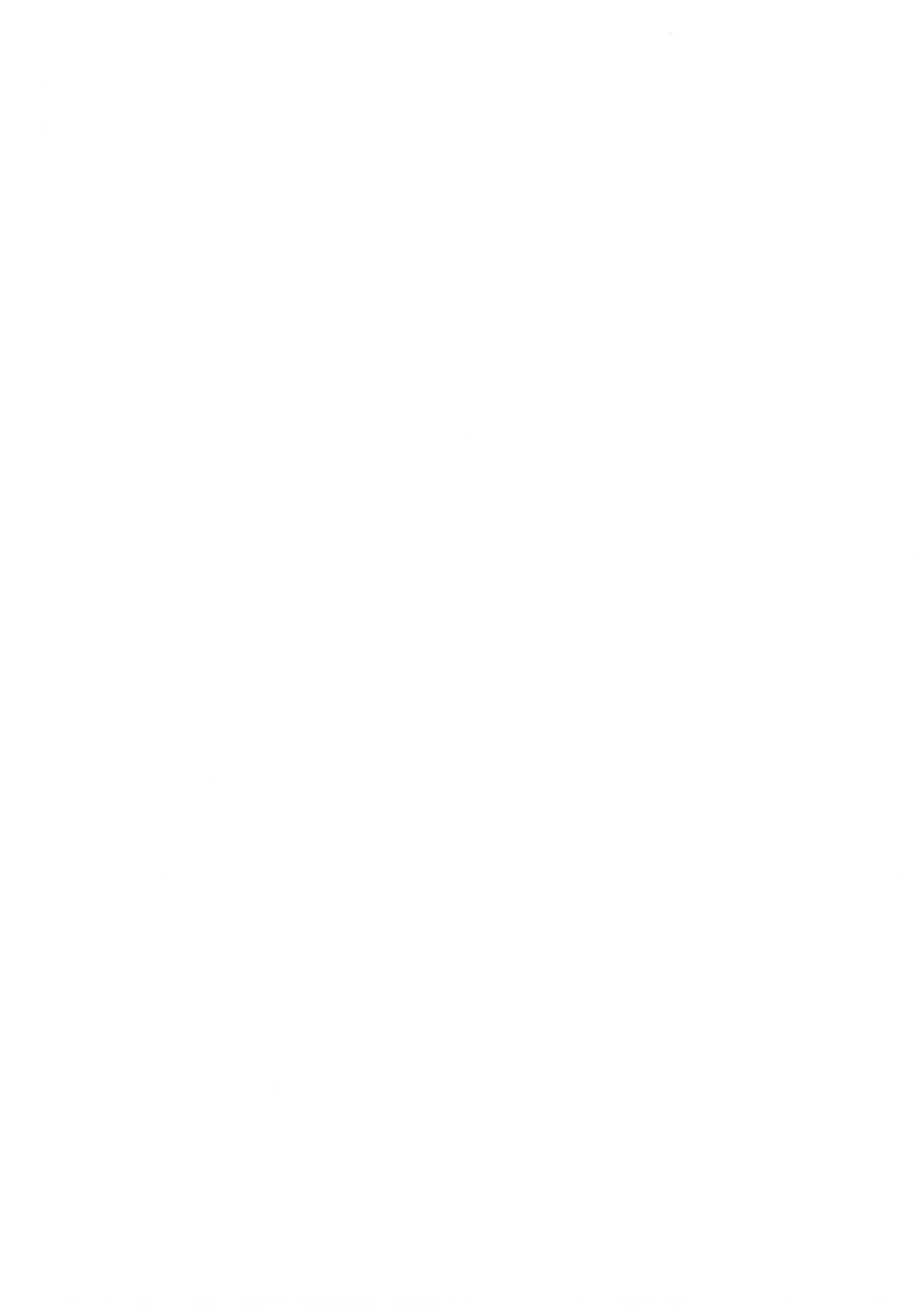
Document 2. Part 2.

WORKMANSHIP PREAMBLES



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**A90 GENERAL TECHNICAL REQUIREMENTS**

##### GENER AL

###### Precedence

General: Where, and to the extent that. documents conflict the following orders of precedence apply:

Schedules of work override preliminaries, which override contract drawings , which override the Reference specification. Work sections of the Reference specification override A90.

Conflict in the documents: Give notice.

###### Definitions and interpretations - general

Employer's Representative: The person nominated in the Contract as Employer's Representative, Architect , Contract Admin istrator or Project Manager.

Reference spec ification : Not all clauses in the Reference specification apply to this project. If in doubt about the applicability of a clause, obtain instructions.

Communication: When required to communicate - including advise, inform, submit, give notice, instruct , agree, confirm,

seek or obtain information, consent or instructions, or make arrangements - do so in writing to the Employer's Representative .

Responses from the Employer's Representative: Do not proceed until response has been received.

###### Definitions and interpretations - products and work

Remove:

Disconnect, dismantle as necessary and take out the designated products or work and associated accessories, fastenings , supports , linings and bedding materials. Dispose of unwanted materials.

Excludes taking out and disposing of associated pipework, wiring, ductwork or other services.

Keep for reuse:

Do not damage designated products or work . Clean off bedding and jo inting materials.

Make good:

Execute local remedial work to designated work. Make secure, sound and neat. Excludes redecoration and/ or replacement.

Repair:

Execute remedial work to designated products. Make secure , sound and neat. Excludes redecoration and/ or replacement.

Refix: Fix removed products.

Replace: Supply and fix new products matching those removed. Execute work to match original new state of that removed.

Ease:Adjust moving parts of designated products or work to achieve free movement and good fit in open and closed positions.

Match existing: Provide products and work of the same appearance and features as the original, excluding ageing and weathering . Make joints between existing and new work as inconspicuous as possible.

###### Documents

Currency: References to published documents are to the editions, including amendments, current on the date of the Invitation to tender.

Services drawings: Diagrammatic, except to the extent that figured dimensions are given or calculable. Dimensions: Do not rely on scaled dimensions.

##### COMPLIANCE

###### Compliance generally

Submittals, samples, inspections and tests: Undertake to suit the Works programme. Do not conceal, or proceed with, affected work until compliance with requirements is confirmed.

Compliance with proprietary specifications: Retain on site evidence that the proprietary product specified has been

supplied.

Compliance with performance specifications: Submit evidence of compliance, including test reports indicating properties tested, pass/ fail criteria, test methods and procedures, test results, identity of testing agency, test dates and times, identities of witnesses, and analysis of results.

###### Design and production documentation

Design compliance: Submit certification that design complies with documented requirements . Documentation:

Draft: Submit complete design and production documentation .

Final: Submit sufficient copies for distribution to affected parties. Keep at least one copy on site.

Space requirements: Check space requirements of products or work indicated diagrammatically in the contract documents . Submit a report on consequent variations needed to the design.

Drawings : Include dimensions .

###### Authorities and statutory undertakers

Approvals: Submit evidence of approvals of relevant authorities and statutory undertakers.

###### Product samples

Complying samples: Retain in good, clean condition on site.

##### PRODUCTS AND EXECUTION

###### General quality

Products generally: New. Proposals for recycled products will be considered.

Supply of each product: From the same source or manufacturer.

Whole quantity of each product required to complete the Works: Consistent kind, size, quality and overall appearance. Product tolerances: Where critical, measure a sufficient quantity to determine compliance.

Execution generally: Fix, apply, install or lay products securely, accurately, plumb, neatly and in alignment.

Colour batching: Do not use different colour batches where they can be seen together. Dimensions: Check on-site dimensions.

Finished work: Not defective, e.g. not damaged, disfigured, dirty, faulty, or out of tolerance.

###### Sizes

General dimensions: Nominal.

Cross section dimensions of timber: Finished dimensions.

###### Substitution

Products: If an alternative product to that specified is proposed, obtain approval before ordering the product. Work: If alternative work lo lhal specified is proposed, obtain approval before execution.

Reasons: Submit reasons for the proposed substitution. Documentation: Submit relevant information, including:

manufacturer and product reference; cost;

availability;

relevant standards: performance; function:

compatibility of accessories;

proposed revisions to drawings and specification; compatibility with adjacent work;

appearance; and

copy of warranty/ guarantee.

Alterations to adjacent work: If needed, advise scope, nature and cost. Manufacturers' guarantees: If substitution is accepted, submit.

###### Incomplete documentation

General: Where and to the extent that products or work are not fully documented, they are to be:

Of a kind and standard appropriate to the nature and character of that part of the Works where they will be used. Suitable for the purposes stated or reasonably to be inferred.

###### Manufacturers' recommendations

General: Comply with manufacturer's current printed recommendations and instructions. Changes to recommendations or instructions since close of tender: Submit details.

Manufacturers' current recommendations and instructions: Keep copies on site.

Ancillary products and accessories: Use those supplied or recommended by main product manufacturer.

Agrement certified products: Comply with limitations, recommendations and requirements of relevant valid certificates.

###### Defects in existing work

Reporting undocumented defects: When discovered, immediately give notice. Do not proceed with affected related work until response has been received.

Documented remedial work: Do not execute work which may: hinder access to defective products or work; or

be rendered abortive by remedial work.

###### Accuracy, appearance and fit

Tolerances and dimensions: If likely to be critical to execution or difficult to achieve, as early as possible either: submit proposals; or

arrange for inspection of appearance of relevant aspects of partially finished work.

General tolerances (maximum): To BS 5606, tables 1 and 2. Structural floor design level tolerances (maximum):

Floors which are to be self-finished, and floors to receive sheet or tile finishes directly bedded in adhesive: ±1O mm. Floors to receive dry board/ panel work with little or no tolerance on thickness: ±1O mm.

Floors to receive fully bonded screeds/ toppings/ beds: ±15 mm. Floors to receive unbonded or floating screeds/ beds: ±20 mm.

###### Services runs

General: Provide adequate space and support for services, including unobstructed routes and fixings.

Services inaccessible after installation: Submit proposals for future location and identification of runs and fittings. Fixing of services: Submit typical details of locations, types and methods of fixing of services to fabric.

###### Spares

General: Supply designated spares in their original packaging.

## 020 EXCAVATING AND FILLING

#### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements .

**PRODUCTS**

###### Herbicide for treating topsoil before stripping

Type: Suitable translocated nonresidual herbicide.

###### Proposed fill materials

Details: Prior to commencing filling, submit full details and test reports of proposed fill materials demonstrating compliance with specification, including:

Imported fill: Type and source.

Material excavated on site: Proposals for processing and reuse.

###### Hazardous, aggressive or unstable fill materials

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.

Do not use material that is: Frozen or containing ice. Organic.

Contaminated or noxious.

Susceptible to spontaneous combustion. Likely to erode or decay and cause voids.

With excessive moisture content, slurry, mud or from marshes or bogs. Clay of liquid limit exceeding 80 and/ or plasticity index exceeding 55.

Defined in Highways Agency (HA) publication 'Manual of contract documents for highway works: Volume 1: Specification for highway works', clause 601 as 'Unacceptable materials'.

###### Frost susceptibility of fill materials

General: Fill must not be frost-susceptible as defined in 'Specification for highway works', clause 801.

Test reports: If the following fill materials are proposed, submit a laboratory report confirming they are not frost­ susceptible:

Fine grained soil with a plasticity index less than 20%.

Coarse grained soil or crushed granite with more than 10% retained on a 0.063 mm sieve. Crushed chalk.

Crushed limestone fill with average saturation moisture content in excess of 3%.

Burnt colliery shale.

Frost-susceptible fill: May only be used within the external walls of buildings below spaces that will be heated. Protect from frost during construction.

###### Compacted fill for landscape areas

Fill: Material capable of compaction by light earthmoving plant.

###### Highways Agency Type 1 granular fill

Fill: To 'Specification for highway works', clause 803: Crushed rock (other than argillaceous rock).

Crushed concrete. Recycled aggregates.

Crushed non-expansive slag.

Well-burnt non-plastic colliery shale.

###### Highways Agency Type 2 granular f ill

Fill: To 'Specification for highway works', clause 804: Crushed rock (other than argillaceous rock).

Crushed concrete.

Crushed non-expansive slag.

* Well-burnt non-plastic colliery shale. Natural gravel.

Natural sand.

**Hardcore fill**

Fill: Granular material, free from excessive dust, well graded, passing a 75 mm BS sieve, 10% (minimum) fines value of 50 kN when tested in a soaked condition to BS 812-111. In each layer only one of the following groups:

Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.

Crushed concrete, crushed brick or tile, free from plaster, timber and metal. Recycled aggregates.

Crushed non-expansive slag.

Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.

* Well-burnt non-plastic colliery shale. Natural gravel.

Natural sand.

**Venting hardcore layer**

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 groups:

Crushed hard rock.

Crushed concrete, crushed brick or tile, free from plaster, timber and metal. Recycled aggregates.

Gravel.

**Sand blinding**

Sand for blinding: To BS EN 12620, grade 0/4 or 0/2 (MP). Alternative fine materials: Submit proposals.

**EXECUTION**

**Site clearance**

Timing: Before topsoil stripping, if any.

General: Clear site of rubbish, debris and vegetation. Do not compact topsoil.

**Removing small trees, shrubs, hedges and roots**

Safety: Comply with HSE/ Arboriculture and Forestry Advisory Group Safety guides.

**Felling large trees**

Safety: Comply with HSE/ Arboriculture and Forestry Advisory Group Safety Guides. Felling: As close to the ground as possible.

Work near retained trees: Take down trees carefully in small sections to avoid damage to adjacent trees that are to be retained, where tree canopies overlap and in confined spaces generally.

**Stripping topsoil**

General: Before commencing general excavation or filling, strip topsoil from areas where there will be regrading, buildings, pavings/ roads and other areas shown on drawings.

Depth of topsoil difficult to determine: Give notice.

Around trees: Do not remove topsoil from below the spread of trees to be retained.

**Handling topsoil**

Aggressive weeds :

Give notice and obtain instructions before moving topsoil containing aggressive weeds included in the Weeds Act, section 2 or the Wildlife and Countryside Act, Schedule 9, part II.

Minimize disturbance , tralficking and compaction. Contamination: Do not mix topsoil with the following:

Subsoil, stone, hardcore, rubbish or material from demolition work. Oil, fuel, cement or other substances harmful to plant growth .

Other grades of topsoil.

Multiple handling: Keep to a minimum. Use topsoil immediately after stripping.

Wet conditions: Handle topsoil in the driest condition possible. Do not handle during or after heavy rainfall or when topsoil is wetter than the plastic limit as defined by BS 3882, Annex N2.

###### Adjacent excavations

Proximity: Where an excavation encroaches below a line drawn at an angle from the nearest formation level of another higher excavation, the lower excavation, all work within it and backfilling thereto must be completed before the higher excavation is made.

Angle of line from horizontal: 45 ° for stable soils, 30 ° for wet clays.

###### Permissible deviations from formation levels

Beneath mass concrete foundations: ±25 mm.

Beneath ground bearing slabs and reinforced concrete foundations : ±15 mm. Embankments and cuttings: ±50 mm.

Ground abutting external walls : ±50 mm, but finished level must be at least 150 mm below dpc.

###### Inspecting formations

Give notice: Make advance arrangements for inspection of formations .

Preparation: Just before inspection remove the last 150 mm of excavation. Trim to required profiles and levels, and remove loose material.

Formations: Seal with concrete within 4 hours of inspection.

###### Foundations

Give notice if:

A natural bearing formation of undisturbed subsoil is not obtained at the depth shown on the drawings ; or The formation contains soft or hard spots or highly variable material.

###### Trench fill foundations

Excavation: Form trench down to formation in one operation . Safety: Prepare formation from ground level.

Inspection of formations: Give notice before excavating.

Shoring: Where inspection of formation is required, provide localised shoring to suit ground conditions .

Concrete fill: Place concrete immediately after inspection and no more than four hours after exposing the formation.

###### Foundations in made up ground

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

###### Unstable ground

Generally: Keep excavation stable at all times.

Give notice: Without delay, ii newly excavated faces are too unstable to allow earthwork support to be inserted. If instability is likely to affect adjacent structures or roadways : Take appropriate emergency action.

###### Recorded features

Recorded foundations, beds, drains, manholes, etc : Break out and seal drain ends. Contaminated earth: Remove and disinfect as required by local authority.

###### Unrecorded features

Give notice: If unrecorded foundations, beds, voids, basements, filling, tanks, pipes, cables, drains, manholes, watercourses, ditches, etc. are encountered.

###### Existing watercourses

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

###### Topsoil & subsoil

Retained excavated material:

Stockpile in separate temporary storage heaps. Spread and level surplus subsoil on site.

Protected areas : Do not raise soil level within root spread of trees that are to be retained.

Remaining material: Remove from site.

###### Water

Generally: Keep excavations free from water until: Formations are covered:

Below ground constructions are completed: and

Basement structures and retaining walls are able to resist leakage, water pressure and flotation.

Drainage: Form surfaces of excavations and fill to provide adequate falls.

Removal of water: Provide temporary drains, sumps and pumping as necessary . Do not pollute watercourses .

**Ground water level/ Running water**

Give notice:

If excavations are below water table.

If springs or running water are encountered .

**Pumping**

General: Do not disturb excavated faces or stability of adjacent ground or structures . Pumped water: Discharge without flooding the site or adjoining property.

Sumps: Construct clear of excavations. Fill on completion.

**Placing fill**

Excavations and areas to be filled: Free from loose soil, rubbish and standing water.

Freezing conditions: Do nol place fill on frozen surfaces. Remove material affected by frost. Replace and recompact if not damaged after thawing.

Adjacent structures, membranes and buried services: Do not overload, destabilize or damage.

Submit proposals for temporary support necessary to ensure stability during filling.

Allow 14 days (minimum) before backfilling against in situ concrete structures.

Layers: Place so that only one type of material occurs in each layer. Earthmoving equipment: Vary route to avoid rutting.

**Compaction**

General: Compact fill as soon as possible after placing.

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.

Defective areas: Remove and recompact to full thickness of layer using new material.

**Geotextile sheeting**

Preparation: Before laying, remove humps and sharp projections. Fill hollows. Protect from:

Exposure to light, except for five hours (maximum) during laying. Contaminants.

Materials listed as potentially deleterious by geotextile manufacturer . Damage until fully covered by fill.

Wind uplift, by laying 15 m (maximum) before covering with fill.

**Compacted filling for landscape areas**

Layer thickness: 200 mm (maximum).

Laying: Lightly compact each layer to produce a stable soil structure.

**Highways Agency granular filling**

Filling: To 'Specification for highway works', clauses 801-804 .

**Compacted general filling**

Excavated material: Select suitable material and keep separate.

Filling: Spread and level material in layers. As soon as possible thoroughly compact each layer. Proposals: Well in advance of starting work submit details of proposed:

Materials to be used, including quantities of each type. Type of plant.

Maximum depth of each compacted layer. Minimum number of passes per layer.

**Backfilling around foundations**

Under oversite concrete and pavings: Spread and level in 150 mm (maximum) layers. Thoroughly compact each layer. Under grassed or soil areas: Lay and compact in 300 mm (maximum) layers.

**Hardcore filling**

Filling: Spread and level in 150 mm (maximum) layers. Compact each layer thoroughly.

**Venting hardcore layer**

Filling: Spread and level in 150 mm (maximum) layers. Thoroughly compact each layer whilst maintaining enough voids to allow efficient venting.

**Blinding**

Surfaces (other than venting hardcore layer) lo receive sheet overlays or concrete, blind with:

Sand or line gravel applied lo fill interstices. Moisten as necessary before final rolling to provide a flat, closed, smooth surface.

Permissible deviations on surface level: +O -25 mm.

## E10 IN SITU CONCRETE

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

##### PRODUCTS

###### Concrete

Standard: To BS EN 206-1. Complimentary British Standard:

Method of specifying and guidance: To BS 8500-1. Specification : To BS 8500-2.

###### Aggregates

Aggregates for concrete: To BS EN 12620. Aggregates for exposed visual concrete:

Limitations on contaminants: Free from absorbent particles which may cause "popouts', and other particles such as coal and iron sulfide which may be unsightly or cause unacceptable staining.

Colour: Consistent.

Supply: From a single source and maintained throughout the contract. Samples: Submit on request.

Lightweight aggregates for concrete: To BS EN 13055-1.

###### Underlay

Building paper: To BS 1521, Class B1F. Polyethylene sheet: Minimum 250 µm.

##### EXECUTION

###### Ready mixed concrete

Production plant: Currently certified by a body accredited by UKAS to BS EN 45011 for product conformity certification of ready-mixed concrete.

Source: Obtain from one source if possible, otherwise submit proposals. Delivery notes: Retain for inspection.

Declarations of nonconformity from concrete producer: Notify immediately. Substitution of standardized prescribed concrete for designated concrete:

Generally: Conform to BS 8500-2, clause 8.

Substitution: In accordance with BS 8500-1, table A.7. Submit proposals for each substitution, stating reasons.

###### Site mixed concrete

Application: Use where neither strength nor appearance is critical. Water: Use mains water. Protect from contamination.

Batching by mass: Allow for water content of aggregates.

Site made standardized prescribed concrete mixes: Conform to BS 8000-2.1, sub sections 2, 3 and 4. Admixtures:

Calcium chloride and admixtures containing calcium chloride: Not permitted.

###### Construction (daywork) joints

Locations: Where not shown on drawings, submit proposals.

Preparation: While concrete is still green, remove surface laitance and expose aggregate finish.

Condition of surface immediately before placing fresh concrete: Clean and damp.

###### Premature water loss

Requirement: Prevent water loss from concrete laid on absorbent substrates. Lay underlay. Lap edges 150 mm.

###### Placing

Cleanliness of surfaces immediately before placing concrete: Clean with no debris, tying wire clippings, fastenings or free waler.

Pours: Maintain records for lime, date and location.

Timing: Place as soon as practicable after mixing and while sufficiently plastic for full compaction. Temperature limitations for concrete: 5-30"C.

Continuity of pours: Place in final position in one continuous operation up to construction joints. Placing of concrete must not:

cause uneven dispersal, segregation or loss of ingredients; adversely affect the formwork or formed finishes;

be carried out against frozen or frost covered surfaces; or form cold joints.

Thickness: To suit method of compaction and achieve efficient amalgamation during compaction.

###### Compacting

General: Fully compact concrete to full depth. Continue until air bubbles cease to appear on the top surface. Consecutive batches of concrete: Amalgamate without damaging adjacent partly hardened concrete.

Methods of compaction: To suit consistence class and use of concrete.

###### Surface regularity

Sudden irregularities: Not permitted.

Measurement: Use slip gauges to BS 8204-1 or -2.

###### Curing

Requirement: Keep surface layers of concrete moist throughout curing period, including perimeters and abutments, by either restricting evaporation or continuously wetting surfaces of concrete.

Surfaces covered by formwork: Retain formwork in position and, where necessary to satisfy curing period, cover surfaces immediately after striking.

Top surfaces: Cover immediately after placing and compacting.

Removal of covering for finishing operations: Replace immediately thereafter.

Surface temperature: Maintain above 5"C for four days.

Records: Maintain details of location and timing of casting of individual batches, removal of formwork and removal of coverings. Keep on site, available for inspection.

Coverings for curing: Suitable impervious sheet materials.

Curing compounds: Do not use without consenl.

Interim covering to top surfaces of concrete: Until surfaces are in a suitable state to receive coverings in direct contact, cover with waterproof sheeting held clear of the surface and seal against draughts.

Curing periods (minimum):

Surfaces which will be exposed in the finished work, and wearing surfaces of floors and pavements: 10 days. Other structural concrete surfaces: 5 days.

###### Protection

Prevent damage to concrete, including:

Surfaces generally: From rain, indentation and other physical damage.

Surfaces to exposed visual concrete: From dirt, staining, rust marks and other disfiguration. Immature concrete: From thermal shock, physical shock, overloading, movement and vibration. In cold weather: From entrapment and freezing expansion of water in pockets, etc.

## F10 BRICK AND BLOCK WALLING

#### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements. Mortars: Read with Z21.

**PRODUCTS**

###### New masonry units

Aggregate concrete bricks and blocks: To BS EN 771-3. Autoclaved aerated concrete (AAC) blocks: To BS EN 771-4. Calcium silicate bricks: To BS EN 771-2.

Clay blocks: To BS EN 771-1.

Type: LD.

Clay bricks: To BS EN 771-1. Gypsum blocks: To BS EN 12859.

Manufactured stone blocks: To BS EN 771-5.

Standard special shape bricks: To BS 4729.

###### Second hand masonry units

Reclaimed facing bricks: Sound, free from mortar and deleterious matter.

##### EXECUTION

###### Workmanship generally

Standard: To BS 5628-3.

###### Conditioning clay and calcium silicate bricks

Bricks delivered warm from manufacturing process: Do not use until cold. Absorbent bricks in warm weather: Wet to reduce suction. Do not soak.

###### Conditioning concrete bricks/ blocks

Autoclaved concrete bricks/ blocks delivered warm from manufacturing process: Do not use. Age of nonautoclaved concrete bricks/ blocks: Do not use until at least four weeks old.

Avoidance of suction in concrete bricks/ blocks: Do not wet. Use of water retaining mortar admixture: Submit details.

###### Laying generally

Mortar joints generally: Fill vertical joints. Lay bricks, solid and cellular blocks on a full bed.

Autoclaved aerated concrete (AAC) blocks laid with thin mortar adhesive joints: Fill vertical joints. Lay blocks on a full bed. Clay blocks with interlocking vertical joints: Dry vertical joints . Lay blocks on a full bed of thin layer mortar.

Bond where not specified: Half lap stretcher.

Vertical joints in facework: Even widths. Plumb at every fifth cross joint along course.

###### Height of lifts

General: Rack back when raising quoins and other *advance* work . Walling using cement gauged or hydraulic lime mortar:

Lift height: 1.2 m (maximum) above any other part of work at any time.

Daily lift height: 1.5 m (maximum) for any one leaf.

Walling using thin joint mortar glue:

Lift height: 1.3 m (maximum) above any other part of work at any time.

###### Levelling of separate leaves using cement gauged or hydraulic lime mortar

Locations for equal levelling of cavity wall leaves: As follows :

Every course containing vertical twist type ties or other rigid ties. Every third tie course for double triangle/ butterfly ties.

Courses in which lintels are to be bedded.

###### Coursing brickwork

Gauge for new work with bricks of 65 mm work height: Four brick courses including bed joints to 300 mm. Tying in to existing brickwork : Line up with existing brick courses.

###### Laying frogged bricks

Single frogged bricks: Frog uppermost.

Double frogged bricks: Larger frog uppermost. Frog cavity: Fill with mortar.

###### Laying gypsum blocks with tongues and grooves

Orientation: Tongued length uppermost.

###### Support of existing work

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

###### Block bonding new walls to existing

Pocket requirements: Formed as follows :

* Width: Full thickness of new wall. Depth: 100 mm (minimum).

Vertical spacing of pockets :

Brick to brick: 4 courses high at 8 course centres. Block to block: Every other course.

Pocket joints: Fully filled with mortar.

###### Jointing

Profile: Consistent in appearance.

Accessible joints not exposed to view: Struck flush as work proceeds.

###### Pointing

Joint preparation: Remove debris. Dampen surface.

###### Fire stopping

Avoidance of fire and smoke penetration: Tight fit between cavity barriers and masonry. Leave no gaps.

###### Adverse weather

General: Do not use lrozen materials or lay on frozen surfaces. Air temperature requirements: Do not lay bricks/ blocks:

In cement gauged mortars when at or below 3 "C and falling or unless it is at least 1"C and rising. In hydraulic lime:sand mortars when at or below 5"C and falling or below 3"C and rising.

In thin joinU layer mortar glue when outside the limits set by the mortar manufacturer.

Temperature of walling during curing: Above freezing until hardened. Newly erected walling: Protect at all times from:

Rain and snow.

Drying out too rapidly in hot conditions and in drying winds.

###### Facework

Colour consistency of masonry units:

Methods to ensure that delivered units are consistent and of an even colour range within deliveries: Submit proposals.

Conformity: Check each delivery for consistency of appearance with previous deliveries and with approved reference panels; do not use if variation is excessive.

Finished work: Free from patches, horizontal stripes and racking back marks.

Appearance:

Brick/ block selection: Do not use units with damaged faces or arrises.

Cut masonry units: Where cut faces or edges are exposed cut with table masonry saw. Quality control: Lay masonry units to match relevant reference panels.

Selling out: To produce satisfactory junctions and joints with built-in elements and components. Coursing: Evenly spaced using gauge rods.

Lifts: Complete in one operation.

Methods of protecting facework: Submit proposals .

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

Putlog scaffolding: Not permitted in facework.

Toothed bond: New and existing facework in the same plane: Bond together at every course to achieve continuity of bond and coursing.

Cleanliness:

Facework: Keep clean.

Mortar on facework: Allow to dry before removing. Removal of marks and stains: Rubbing not permitted.

## F30 ACCESSORIES AND SUNDR Y ITEMS FOR BRICK BLOCK AND STONE WALLING

#### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

**PRODUCTS**

###### Air bricks in external walling

Standard: To BS 493, Class 1.

###### Cavity insulation

Glass or rock wool balls: To BS EN 13162 or Agrement certified.

Expanded polystyrene (EPS) boards: To BS EN 13163 or Agrement certified. Extruded polystyrene (XPS) boards: To BS EN 13164 or Agrement certified. Polyisocyanurate (PIR) foam boards: To BS EN 13165 or Agrement certified. Polyurethane (PUR) foam boards: To BS EN 13165 or Agrement certified.

Phenolic foam boards: To BS EN 13166 or Agrement certified.

###### Concrete fill to base of cavity wall

Standard: To BS EN 206-1 and BS 8500-2 .

###### Coping units

Precast concrete, clayware, slate and natural stone: To BS 5642-2.

###### Fireplace components

Standard: To BS 1251.

###### Flexible damp proof courses and cavity trays

Bitumen based: To BS 6398. Polyethylene: To BS 6515.

Pitch polymer, bitumen polymer, polypropylene, and ethylene polypropylene based: Agrement certified.

###### Flue blocks

Clay/ Ceramic: To BS EN 1806.

###### Flue linings

Clay/ Ceramic: To BS EN 1457. Concrete: To BS EN 1857.

###### Gratings/ Ventilators in internal walling

Standard: To BS 493, Class 2.

###### Lintels

Precast concrete , precast clay block and prefabricated steel: To BS EN 845-2.

###### Meshwork joint reinforcement

Standard: To BS EN 845-3.

###### Plain clay tiles

Standard: To BS EN 1304.

###### Sills

Precast concrete, clayware, slate and natural stone: To BS 5642-1.

###### Wall ties

Cavity ties: To BS 1243, DD 140-2 or BS EN 845-1. Slip ties and slot ties: To BS EN 845-1.

##### EXECUTION

###### Air bricks in external walling and gratings/ ventilators in internal walling

Placemen\: Built in with no gaps at joints.

###### Cavities in masonry walling

Concrete fill to base of cavity wall:

Extent: Maintain 75 mm between top of fill and external ground level and 225 mm (minimum) between top of fill and ground level dpc.

Placement: Compact to eliminate voids.

Cleanliness: Cavity base and faces, ties, insulation and exposed dpcs free from mortar and debris.

###### Cavity trays

Formed in-situ:

• Joint treatment: Use unjointed wherever possible, otherwise lap 100 mm (minimum) and seal to produce a free draining and watertight installation.

Horizontal cavity trays: Support using cavity closer. Sloping cavity trays: Prevent sagging.

Cleanliness: Free from debris and mortar droppings.

Preformed:

Placement: To provide a free draining and watertight installation. Joint treatment: As manufacturer's recommendations.

Over openings and other cavity bridgings:

Length: To extend 150 mm (minimum) beyond ends of lintels/ bridgings.

###### Cavity trays - gas resistant

Formed in-situ:

Joint treatment: Use unjointed wherever possible, otherwise lap 150 mm (minimum) and seal to form a gas and watertight installation.

Joint with damp proof membrane: Overlap dpc/ cavity tray 150 mm (minimum).

**Cavity wall insulation Full** fill type:

Placement : Continuous and free of mortar and debris .

Partial fill type:

Placement: Secure against face of inner leaf. Residual cavity: Clear and unobstructed.

Joints between boards, at closures and penetrations: No gaps and free from mortar and debris.

###### Opes - horizontal

Placement: In continuous lengths on full even bed of fresh mortar, with 100 mm laps at joints and full laps at angles.

Width: At least full width of leaf unless otherwise specified. Edges of dpc not covered with mortar or projecting into cavity . Overlying construction: Immediately cover with full even bed of mortar lo receive next masonry course.

Overall finished joint thickness: As close to normal as practicable.

Ground level dpcs:

* Joint with damp proof membrane: Continuous and effectively sealed. Stepped dpcs in external walls:

External walls on sloping ground: Install dpcs 150 mm (minimum) above adjoining finished ground level.

Sill dpcs: In one piece and turned up at back when sill is in contact with inner leaf. Coping/ Capping dpcs:

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

###### Opes - vertical

Form: In one piece wherever possible.

Joints: Upper part overlapping lower 100 mm (minimum). Jamb dpcs at openings:

Joint with cavity tray/ lintel at head: Full underlap. Joint with sill/ horizontal dpc at base: Full overlap. Projection into cavity: 25 mm (minimum).

Relationship with frame: In full contact.

Jamb dpcs to built in timber frames:

Fixing: Securely fastened to back of frame. Fasteners: Galvanized clout nails or staples.

###### Flues - block system

Block placement: Finish joints flush to ensure a smooth, unrestricted flueway.

Starter, offset and transfer blocks: Use. Coursing: As adjacent masonry.

Non-bonded blocks: Support.

Joints between blocks: Seal.

Testing flue system:

Core ball test and smoke test to BS EN 15287-1: On completion, carry out each test. If obstructions or leaks are revealed, submit proposals for making good.

###### Flues - clay/ ceramic lining system

Linings placement: Fully bed with socket or rebate uppermost using correct starters, adaptors, bends etc.

Joints: Flush to provide an unrestricted flueway with smooth interior surfaces.

Testing flue system:

Core ball test and smoke test to BS EN 15287-1: On completion, carry out each test. If obstructions or leaks are revealed, submit proposals for making good.

###### Frames

Built in frames: Remove horns and provide support.

Fixing cramps: Fully bed in mortar.

Frames in prepared openings:

Formation of opening: Use accurate, rigid templates to required size.

###### Lintels

Placement: Bed on mortar used for adjacent work.

Bearing: 100 mm (minimum).

Precast concrete and precast clay block lintels: Use slate packing pieces.

###### Meshwork joint reinforcement

Placement: Lay on an even bed of mortar in a continuous strip. Laps:

* Joints: 225 mm (minimum). Angles: Full.

Keep edges back from face of work: External: 20 mm.

Internal: 12 mm.

Joint finish: Normal thickness.

###### Movement joints with sealant

Joint preparation and sealant application: As section Z22. Filler:

Thickness: To match design width of joint.

Placement: Build in as work proceeds with no projections into cavities and to correct depth to receive sealant system.

###### Movement joints without sealant

Filler to standard joints:

Thickness: To match design width of joint.

Placement: Build in as work proceeds filling the joint but without projecting into cavities.

Filler to fire resistant joints :

Placement: Compress and insert into place in open joint.

Adhesives and accessories: Types recommended by filler manufacturer.

###### Pinning up to soffits

Top joint ol loadbearing walls: Fill and consolidate with mortar.

###### Pointing in flashings

Joint preparation: Free of debris and lightly wetted. Pointing mortar: As for adjacent walling.

Placement: Fill joint and finish flush .

###### Precast concrete, clayware, slate and natural stone coping units

Joints: Full and finished flush.

Placement: Lay on a full bed of mortar to line and level.

###### Precast concrete, clayware, slate and natural stone sills

Joints: Flush.

Bedding one piece sills: Leave bed joints open except under end bearings and masonry mullions. Pointing on completion: To match adjacent work.

###### Preformed dpc/ cavity tray junction cloaks/ stop ends

Placement: To provide a free draining and watertight installation.

###### Site formed dpc/ cavity tray junctions/ stop ends

* + Three dimensional changes in shape: Form to provide a free draining and watertight installation. Seal laps. Alternative use of preformed junction cloaks/ stop ends: Submit proposals.

###### Ties in masonry cavity walls

Embedment in mortar beds: 50 mm (minimum).

Placement: Sloping slightly downwards towards outer leaf, without bending.

Drip: Centred in the cavity and pointing downwards.

Provision of additional ties in cavity walls with full fill cavity insulation: One row to support lowest row of insulation baits. Additional ties at openings and movement joints: 300 mm (maximum) centres vertically within 225 mm of vertical movement joints and reveals of unbonded openings.

###### Ties in masonry cladding to timber frames

Embedment in mortar beds: 50 mm (minimum).

Placement: Slope downwards away from timber frame, without bending.

Additional ties at openings and movement joints: 300 mm (maximum) centres vertically within 225 mm of vertical movement joints and reveals of unbonded openings.

###### Tile creasing

Placement: Two courses, broken jointed. Mortar: As adjacent work ,full bed.

Joints: Full and finished flush.

###### Tile sills

Placement: Two courses, broken jointed, true to line and level on full bed of mortar. Joints: Full and finished flush.

###### Tops of restrained nonloadbearing walls

Restraints: Secure to soffit. Filler placement: Full, no gaps.

###### Ventilation ducts in external walling

Placement: Across cavity, sloping away from inner leaf.

Cavity seal: Full mortar joints.

Protection from water penetration to inner leaf: Where barrier is not integrallo duct, form stepped dpc cavity tray with stop ends above duct , extending 150 mm on each side.

###### Wall plates

Placement: On full bed of mortar lo correct horizontal level.

###### Weep holes

Locations: Through outer leaf immediately above base of cavity, at cavity trays, stepped dpcs and external openings.

Position: 75 mm above lop of cavity fill at base of cavity.

Provision: 1000 mm (maximum) centres and not less than two over each opening.

**G20 CARPENTR Y AND TIMBER FRAMING**

#### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements .

**PRODUCTS**

###### Timber procurement

Timber (including timber for wood based products): Obtained from well managed forests/ plantations in accordance with: The laws governing forest management in the producer country or countries.

International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).

Documentation: Provide either:

Documentary evidence (which has been or can be independently verified) regarding the provenance of all timber supplied, or

Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood based products.

###### Strength grading

Grader: A company currently registered under a third party quality assurance scheme operated by a certification body approved by the UK Timber Grading Committee.

###### Grading and marking of softwood

Timber of target/ finished thickness less than 100 mm and not specified for wet exposure: Graded at an average moisture content not exceeding 20% and no reading greater than 24% and clearly marked as 'DRY' or 'KD' (kiln dried).

Timber graded undried (green) and specified for installation at higher moisture contents: Clearly marked as 'WET' or

'GRN'.

Structural timber members cut from large graded sections: Regraded to approval and marked accordingly.

###### Timber products

Structural softwood (graded direct to strength class):

Grading standard: To BS 4978, BS EN 14081-1, or other national equivalent and so marked. Strength class: To BS EN 338.

Structural softwood (strength class not specified):

Grading standard: To the appropriate standard or rules for the specified grade and so marked.

Structural hardwood (strength class not specified): Grading standard: To BS 5756 and so marked.

Ungraded softwood:

Quality of timber: Free from decay, insect attack (except pinhole borers) and with no knots wider than half the width of the seclion.

Wood trim for fascias, bargeboards and the like: Standard: To BS 1186-3.

Nonstructural plywood:

Standard: To an approved national standard. Surface appearance: To BS EN 635.

Bonding quality: To BS EN 314-2.

Trussed rafters:

Design and fabrication: To BS 5268-3 and BS EN 14250.

Manufacturer: A firm currently registered under a third party quality assurance scheme.

###### Structural softwood and hardwood cross section dimensions

Target sizes: To BS EN 336.

Maximum permitted deviations from target sizes: Tolerances to BS EN 336, clause 4.3.

Sawn surfaces: Tolerance class 1 (T1).

Further processed surfaces: Tolerance class 2 (T2).

###### Nonstructural softwood cross section dimensions

Cross section dimensions specified are finished sizes.

Maximum permitted deviations from finished sizes: To BS EN 1313-1 and National Annex.

Sawn surfaces: Clause 6.

Further processed surfaces: Clause NA2.

###### Nonstructural hardwood cross section dimensions

Cross section dimensions specified are finished sizes.

Maximum permitted deviations from finished sizes : To BS EN 1313-2 and National Annex .

Sawn surfaces : Clause 6.

Further processed surfaces: Clause NA3.

###### Warping of timber

Bow, spring, twist and cup: Not greater than the limits set down in BS 4978 or BS EN 14081-1 for softwood, and BS 5756 or BS EN 14081-1 for hardwood.

###### Preservative treatment

Standard: To Wood Protection Association (WPA) Commodity Specifications. Soflwood soffits, fascias and bargeboards: Commodity Specification CS. Constructional timbers : Commodity Specification C8.

Timber frame housing (only applicable to structural framing to external walls): Commodity Specification C9.

###### Pre-finishing

Structural timber to be painted: Prime before delivery to site.

Structural timber to be clear finished : Keep clean and apply first coat of finish before delivery to site.

###### Joist hangers

Size: To suit joist, design load and crushing strength of supporting construction.

##### EXECUTION

###### Selection and use of timber

Timber members damaged, crushed or split beyond the limits permitted by their grading: Do not use.

Notches and holes: Position in relation to knots or other defects such that the strength of members will not be reduced. Scarf joints, finger joints and splice plates: Do not use without approval.

###### Processing treated timber

Cutting and machining: Carry out as much as possible before treatment.

Extensively processed timber: Re-treat timber sawn lengthways, thicknessed, planed, ploughed, etc.

Surfaces exposed by minor cutting and drilling: Treat with two flood coats of a solution recommended by main treatment solution manufacturer .

###### Moisture content

Moisture content of wood and wood based products at time of installation: Maximum: Covered and generally unheated spaces: 24%.

Covered and generally heated spaces: 20%. Internal in continuously heated spaces: 20%.

###### Protection

Generally: Keep timber dry and do not overstress, distort or disfigure sections or components during transit, storage, lifting, erection or fixing.

Timber and components: Store under cover, clear of the ground and with good ventilation. Support on regularly spaced, level bearers on a dry, firm base. Open pile to ensure free movement of air through the stack .

Trussed rafters: Keep vertical during handling and storage.

###### Exposed end grain

Components: Seal exposed end grain of timber components before delivery to site.

###### Exposed timber

Planed structural timber exposed to view in completed work: Prevent damage to and marking of surfaces and arrises.

###### Jointing and fixing

Generally: Where not specified precisely, select methods of jointing and fixing and types, sizes and spacings of fasteners in compliance with section Z20.

Framing anchors:

Fasteners: Galvanized or sherardized square twist nails. Size, not less than size recommended by anchor manufacturer.

Fixing: Secure using not less than number/ type of fasteners recommended by anchor manufacturer.

BolV Screw assemblies:

Nuts and washers: Material grade and finish to suit bolts.

Washer dimensions: Diameter/ side length in contact with timber surfaces to be minimum 3 times bolt diameter, with a thickness not less than 0.25 times bolt diameter.

Bolled joints:

Bolt spacings (minimum): To BS 5268-2, table 81.

Holes for bolts: Located accurately and drilled to diameters as close as practical to the nominal bolt diameter and not more than 2 mm larger.

Washers: Placed under bolt heads and nuts that would otherwise bear directly on timber. Use spring washers in locations which will be hidden or inaccessible in the completed building.

Bolt tightening: So that washers just bite the surface of the timber. Ensure that at least one complete thread protrudes from the nut. Check at agreed regular intervals up to Completion. Tighten as necessary.

Anticorrosion finishes for fasteners:

Galvanizing: To BS 7371-6. with internal threads tapped and lightly oiled following treatment. Sherardizing: To BS 7371-8, Class 1.

Zinc plating: To BS EN ISO 4042 and passivated.

###### Temporary bracing

Provision: As necessary to maintain structural timber components in position and to ensure complete stability during construction.

###### Additional supports

Provision: Position and fix additional studs, noggings and/ or battens to support edges of sheet materials and wall/ floor/ ceiling mounted appliances, fixtures, etc. shown on drawings.

Material properties: Additional studs, noggings and battens to be of adequate size and have the same treatment as

adjacent timber supports.

###### Wall plates

Position and alignment: To give correct span and level for trusses, joists, etc. Bedding: Fully in fresh mortar.

Joints: At corners and elsewhere where joints are unavoidable use nailed half lap joints. Do not use short lengths of timber.

###### Installing joists

Generally:

Centres: Equal, not exceeding designed spacing. Bowed joists: Install with positive camber.

End joists: Positioned approximately 50 mm from masonry walls.

Joists on hangers:

Hangers: Bedded directly on and hard against supporting construction. Do not use packs or bed on mortar.

Joists: Cut to leave not more than 6 mm gap between ends of joists and back of hanger. Rebated to lie flush with underside of hangers.

Fixing to hangers: A nail in every hole.

###### Trimming openings

Trimmers and trimming joists: When not specified otherwise, not less than 25 mm wider than general joists.

###### Trussed ratter installation

Erection: To BS 5268-3, clause 9.3 and Trussed Rafter Association (TRA) site installation guide. Trusses generally: Do not modify without approval.

Damaged trusses: Do not use.

Fixing: Truss clips and bottom chords of standard trusses and rafters of raised tie trusses bearing fully on wall plates.

Bottom chords of standard trusses: Do not fix to internal walls until roofing is complete and cisterns are installed and filled.

Permanent bracing:

Method of fixing: To every rafter, strut or tie with not less than two fasteners. Lap joints: Extended over and nailed to at least two truss members.

###### Lateral restraint straps

Fixing to top of joists/ rafters/ ties: Ensure that cranked end is in tight contact with cavity face of wall inner leaf and is not pointing upwards.

Straps spanning joists/ rafters/ ties running parallel to wall: Fix noggings and packs tightly beneath straps.

Size of noggings and packs: Minimum three quarters of joist/ rafter/ tie depth and 38 mm (minimum) thick. Notching: Notch joists so that straps fit flush with surface. Do not notch rafters/ ties.

###### Strutting to floor joists

Fixing: Strutting must not project beyond top and bottom edges of joists. Outer joists: Blocked solidly to perimeter walls.

### H21 TIMBER WEATHERBOARDING

**GENER AL**

###### Cross-reference

General: Read with A90 General technical requirements.

Wood treatment: Read with Z12 Preservative and fire retardant treatment.

# PRODUCTS

###### Timber weatherboarding

Species and classification: To BS 1186-3. Quality: To BS 1186-3 and BS EN 942.

Treatment:

Preservative impregnation: To Wood Protection Association Commodity Specification C6. Fire retardant impregnation: To Wood Protection Association Commodity Specification FR5.

Moisture content at time of fixing: 13-19%.

###### Battens and counterbattens

Timber: Preservative treated regularized softwood free from decay, insect attack (except ambrosia beetle damage) and with no knots wider than half the section width .

Moisture content at time of fixing and covering (maximum): 20%.

Preservative treatment: To Wood Protection Association Commodity Specification CS.

###### Nails

Material: Stainless steel, nonferrous, or coated ferrous compatible with the selected timber, preservative system and local atmospheric conditions.

Standard:

Aluminium: To BS 1202-3. Copper: To BS 1202-2.

Steel annular ringed shank flat head: To BS 1202-1. Steel wire nails: To BS EN 10230-1.

###### Wood screws

Standard: To BS 1210 (obsolescent but remains current).

# EXECUTION

###### Battens and counterbattens

Setting out:

To masonry: In straight vertical lines.

To framing/ sheathing: In straight vertical lines at centres coincident with vertical framing members. Battens to counterbattens: In straight horizontal lines. Align on adjacent areas.

Length (minimum): 1200 mm.

Fixing: Fastener heads to finish flush with or slightly below batten face.

To sheathing: Fix through sheathing into framing.

Battens to counterbattens: Fix each batten to each counterbatten. Use splay fixing at joints. Joints to be square cut, butted centrally on counterbattens and not occurring more than once in any group of four battens on any one counterbatten.

###### Treated timber

Surfaces exposed by minor cutting and drilling: Treat with two flood coats of a solution recommended for the purpose by main treatment solution manufacturer.

###### Finishing

First coat of finishing system: Before fixing boards, apply to all surfaces. Apply liberally to end grain.

###### Fixing boarding

General: Fix boards securely to give !lat, true surfaces free from undulations, lipping, splits, hammer marks and protruding fastenings.

Movement: Allow for thermal movement of boards and fastenings. Prevent cupping, springing, excessive opening of joints or other defects.

Heading joints: Position centrally over supports and at least two board widths apart on any one support. Lost nail heads: Punch below surfaces that will be visible in the completed work.

**H22 PLASTICS WEATHERBOARDING**

**GENER AL**

**Cross-reference**

General: Read with A90 General technical requirements.

Wood treatment: Read with Z12 Preservative and fire retardant treatment.

**PRODUCTS**

**Battens and counterbattens**

Timber: Preservative treated regularized softwood free from decay, insect attack (except ambrosia beetle damage) and with no knots wider than half the section width.

Moisture content at time of fixing and covering (maximum): 20%.

Preservative treatment: To Wood Protection Association Commodity Specification CB.

**Nails**

Material: Stainless steel, nonferrous, or coated ferrous compatible with the selected timber, preservative system and local atmospheric conditions.

Standard:

Aluminium: To BS 1202-3. Copper: To BS 1202-2.

Steel annular ringed shank flat head: To BS 1202-1. Steel wire nails: To BS EN 10230-1.

**EXECUTION**

**Battens and counterbattens**

Setting out:

To masonry: In straight vertical lines.

To framing/ sheathing: In straight vertical lines at centres coincident with vertical framing members. Battens to counterbattens: In straight lines. Align on adjacent areas.

Length (minimum): 1200 mm.

Fixing: Fastener heads to finish flush with or slightly below batten face.

To sheathing: Fix through sheathing into framing.

Battens to counterbattens: Fix each batten to each counterbatten. Use splay fixing at joints. Joints to be square cut, butted centrally on counterbattens and not occurring more than once in any group of four battens on any one counterbatten.

**Treated timber**

Surfaces exposed by minor cutting and drilling: Treat with two flood coats of a solution recommended for the purpose by main treatment solution manufacturer.

**Fixing boarding**

Environmental conditions: Do not fix cladding when ambient temperature is at or below O"C, or above 30"C. General: Fix boards securely to give flat, true surfaces free from undulations, splits, hammer marks and protruding fasteners.

Movement: Allow for thermal movement of boards and fixings. Prevent springing, excessive opening of joints or other defects.

Heading joints: Position centrally over supports and at least two board widths apart on any one support.

**J40 FLEXIBLE SHEET WATERPROOFING AND DAMP PROOFING**

**GENER AL**

**Cross-reference**

General: Read with A90 General technical requirements.

**PRODUCTS**

**Concrete**

Standard: To BS 8500-2.

###### Bitumen damp proof sheets

Standard: To BS 743.

###### Polyester based bitumen damp proof membranes

Standard: To BS 8747.

###### Polyethylene membranes

Standard: To Packaging and Industrial Films Association (PIFA) Standard 6/83A, or Agrement certified.

###### Oxidized bitumen bonding compound

Standard: To BS 3690-2.

**EXECUTION**

###### General

Execution: In accordance with relevant parts of BS 8102 and CP 102. Condition of substrate:

Clean and even textured free from voids and sharp protrusions.

Moisture content: Compatible with damp proofing/ tanking .

Air and surface temperature: Do not apply sheets if below minimum recommended by membrane manufacturer. Condition of membrane at completion:

Neat, smooth and fully supported, dressed well into abutments and around intrusions. Completely impervious and continuous.

Undamaged. Prevent puncturing during following work.

Permanent overlying construction : Cover membrane as soon as possible.

###### Hardcore/ Venting hardcore beds

Finish: Smooth, consolidated, blinded bed free of sharp projections.

###### Primers

Curing: Allow to dry thoroughly before covering.

###### Hot applied bonding compounds

Application: Continuous even coaling to provide full bonding over whole surface. Do not overheat.

###### Loose laid membranes

Surfaces to be jointed : Clean and dry beyond full width of joint.

Covering to oversite damp proofing: Place immediately after laying membrane.

###### Self-adhesive membranes

Bonding: Full. Smooth out to exclude air.

###### Multilayer membranes

Subsequent layers: Apply as soon as possible.

###### Angles in bonded sheeting

Preformed rot proof fillet to internal angles: Size (minimum): 50 x 50 mm, splay faced.

Bedding: Bitumen mastic or bonding compound .

Reinforcing strip to all angles:

Material: As damp proofing/ tanking. Width (minimum) : 300 mm.

Timing: Apply before main sheeting. Proprietary reinforcing strip to all angles:

Timing: Apply before main sheeting.

Dressing of main sheeting on to adjacent surfaces (minimum): 100 mm.

###### Junctions with projecting dpcs/ cavity trays

Adjoining surfaces: Clean and dry.

Opes/ Cavity trays : Lap and fully bond/ seal with sheeting.

Laps (minimum): 100 mm. Gas retardant dpcs/ cavity trays : 150 mm. Bonding/ Sealing: Method compatible with component materials.

###### Junctions with flush dpcs/ cavity trays

Adjoining surfaces: Clean and dry. Opes/ Cavity trays:

Expose edge where concealed.

Lap and fully bond/ seal sheeting to wall.

Dressing of sheeting beyond dpc/ cavity tray (minimum): 50 mm. Bonding/ Sealing: Method compatible with component materials.

###### Preformed collars for pipes, ducts, cables, etc

Sealing: Fully bond to penetrations and sheeting. Completed junctions: Impervious.

###### Protection boards for damp proofing/ tanking

Application

Membrane surface: Clean and free from contaminants. Board contact with membrane: Secure and continuous.

Backfilling: Carry out when tanking, loading and protection are complete .

**J41 REINFORCED BITUMEN MEMBR ANE ROOF COVERINGS**

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

##### PRODUCTS

###### Bitumen and bitumen membrane

Bitumen membrane: To BS 8747.

Bitumen dressing compound: To BS EN 12591.

Restriction: For heat sensitive insulation materials, use cold bonding compounds.

Primers: As recommended by bitumen sheet manufacturer, or:

Bitumen cut back with volatile solvent. Characteristics when tested to BS EN 13357: Volatile solvent content (minimum): 40% by mass.

Viscosity (maximum) (STV at 25"C, 4 mm orifice): 1Os.

Cover strips to joints in rigid board substrates: Polyester reinforced bitumen membrane to BS 8747.

Width: 150 mm.

###### Fasteners

Nails: To BS 1202 Specification for nails: Steel nails: To BS 1202-1.

Copper nails: To BS 1202-2.

Wood screws: To BS 121O Specification for wood screws.

###### Insulation boards

Per1ormance: Capable of resisting permanent deformation or damage when subjected to expected concentrated loads, with sufficient laminar strength to resist stress imposed by wind uplift forces.

Rigid urethane foam (RUF):

Rigid polyisocyanurate foam (PIR) roofboard: To BS 4841-3. Rigid polyurethane foam (PUR) roofboard: To BS EN 13165.

Mineral wool (MW): Roofing grade to BS EN 13162. Expanded polystyrene (EPS): To BS EN 13163.

Extruded polystyrene (XPS): To BS EN 13164. Phenolic foam (PF): To BS EN 13166.

Cellular glass: To BS EN 13167. Perlite: To BS EN 13169.

Expanded cork (ICB): To BS EN 13170.

###### Overlay boards

Oriented strand board (OSB): To BS EN 300, type OSB/3. Bitumen impregnated sailboard: To BS EN 622-4.

Plywood: To BS EN 636, section 7 (plywood for use in humid conditions).

Quality: Naturally durable timber, free from preservatives.

Expanded cork (ICB): To BS EN 13170.

###### Protection

Precast concrete paving slabs: To BS EN 1339.

###### Timber trims, fillets etc.

Quality: Planed. Free from wane, pitch pockets, decay and insect attack (except ambrosia beetle damage). Moisture content at time of covering: 22% (maximum).

Restriction: Fillets under torch-on bitumen membranes to be non-combustible.

##### EXECUTION

###### Adverse weather

General: Do not lay coverings in high winds, wet or damp conditions or in extremes of temperature unless effective temporary cover is provided over working area.

Unfinished areas al roof: Keep dry. Protect edges al laid membrane from wind action.

###### Applying primers

Surface coverage: Even and lull.

Coats: Fully bond. Allow volatiles to dry oil thoroughly between coats.

###### Applying bonding compounds

Temperature al compound : Suitable to achieve bond over whole surface. Do not overheat.

Heat sensit ive insulation materials: Use cold bituminous adhesive or overlays recommended by the insulation manufacturer.

###### Suitability of substrates

Substrate generally: Secure, clean, dry, smooth, free from frost, contaminants, voids and protrusions. Preliminary work: Complete including:

Grading to correct !alls .

Formation of upstands, kerbs, box gutters, sumps, grooves, chases, expansion joints. Fixing al battens, fillets, anchoring plugs/ strips.

Moisture content and stability of substrate: Must not impair roof integrity.

###### Renewing existing coverings

Substrate: Do not damage.

Timing : Remove only sufficient coverings as will be renewed and made weathertighl on same day.Chippings and paving tiles.

Edge trims. Replace with new as specified.

Rainwater outlet gratings . Set aside for reuse on completion. Skirtings: Cut out and make good as for new work.

###### Laying overlay to metal deck

Setting out: Lay boards with staggered joints and long edges at right angles to troughs in deck.

End joints: Centre over crowns al deck.

Fasteners:

Type: Recommended by fastener manufacturer. Fastener heads: Flush with, or below board surface.

###### Joints in rigid board substrates

Cover strip: Lay centrally over substrate joints before laying vapour control layers or coverings. Adhere to substrate with bonding compound along edges only.

###### Laying vapour control layer

Joints in second layer (where applicable): Stagger by half a membrane .

Penetrations: Fully seal using bonding or taping methods recommended by manufacturer.

Edges of insulation at roof edges, abutments, upstands, kerbs, penetrations etc: Enclosed with vapour control layer:

Treatment: Dressed up sufficiently, providing 50 mm (minimum) seal when overlapped by the roof covering; or turned back 150 mm (minimum) over the insulation and sealed down.

###### Laying warm deck roof insulation

Setting out:

End edges: Adequately support.

* + Joints: Bull together. End joints : Stagger .

Protection to exposed edges of insulation: Reduced thickness treated timber batten, outer edge chamfered at changes in level.

Completion: Boards must be in good condition, well fitting and stable.

###### Laying overlay to warm deck roof insulation

Setting out: Stagger to break joint with insulation.

Joints: Butt together .

###### Laying reinforced bitumen membranes generally

Direction of laying: Unrolled up the slope.

Where practicable, install so that water drains over and not into laps.

Side and end laps: Size and seal using materials and method recommended *by* bitumen membrane manufacturer. Head and side laps: Olfset.

Intermediate and top layer/ capsheet: Fully bond.

Successive layers: Apply without delay. Do not trap moisture.

Strips of bitumen membrane for 'linear' details: Cut from length of roll.

Completed coverings: Firmly attached, fully sealed, smooth, weatherproof and free draining.

###### Laying reinforced bitumen membranes on roofs pitched more than 59

Timber battens: Fix flush with suriace in substrates that will not securely accept nails.

Locations: To BS 8217, table 5 .

Set out: Parallel to roof slope, with successive layers carried over ridges.

Lengths (maximum): As recommended by reinforced bitumen membrane manufacturer. End laps: Half stagger and align on alternate bitumen membrane.

Additional fixing for bitumen membranes: As recommended by reinforced bitumen membrane manufacturer.

**Nailing first layer of reinforced bitumen membranes to timber substrate** Setting out: Unroll, align and cut to length and work from one end. Minimize wrinkles. Fixing centres:

General area: 150 mm (maximum) grid centres.

Perimeter of roof areas and at all side and head laps: 50 mm.

###### Partial bonding of reinforced bitumen membranes

Venting first layer: Loose lay, align and cut to length. Do not carry up angle fillets and vertical suriaces or through details .

Long edges: Overlap 50 mm (minimum). Ends: Butt together.

Intermediate layer: Fully bond to first layer and through to substrate.

###### Pour and roll bonding of reinforced bitumen membranes

Bonding compound:

Hot and fluid when bitumen membranes are laid.

Application: Spread evenly so that a small quantity is squeezed out at each edge.

Bond: Full over whole surface , with no air pockets. Excess compound at laps:

First and intermediate layers. Spread out. Top layer/ Capsheet: Remove.

###### Torch-on bonding of reinforced bitumen membranes

Bond: Full over whole surface, with no air pockets.

Excess compound at laps of top layer/ capsheet: Leave as a continuous bead.

###### Cold applied and self-adhesive bonding of reinforced bitumen membranes

Bond: Full over whole surface, with no air pockets.

###### Laying mineral/ metal faced reinforced bitumen membranes

Lap positions and detailing of ridges, eaves, verges, hips, abutments, etc: Submit proposals. Setting out: Neat, with carefully formed junctions.

Excess bonding compound at laps: Remove, whilst still warm .

Lap bonding of mineral faced bitumen membranes: Carry out only at prefinished margins or prepared 'black to black' edges.

Face of metal faced bitumen membranes: Do not mark, crease or stain.

###### Mechanical fixing of single layer reinforced bitumen membranes

Installing fasteners:

Use manufacturer's recommended methods and equipment. Insertion: Correct and consistent.

Washers/ Pressure plates/ Bars:

Distance from fixed edge: 1O mm (minimum). Fixing: Flush with membrane.

###### Welded jointing of single layer reinforced bitumen membranes

Side and end joints:

Preparation: Clean and dry surfaces for full width of joint. Sealing: Hot air welded.

Condition at completion: Fully sealed, watertight and free draining.

###### Skirtings and upstands

Angle fillets: Fix by bitumen bonding or nailing.

Venting first layer: Stop at angle fillet. Fully bond in bitumen for 300 mm strip around perimeters. Overlap onto upstand with strips of glass reinforced bitumen membrane, fully bonded.

Other layers of bitumen membrane: Carry in staggered formation up upstand, with each layer fully bonded. Where practicable, carry top layer over top of upstand.

Upstands:

At ends of rolls: Form with bitumen membrane carried up without using separate strip. Elsewhere: Form with matching strips of bitumen membrane, maintaining laps.

Additional fixing of bitumen membranes: As recommended by bitumen membrane manufacturer.

###### Welted drips

General:

Length: Form using maximum length strips. Height at external gutter: 75 mm (minimum).

Welt tail: Nail to face of drip batten. Fold neatly.

Welt: Bond together, carry 100 mm (minimum) onto roof. Overlap with top bitumen membrane.

###### Fixing perimeter trims

First / Intermediate layers bitumen membrane: Lay over roof edge upstand. Project free edge 25 mm from wall or fascia. Trim:

Setting out: 3 mm (minimum) clear from wall or fascia.

Fixing: 30 mm from ends and at 300 mm (maximum) centres.

Jointing sleeves: Fixed one side only and with 3 mm expansion gaps. Corner pieces: Purpose made.

Completion of trims:

Contact surfaces: Prime.

Joints: Cover with 150 mm long pads of bitumen membrane, bonded to trim.

Completion of bitumen membrane:

Top layer/ Capsheel: Butt joint to rear edge of trim.

Cover strip: Fully bond to trim and top layer/ capsheet of bitumen membrane. Carry over roof edge upstand and lap 75 mm onto roof.

###### Installing roof ventilators

Priming:

Substrate below vents: Do not prime or apply bonding compound. Vent skirts: Prime before sheeting, if recommended by manufacturer.

###### Laying inverted roof insulation

Condition of substrate: Clean.

Setting out: Loose lay with staggered joints.

Cutting: Minimize.

Small cut pieces: Avoid at perimeters and penetrations. Joints: Butt together.

Projections, upstands, rainwater outlets, etc: Cut insulation cleanly and fit closely around. Completion:

Boards must be in good condition, well fitting and stable.

Cover as soon as practicable to prevent wind uplift and flotation.

**Laying stone ballast** Condition of substrate: Clean. Outlets: Fit gravel guards.

Previously laid materials: Protect during laying of ballast. Laying: Spread evenly. Do not pile to excessive heights.

###### Laying precast concrete paving slabs

Condition of substrate: Clean. Setting out: Minimize cutting.

Completion: Slabs must be level and stable.

**Laying paving tiles** Condition of substrate: Clean. Setting out: Minimize cutting.

Contact surfaces: If recommended by tile manufacturer, prime and then allow to dry. Bonding compound: Avoid excess compound being squeezed over tile face.

Joints: 3 mm generally, 25 mm between bays. Bays:

Bay size (approximate): 9 m2.

Bay joint locations: Submit proposals.

**Applying chippings** Condition of substrate: Clean. Outlets: Fit gravel guards.

Completion: Remove loose excess chippings without exposing dressing compound.

###### Applying solar reflective paints

Surface coverage: Even and full. Coats: Fully adhered.

###### Inspection

Interim and final roof inspections: Submit reports.

**Electronic roof integrity test**

Testing authority: Contractor. Timing of test: At completion. Condition of roof prior to testing:

Complete to a stage where integrity of membrane can be tested. Surface: Clean.

Test results and warranty: Submit on completion of testing.

**Completion**

Roof areas: Clean. Outlets: Clear.

Work necessary to provide a wealhertight finish: Complete.

Storage of materials on finished surface: Not permitted.

Completed membrane: Do not damage. Protect from chemicals, traffic and adjacent or high level working .

**K10 PLASTERBOARD DRY LININGS FOR WALLS, PARTITIONS AND CEILINGS**

**GENER AL REQUIREMENTS**

**Cross-reference**

General: Read with A90 General technical requirements.

**PRODUCTS**

**Insulation**

Mineral wool: To BS EN 13162.

**Gypsum plasterboards to BS EN 520**

Type A:

Face suitable for gypsum plasters or decoration to be applied.

Type H (plasterboard with reduced water absorption):

Types H1, H2 and H3 have different water absorption performance.

Type E (gypsum sheathing board):

Manufactured to be used as sheathing board in external walls. Not intended to receive decoration.

Not designed to be permanently exposed to external weather conditions.

Has reduced water absorption rates.

Type F (gypsum plasterboard with improved core adhesion at high temperatures): Face suitable for gypsum plasters or decoration to be applied.

Type P (gypsum baseboard):

Face intended to receive gypsum plaster. May be perforated during manufacture.

Type D (gypsum plasterboard with controlled density):

Face suitable for gypsum plasters or decoration to be applied.

Type R (gypsum plasterboard with enhanced strength): For applications where higher strength is required. Increased longitudinal and transverse breaking loads.

Face suitable for gypsum plasters or decoration to be applied.

Type I (gypsum plasterboard with enhanced surface hardness): Face suitable for gypsum plasters or decoration to be applied. Designated Type 13.3 for edge and end profiles.

Edges:

Normally square cut, but can be bevelled, tapered, half rounded, rounded or a combination of each. Type P - square or rounded.

Designation of plasterboards:

* \_Gypsum plasterboard/ type letter/ BS EN 520 - width/ length/ thickness/ edge profile\_.

E.g. \_Gypsum plasterboard/Type A/ BS EN 520 - 1200/ 2400/ 12.5/ tapered edge\_

**Rigid beads/ stops**

Standard: Galvanized steel: To BS EN ISO 1461.

**EXECUTION**

**New wet laid bases**

DPCs: Install under full width of partitions/ lreestanding wall linings.

###### Metal framing for partitions/ wall linings

Setting out: Accurately aligned and plumb.

Frame/ Stud positions: Equal centres to suit specified linings, maintaining sequence across openings. Additional studs: To support vertical edges of boards.

Fixing centres at perimeters (maximum): 600 mm. Openings: Form accurately:

Doorsets: Use sleeved/ or boxed metal studs and/ or suitable timber framing to achieve strength grade requirements for framing assembly and adequately support weight of door .

Services penetrations: Allow for associated fire stopping .

###### Additional supports

Framing: Accurately position and securely fix to give full support to:

Partition heads: Running parallel with, but offset from main structural supports.

Fixtures, fittings and service outlets. Mark framing positions clearly and accurately on linings.

Board edges and lining perimeters: As recommended by board manufacturer to suit type and performance of lining.

###### Metal furrings for wall linings

Setting out:

Vertical furring positions: Equal vertical centres to suit specified linings, maintaining sequence across openings. Position adjacent to angles and openings.

Additional vertical furrings: To support vertical edges of boards and at junctions with partitions. Horizontal furring positions: To provide continuous support to edges of boards.

Adhesive bedding to furrings:

Dabs: Length 200 mm (minimum). Located at ends of furrings and thereafter at 450 mm (maximum) centres. Junctions with partitions: Continuous bed with no gaps across cavity.

###### Suspended ceiling grids

Grid members and hangers: Centres to suit specified linings and imposed loads.

Additional grid members: To provide bracing and stiffening as necessary at upstands, partition heads, access hatches, etc.

###### Dry lining generally

General: Use fixing, jointing, sealing and finishing materials, components and installation methods recommended by board manufacturer.

Cutting plasterboard: Neatly and accurately without damaging core or tearing paper facing.

Cut edges: Minimize and position at internal angles wherever possible. Mask with bound edges of adjacent boards at external corners.

Fixing boards: Fix securely and firmly to suitably prepared and accurately levelled backgrounds. Finishing: Neatly to give flush, smooth, flat surfaces free from bowing and abrupt changes of level.

###### Dry lining ceilings

Sequence: Fix boards to ceilings before dry lining walls and partitions.

Orientation of boards: Fix with bound edges at right angles to supports and with ends staggered in adjacent rows. Two layer boarding: Stagger joints between layers.

###### Installing mineral wool insulation

Fitting insulation: Closely butted joints and no gaps. Use fasteners to prevent slumping or displacement. Services:

Electrical cables overlaid by insulation. Sized accordingly . Ceilings: Do not lay over luminaires.

###### Sealing gaps and air paths

Location of sealant: To perimeter abutments and around openings.

Pressurised shafts and ducts: At board-to-board and board-to-metal frame junctions.

Application: To clean, dry and dust free surfaces as a continuous bead with no gaps.

Gaps greater than 6 mm between floor and underside of plasterboard: After sealing, fill with jointing compound.

###### Cavity fire barriers

Installation: Form accurately and fix securely with no gaps to provide a complete barrier to smoke and flame.

Within suspended ceilings: Fixing at perimeters and joints: Secure, stable and continuous with no gaps, to provide a complete barrier to smoke and flame .

Service penetrations: Cut and pack to maintain barrier integrity. Sleeve flexible materials. Adequately support services passing through barriers.

Ceiling systems for fire protection: Do not impair fire resisting performance of ceiling system.

###### Fire stopping at perimeters of dry lining systems

Material: Tightly packed mineral wool or intumescent mastic/ sealant. Application: Provide a complete barrier to smoke and flame.

**Joints between boards**

Tapered edged plasterboard: Bound edges: Lightly butted.

Cut/ unbound edges: 3 mm gap.

Square edged plasterboard: 3 mm gap.

Square edged fibre reinforced gypsum board: 5 mm gap.

**Vertical joints**

Joints: Centre on studs/ framing .

Partitions: Stagger joints on opposite sides of studs. Two layer boarding: Stagger joints between layers.

**Horizontal joints**

Surfaces exposed to view: Horizontal joints not permitted. Seek instructions where height of partition/ lining exceeds maximum available length of board.

Two layer boarding: Stagger joints between layers by at least 600 mm. Edges of boards: Support using additional framing.

Two layer boarding: Support edges of outer layer.

**Insulation backed plasterboard**

General: Do not damage or cut away insulation to accommodate services.

Installation at corners: Carefully cut back insulation or plasterboard as appropriate along edges of boards to give a continuous plasterboardlace, with no gaps in insulation.

**Fixing plasterboard to metal framing:**

Screw fixing to framing/ furrings:

Position of screws from edges of boards (minimum): 1O mm.

Screw heads: Set in a depression. Do not break paper or gypsum core.

Fixing insulation backed plasterboard to metal furrings: In addition to screw fixings, apply continuous beads of adhesive sealant to furrings.

**Fixing plasterboard to timber framing:**

Position of nails/ screws from edges of boards (minimum): Bound edges: 1O mm.

Cuti unbound edges: 13 mm.

Position of nails/ screws from edges of timber supports (minimum): 6 mm.

**Fixing plasterboard with adhesive dabs** Setting out boards: Accurately aligned and plumb. Fixing to background: Securely using adhesive dabs.

Dab spacing to each board horizontally: One row along top edge and one continuous dab along bottom edge.

Dab spacing to each board vertically: One row along each edge and at intermediate spacings to suit size of board: Boards 9.5 x 1200 mm: 400 mm centres.

Boards 9.5/ 12.5 x 900 mm: 450 mm centres.

Boards 12.5 x 1200 mm: 600 mm centres.

Adhesive dab dimensions (width x length): Al least 50-75 mm x 250 mm.

Position of dabs from edges/ ends of boards (minimum): 25 mm.

Fixing insulation backed plasterboard with adhesive dabs: In addition to adhesive dab fixings, secure boards with nailable plugs in locations recommended by board manufacturer.

**Fixing insulation backed plasterboard with adhesive spots**

Setting out boards: Accurately aligned and plumb.

Fixing to background: Securely using adhesive spots and mechanical fastenings.

Adhesive spot spacings to each board: Four vertical rows, at 400 mm centres in each row. Adhesive spot diameters: 25 mm (minimum).

Mechanical fasteners: Nailable plugs in locations recommended by board manufacturer.

**Level of dry lining across joints**

Sudden irregularities: Not permitted.

Joint deviations: Measure fromlaces of adjacent boards using methods and straightedges (450 mm long with feet/ pads) to BS 8212, clause 3.3.5.

Tapered edge joints: Permissible deviation (maximum) across joints when measured with feet resting on boards: 3 mm. External angles: Permissible deviation for both laces, 4 mm (maximum) .

Internal angles: Permissible deviation for both laces, 5 mm (maximum).

**Seamless jointing to plasterboard**

Cut edges of boards: Remove paper burrs.

Filling and taping: Fill joints, gaps and internal angles with jointing compound and cover with continuous lengths of paper tape, fully bedded.

Protection of edges/ corners: Reinforce external angles, stop ends, etc. with specified edge/ angle bead.

Finishing: Apply jointing compound. Feather out each application beyond previous application to give a flush, smooth, seamless surface.

Nail/ screw depressions: Fill with jointing compound to give a flush surface. Minor imperfections: Remove by light sanding.

**Installing beads/ stops**

Cutting: Neatly using mitres al return angles.

Fixing: Use longest possible lengths, plumb, square and straight, ensuring full contact of wings with substrate. Finishing: After joint compounds/ plasters have been applied, remove surplus material while still wet from surfaces of beads exposed to view.

**Repairs to existing plasterboard**

Filling small areas with broken cores: Cut away paper facing, remove loose core material and fill with jointing compound.

Finish: Flush, smooth surface suitable for redecoration.

Large patch repairs: Cul out damaged area and form neat hole with rectangular sides. Replace with matching plasterboard.

Fixing: Use methods to suit type of dry lining, ensuring full support to all edges of existing and new plasterboard. Finishing: Fill joints, tape and apply jointing compound to give a flush, smooth surface suitable for redecoration.

**K11 RIGID SHEET FLOORING, SHEATHING, DECKING, SARKING, LININGS AND CASINGS**

**GENER AL**

**Cross-reference**

General: Read with A90 General technical requirements.

**PRODUCTS**

**Adhesives**

Bonding and jointing adhesives generally: PVA to BS EN 204, class D3.

Bonding and jointing adhesives to fire resistant flooring or flooring exposed to regular wetting: Phenol-resorcinol formaldehyde to BS EN 301, type I.

**Battens for floating floors**

Timber: Regularized softwood.

Timber quality: Free from decay, insect attack (except ambrosia beetle damage).

Knot width (maximum) : Half section width.

Moisture content at time of laying: 16% (maximum).

**Insulation**

Expanded polystyrene insulation (EPS): To BS EN 13163. Extruded polystyrene insulation (XPS): To BS EN 13164. Mineral wool insulation (MW): To BS EN 13162.

Polyurethane insulation (PUA): To BS EN 13165.

**Rigid sheet materials**

Plywood: To BS EN 636.

Bonding quality to BS EN 314-2. Appearance class to BS EN 635.

Particleboard: To BS EN 312.

General purpose - Dry: Type P1. Interior fitments - Dry: Type P2. Loadbearing - Dry: Type P4.

Loadbearing - Humid: Type P5.

Heavy duty loadbearing - Dry: Type P6. Heavy duty loadbearing - Humid: Type P7.

Cement bonded particleboard: To BS EN 634-2. Oriented strand board (OSB): To BS EN 300.

General purpose boards, and boards tor interior fitments for use in dry conditions: Type OSB/1. Loadbearing boards for use in dry conditions: Type OSB/2.

Loadbearing boards for use in humid conditions: Type OSB/3.

Heavy duty loadbearing boards for use in humid conditions: Type OSB/4.

Hardboard: To BS EN 622-2.

Medium density fibreboard: To BS EN 622-5. Plasterboard: To BS EN 520.

Technical class: To BS EN 13986, depending on purpose and conditions of use. Strength and stiffness (minimum): To BS EN 1995-1-1.

##### EXECUTION

###### Ribbed (battened) floating floors

Pugging or additional insulating material: Lay between joists. Installation:

Setting out of floating substrate (where specified): Long edges running across battens. End joints central over battens and staggered.

Setting out of flooring: Long edges running across battens. End joints central over battens and staggered. All joints glued.

Flooring laid over floating substrate: Joints must not coincide.

Expansion provision:

Expansion gap around perimeter of floor area and upstands: 10-12 mm filled with resilient material.

Location of mechanical fixings to battens:25 mm from long edges of boards/ sheets and 10 mm (minimum) from short edges.

Plywood fixing centres:

Around floor perimeter and along short edges of each board: 150 mm (maximum). Along intermediate supports: 300 mm (maximum).

Particleboard fixing centres :

Around floor perimeter and along short edges of each board: 200 mm (maximum). Along intermediate supports: 400 mm (maximum).

Oriented strand board (OSB) fixing centres:

Around floor perimeter, along short edges of each board, and along intermediate supports: 300 mm (maximum). Cement bonded particleboard fixing centres:

Around floor perimeter, along short edges of each board, and along intermediate supports : Recommended by sheet manufacturer.

Fixings distance from long edges and minimum from short edges: Recommended by sheet manufacturer.

###### Platform (continuously supported) floating floors

Pugging or additional acoustic insulating material: Lay between joists. Vapour control layer: Lay on warm side of insulation.

Installation:

Floating substrate (where specified): Laid on resilient layer with close butted joints. Flooring: End joints staggered. Joints in flooring and floating substrate must not coincide.

Expansion provision:

Clear expansion gap around perimeter of floor area and upstands: 10-12 mm.

###### Flooring

Substrate: Provide necessary additional supports.

Setting out: Long edges running across joists. End joints central over joists and staggered. Expansion provision:

Clear expansion gap around perimeter of floor area and upstands: 10-12 mm.

Intermediate expansion/ movement joints between boards/ sheets: As recommended by manufacturer.

Location of fixings: 25 mm from long edges of board/ sheet and 10 mm (minimum) from short edges. Plywood fixing centres:

Around floor perimeter and along short edges of each board: 150 mm (maximum) .

Along intermediate supports: 300 mm (maximum).

Particleboard fixing centres:

Around floor perimeter: 200 mm (maximum).

Along intermediate supports: 400 mm (maximum).

Oriented strand board fixing centres:

Around floor perimeter, along short edges of each board, and along intermediate supports: 300 mm (maximum).

Cement bonded particleboard fixing centres:

Around floor perimeter, along short edges of each board, and along intermediate supports: Recommended by sheet manufacturer.

Fixings distance from long edges and minimum from short edges: Recommended by sheet manufacturer.

###### Wall sheathing

Substrate: Provide necessary additional supports. Long edges: Vertical. Centre on supports.

Expansion gap between adjacent boards: 2-3 mm. Fixing centres:

Around board edges: To BS EN 1995-1-1.

Along intermediate supports: 300 mm (maximum).

Fixing distance from edges: 25 mm from bottom edge of board and 1O mm (minimum) from other edges.

###### Rigid sheet insulation fixed through wall sheathing

Setting out: Tongue uppermost, with no gaps.

Fixing centres: Around board edges and along intermediate supports: Recommended by sheet manufacturer.

###### Roof decking

Substrate: Provide necessary additional supports.

Setting out: Long edges running across supports. End joints central over joists and staggered. Expansion provision:

Clear expansion gap around perimeter of roof area and upstands: Plywood: 10 mm.

Particleboard/ OSB: 1.5 mm per metre run of roof, with a gap of 1O mm (minimum).

Intermediate expansion/ movement joints: Recommended by decking manufacturer.

###### Sarking

Substrate: Provide necessary additional supports.

Setting out: Long edges running across rafters. End joints central over joists and staggered. Plywood fixing centres to each rafter:

Around roof perimeter and along short edges of each board: 150 mm (maximum). Along intermediate supports: 300 mm (maximum).

Distance from edges: 25 mm from long edges and 1O mm (minimum) from short edges.

Particleboard fixing centres (maximum) to each rafter:

Around roof perimeter, along short edges of each board, and along intermediate supports: 100 mm. Distance from edges: 25 mm from long edges and 10 mm (minimum) from short edges.

Oriented strand board fixing centres to each rafter:

Around roof perimeter and along short edges of each board: 150 mm (maximum). Along intermediate supports: 300 mm (maximum).

Distance from edges: 25 mm from long edges and 8 mm (minimum) from short edges.

###### Rigid board insulation fixed as roof sarking

Rigid board insulation:

Installation: Neatly. Leave no gaps. Secure with counterbattens.

Fixing: Fix counterbattens along line of each rafter. Secure through insulation to rafters with fasteners at 300 mm centres.

Additional insulation between counterbattens:

Installation: Tight between counterbattens. Close butt joints.

Top of insulation: 12 mm (minimum) below top of counterbattens.

###### Underlay

Substrate:

Condition: Sound and acceptably level. Preparation: Gross irregularities removed or filled. Protruding fasteners: Remove or punch in.

Setting out:

End joints: Stagger.

Joints in underlayment: Offset from joints in substrate.

Fixing:

Fixing centres: 150 mm grid over each sheet commencing at centre. Centres around perimeter: 100 mm (maximum).

Distance from edges: 12 mm.

Fastener heads: Set flush with sheet surface.

Plywood:

Gap between adjacent sheets: 0.5-1 mm.

Hardboard:

Laying: Smooth side uppermost.

Gap between adjacent sheets: 1-2 mm.

**Wall linings, ceilings and casings**

Substrate: Provide necessary additional supports.

Setting out lining: Run long edges across supports. Lay with a gap between adjacent boards. Fixing lining to supports:

Plywood fixing centres:

Around board edges: 150 mm (maximum).

Along intermediate supports: 300 mm (maximum). Distance from edges: 1O mm (minimum).

Particleboard fixing centres:

Around board edges and along intermediate supports: 200 mm (maximum). Distance from board edges: 9 mm (minimum).

Cement bonded particleboard fixing centres:

Around board edges, along intermediate supports and distance from edges: Recommended by sheet manufacturer.

Centres along supports: Recommended by sheet manufacturer .

Distance from long edges: 50 mm (minimum).

Hardboard fixing centres:

Around sheet edges, along intermediate supports and distance from edges: Recommended by sheet manufacturer.

Medium density fibreboard fixing centres:

Around board edges and along intermediate supports: Recommended by sheet manufacturer. Distance from edges: 12 mm (minimum).

**Installation generally**

Timing: Building to be weathertight before fixing boards internally. Moisture content of timber supports: 18% (maximum).

Joints between boards: Accurately aligned, of constant width and parallel to perimeter edges. Methods of fixing, and fasteners: As section Z20 unless specified otherwise.

**Dryness of concrete/ screed substrates for floating floors**

Relative humidily above substrate when tested with a hygrometer to BS 8201, Appendix A: 75% (maximum).

Test points: All corners, around perimeter, and random points over area being tested. Drying aids: Turned off for 4 days (minimum) before testing.

**Vapour control layer in floating floor construction**

Location: Immediately below floating layer. Installation:

Joints: Overlapped by 150 mm (minimum) and sealed with vapour resistant tape.

Treatment of membrane at perimeter of flooring and upstands: Turned up and sealed to top face of flooring using a method approved by the board manufacturer.

Excess material: Trimmed off neatly after fixing skirtings/ cover beads. Condition of membrane before laying flooring: Clean and dry.

**Plain softwood battens for floating floors**

Quality of timber: Free from decay, insect attack (except ambrosia beetle damage) and with no knots. wider than half the width of the section.

Moisture content at time of laying: 16% (maximum).

**Additional supports**

Additional studs, noggings/ dwangs (Scot) and battens:

Provision: In accordance with board manufacturer's recommendations and as follows: Tongue and groove jointed rigid board areas: To all unsupported perimeter edges.

Butt jointed rigid board areas: To all unsupported edges.

Size: 50 mm (minimum) wide and of adequate thickness. Quality of timber: As for adjacent limber supports.

Treatment (where required): As for adjacent timber supports.

###### Board moisture content and conditioning

Moisture content or boards al lime of fixing: Appropriate to end use. Conditioning regime: Submit proposals.

###### Fixing generally

Boards/ sheets: Fixed securely to each support without distortion and true to line and level.

Fasteners: Evenly spaced in straight lines and, unless otherwise recommended by board manufacturer, in pairs across joints.

Distance from edge of board/ sheet: Sufficient to prevent damage.

Surplus adhesive: Removed as work proceeds.

###### Open joints

Perimeter joints, expansion joints and joints between sheets: Free from plaster, mortar droppings and other debris. Temporary wedges and packings: Removed on completion of board fixing.

###### Access panels

Size and position: Agree before boards are fixed.

Additional noggings/ dwangs (Scot), battens, etc: Provide and fix as necessary.

## K20 TIMBER BOARD FLOORING DECKING SARKING LININGS AND CASINGS

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

##### PRODUCTS

###### Timber board flooring

Basic quality tongued and grooved softwood: To BS 1297.

###### Timber board sarking

Basic quality: Softwood, free from decay, insect attack (except ambrosia beetle damage) and wane.

Boards with soffit exposed as finish: Blue stain, fissures, knot holes and loose or unsound knots not permitted on exposed (underside) face of boards.

Treatment:

Preservative impregnation: To Wood Protection Association Commodity Specification C4 or CB. Fire retardant impregnation: To Wood Protection Association Commodity Specification FR4.

Moisture content at time of fixing: Not more than 19%.

###### Timber board linings, casings, etc.

Standard: To BS 11B6-3.

###### Battens for floating floors

Quality: Free from decay, insect attack (except ambrosia beetle damage) and with no knots wider than half the width of the section.

Treatment:

Preservative impregnation: To Wood Protection Association Commodity Specification CB.

##### EXECUTION

###### Generally

Protection during and after installation: Keep boards dry. Protect from dirt, stain and damage until Completion.

###### Boards to be used internally:

Do not install until building is watertight.

###### Moisture content of concrete/ screed substrates for wood floating floors

Test for moisture content:

Standard: To BS B201, Appendix A, using an accurately calibrated hygrometer.

Readings: Take in corners, along edges, and at random points over the area being tested.

###### Acceptability:

Do not lay flooring until all readings show 75% relative humidity or less.

###### Moisture content of timber

General:

Conditions during and after installation: Control ambient temperature and humidity conditions to maintain moisture content at average level specified in BS EN 942, table B.1 for the relevant service condition until Completion.

Test for moisture content: When instructed, using an approved moisture meter.

Sarking:

Moisture content at time of fixing (maximum): 19%.

Timber supports:

Moisture content at time of fixing boards (maximum): 18%.

Battens for floating floors:

Moisture content at time of fixing boards (maximum): 16%.

###### Timber board linings, casings, etc.

Board fixing: To BS 1186-3. Access panels:

Size and position: Agree before fixing boards.

Additional noggings/ dwangs, battens, etc: Provide as necessary.

###### Installing vapour check membrane to floating floors

Location: Immediately below the floating layer.

Joints: Overlap by at least 150 mm and seal with vapour resistant tape.

Perimeter/ Upstands: Turn membrane up around perimeter of flooring and around any upstands and seal to top face of boards.

Excess material: Trim off neatly after fixing skirtings/ cover beads.

Membrane condition: Intact, clean and dry prior to laying flooring.

###### Treated timber

Surfaces exposed by minor cutting and/ or drilling: Treat with two flood coats of a solution recommended by main treatment solution manufacturer.

###### Fixing boards

Environmental conditions: Do not fix boards when ambient temperature is at or below O'C, or above 30'C.

General: Fix boards securely to each support to give flat, true surfaces free from undulations, lipping, splits and protruding fastenings .

Timber movement: Position boards and fixings to prevent cupping, springing, excessive opening of joints and other defects.

Heading joints: Tightly butted, central over supports and at least two board widths apart on any one support. Termination of sarking at roof edges and junctions: In accordance with drawings and specification for roof covering. Exposed nail heads: Neatly punch below surface.

Proud edges: Plane off.

## L10 WINDOWS ROOFLIGHTS SCREENS AND LOUVRES

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements. Sealants: Read with section Z22 Sealants.

Joinery workmanship: Read with section Z10 Purpose made joinery.

##### PRODUCTS

###### Moisture content of windows, screens, louvres and subframes on delivery to site

External joinery: 12-19%.

For unheated buildings: 12-16%.

For buildings with heating providing room temperatures in the range 12-21'C: 9-13%. For buildings with heating providing room temperatures in excess of 21 'C: 6-10%.

###### Windows

Aluminium:

Standard: To BS 4873.

Factory applied powder coatings: To BS 6496.

PVC-U windows (white and surface covered):

Standard: Manufactured to BS 7412 from extruded profiles.

Manufacturer: Registered under a quality assurance scheme operated by a certification and inspection body accredited by the United Kingdom Accreditation Service (UKAS).

Operation and strength characteristics: To BS 6375-2.

Steel:

Standard: To BS 6510.

Operation and strength characteristics: To BS 6375-2. Factory applied powder coatings: To BS EN 13438.

Wood:

Standard: To BS 644.

Manufacturer: Registered under a third party quality assurance scheme. Operation and strength characteristics: To BS 6375-2.

###### Wood members for purpose made windows, screens, louvres and subframes

Timber: Generally to BS EN 942. Appearance class to BS EN 942:

For opaque finish: Glazing beads, drip mouldings and the like, class J1O; all other members, J40 or better. For clear finish: Glazing beads, drip mouldings and the like, Class J2; other members , as specified.

Knots on arrises and finger jointing in timber: Not permitled where exposed to view.

Adhesives:

Polyvinyl acetate (PVAC) to BS EN 204, class D4. Thermosetting resin to BS EN 12765, class C4.

##### EXECUTION

###### Protection of components

General: Do not deliver to site components that cannot be installed immediately or placed in clean, dry floored and covered storage.

Stored components: Stack vertical or near vertical on level bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.

###### Priming/ sealing

Wood surfaces inaccessible after installation: Prime or seal before fixing components.

###### Corrosion protection

Protective coating: Two coats of bitumen solution to BS 6949 or an approved mastic impregnated tape.

Timing of application: Before fixing components.

###### Building in

General: Not permitted unless specified.

Brace and protect components to prevent distortion and damage during construction of adjacent structure.

###### PVC-U windows

Installation standard: To British Plastics Federation et al 'Code of practice for the survey and installation of windows and external doorsets'.

###### Replacement windows installation

Standard: To BS 8213-4 .

###### Window installation

General: Install into prepared openings, without twist or diagonal racking. Gap between frame edge and surrounding construction (maximum):

Steel windows: 3 mm.

Timber and PVC-U windows: 10 mm.

###### Fixing of wood frames

Positions of fasteners unless predrilled:

Distance from ends of each jamb: 150 mm (maximum). Adjacent to each hanging point of opening lights.

Centres: 450 mm (maximum).

###### Fixing of steel frames

Positions of fasteners unless predrilled:

Distance from ends of each jamb: 50-190 mm. Adjacent to each hanging point of opening lights. Centres: 900 mm (maximum).

Windows fixed direct into openings: After fixing, fill back of steel frame with waterproof cement fillet.

###### Fixing of aluminium frames

Positions of fasteners unless predrilled:

Distance from ends of each jamb: 250 mm (maximum). Adjacent to each hanging point of opening lights.

Centres: 600 mm (maximum).

###### Fixing of PVC-U frames

Positions of fasteners unless predrilled:

Distance from ends of each jamb: 150-250 mm (maximum).

Fasteners at critical points: Adjacent to each hanging point of opening lights, but no closer than 150 mm to a transom or mullion centre line.

Centres: 600 mm (maximum).

###### Fixing of composite frames

Positions of fasteners unless predrilled:

Distance from ends of each jamb: 150 mm (maximum). Adjacent to each hanging point of opening lights.

Centres: 600 mm (maximum).

###### Ironmongery

Assembly and fixing: Careful and accurate.

Fasteners: With matching finish. Do not damage ironmongery and adjacent surfaces. Completion: Check, adjust and lubricate as necessary. Ensure correct functioning.

## L20 DOORS/ SHUTTERS/ HATCHES

#### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements. Purpose made joinery: Read with Z10.

Preservative/ fire retardant treatment: Read with Z12. Fixings/ adhesives: Read with Z20.

Sealants: Read with Z22.

**PRODUCTS**

###### Aluminium framed sliding glass doors

Standard: To BS 5286.

**Door facings: laminate** Standard: To BS EN 438-1. Grade: Horizontal:

Standard general purpose: HGS.

Flame retardent general purpose: HGF. Post forming general purpose: HGP.

**Door facings: plywood** Bonding quality: To BS EN 314. Surface appearance:

Hardwood: To BS EN 635-2. Softwood: To BS EN 635-3.

Conditions of use:

Dry conditions: To BS EN 636-1. Humid conditions: To BS EN 636-2. Exterior conditions: To BS EN 636-3.

###### External wood matchboarded doors

Standard: Generally to BS 459.

###### Fire performance

Fire resistant doorsels and shutter assemblies: Type testing: To BS 476-22 or BS EN 1634-1.

Smoke control doorsets and shutter assemblies:

Type testing: To BS 476-31.1 or BS EN 1634-3. lntumescent seals:

Type testing: To BS 476-23 .

Testing authority: UKAS accredited.

###### Metal door frames

Steel frames: Generally to BS 1245.

###### Metric internal and external wood doorsets, door leaves and frames

Coordinated sizes: To BS 4787.

###### Safety glazing to door leaves and sidelights

Standard: To BS 6206. Location: To BS 6262-4.

###### Single leaf external doorsets to dwellings

Security: To BS 8220-1.

General performance requirements: To British Standards Institute (BSI) publication, PAS 23-1 . Enhanced security requirements: To BSI publication , PAS 24-1 .

###### Wood framed panel doors

Timber quality: To BS EN 942.

###### Wood preservative treatment

Service life: Not less than 30 years.

External softwood doors and frames: British Wood Preserving and Damp Proofing Association (BWPDA) commodity specification C5.

External hardwood doors and frames: BWPDA commodity specification C10.

**Adhesives for wood doors and frames** Polyvinyl acetate (PVAC) to BS EN 204. Thermosetting resin to BS EN 12765, class C4.

##### EXECUTION

###### Protection of components

General: Do not deliver to site components that cannot be installed immediately or placed in clean, dry, floored and covered storage .

Stored components: Stacked on level bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.

###### Protection of timber surfaces inaccessible after installation

Protective coating: Primed or sealed before fixing components.

###### Protection of metallic surfaces inaccessible after installation

Relevant conditions : External or damp (high humidity) internal.

Copper alloys: Avoid direct contact with aluminium, iron, steel or zinc (including galvanizing). Aluminium alloys: Avoid direct contact with:

* Timber treated with copper, zinc or mercury based preservatives. Unseasoned oak, sweet chestnut, Douglas fir, western red cedar. Iron and steel unless galvanized.

Copper, copper alloys and rainwater run off from these materials. Concrete, mortars, plasters or soil, especially when embedded.

Paints containing copper or mercury based fungicides, graphite or lead.

Protective coating as separating layer: Two coats of bitumen solution to BS 6949, an approved mastic impregnated tape or submit proposals.

* Timing: Before fixing components.

Constraint: Only to surfaces not exposed on completion .

###### Building in

General: Not permitted except where specifically stated. Components specified for building in:

Bracing and protection: Prevent distortion and damage of built-in frames during erection of adjacent structure. Damp proof courses associated with built in wood frames: Fixed to backs of frames using galvanized clout nails.

###### Fixing of wood frames

Spacing of fixings (frames not predrilled): Maximum 150 mm from ends of each jamb and at 600 mm maximum centres.

**Fire resisting and/ or smoke control doors/ doorsets**

Installation: In accordance with instructions supplied with the product conformity certificate, test report or engineering assessment.

Gaps between frames and supporting construction: Filled as necessary in accordance with requirements for certification

and/ or door/ doorset manufacturer's instructions.

**L40 GENER AL GLAZING**

**GEN ER AL**

**Cross-reference**

General: Read with A90 General technical requirements .

**PRODUCTS**

**Glass**

Standards: To BS 952 and relevant parts of:

BS EN 572 for basic soda lime silicate glass. BS EN 1096 for coated glass.

BS EN 1748-1-1 for borosilicate glass. BS EN 1748-2-1 for ceramic glass.

BS EN 1863 for heat strengthened soda lime silicate glass.

BS EN 12150 for thermally toughened soda lime silicate safety glass. BS EN 12337 for chemically strengthened soda lime silicate glass.

BS EN 13024 for thermally toughened borosilicate safety glass. BS EN ISO 12543 for laminated glass and laminated safety glass.

Panes/ sheets: Clean and free from obvious scratches, bubbles, cracks, rippling, dimples and other defects.

Edges: Generally undamaged. Shells and chips not more than 2 mm deep and extending not more than 5 mm across the surface are acceptable if ground out.

**Heat soaking of thermally toughened glass**

Heat soaking regime: Glass specified as 'heat soaked' to BS EN 14179-1 must be subjected to a heat soaking regime designed to reduce the incidence of failure due to nickel sulfide inclusions.

Heat soaking period (minimum): Submit proposals.

Mean glass temperature: 290 ±1O"C. Certified evidence of treatment: Submit.

**Impact resistance**

Plastics: To BS 6206.

Glass: To BS 6206 or BS EN 12600.

**Fire resistance**

Test standards: To BS 476-22 or BS EN 1364-1.

**Mirrors**

General: Silvered to give maximum reflection, free from distortion, tarnishing, discoloration, scratches and other defects visible in the designed viewing conditions.

**EXECUTION**

**Workmanship**

Glazing generally: To BS 6262.

Integrity: Glazing must be wind and watertight under all conditions with full allowance made for deflections and other movements.

Dimensional tolerances: Panes/ sheets to be within ± 2 mm of specified dimensions. Materials:

Compatibility: Glass/ plastics, surround materials, sealers primers and paints/ clear finishes to be used together to be compatible. Avoid contact between glazing panes/ units and alkaline materials such as cement and lime.

Protection: Keep materials dry until fixed. Protect insulating glass units and plastics glazing sheets from the sun and other heat sources.

Preparation:

Surrounds, rebates, grooves and beads: Clean and prepare before installing glazing.

**Removal of glazing for reuse**

Existing glass/ plastics and glazing compound, beads, etc: Remove carefully, avoiding damage to frame, to leave clean, smooth rebates free from obstructions and debris.

Deterioration of frame/ surround: Submit report on defects revealed by removal of glazing.

Alfected areas: Do not reglaze until instructed.

Reusable materials : Clean glass/ plastics, beads and other components that are to be reused.

###### Bead fixing

With pins:

Pin spacing: Regular at maximum 150 mm centres, and within 50 mm of each corner. Exposed pin heads: Punched just below wood surface.

With screws:

Screw spacing : Regular at maximum 225 mm centres, and within 75 mm of each corner.

###### Single glazing putty fronted

Glazing installation:

Glass: Located centrally in surround using setting and location blocks, and secured with glazing sprigs/ cleats/ clips at 300 mm centres.

Finished thickness of back bedding after inserting glazing (minimum) : 1.5 mm.

Front putty: Finished to a smooth, neat triangular profile stopping 2 mm short of sight line. Surface lightly brushed to seal putty to glass and left smooth with no brush marks.

Sealing putty: Seal as soon as sufficiently hard but not within 7 days of glazing. Within 28 days apply either the full final

finish, suitably protected until completion and cleaned down and made good as necessary , or two coats of primer/ sealer applied locally to the compound, to be followed nearer completion with the full specified finish.

Opening lights: Keep in closed position until putty has set sufficiently to prevenl displacement of glazing when opened.

###### Single glazing bead fixed with glazing compound

Glazing installation:

Glass: Located centrally in surround using setting and location blocks and distance pieces. Finished thickness of back bedding after inserting glazing (minimum): 3 mm.

Front bedding: Applied lo fill voids .

Beads: Bedded in glazing compound and fixed securely.

Visible edge of glazing compound : Finished internally and externally with a smooth chamfer.

###### Single glazing bead fixed with tapes and capping sealant

Glazing installation:

Glass: Located centrally in surround using setting and location blocks.

Glazing lape: Top edge approximately 6 mm short of sight line on external side of glazing, to allow for capping sealant. Corners butt jointed with no gaps.

Thickness of glazing tape bed (minimum): 3 mm on both sides of glazing after compression. Beads: Bedded in sealant, pressed firmly into position to compress tape, and fixed securely. Excess tape on internal side: Carefully trimmed to a smooth chamfer.

Capping sealant: Applied to fill void between bead and glazing and finished to a smooth chamfer.

###### Single glazing bead fixed with extruded gaskets

Glazing installation:

Glass: Located centrally in surround using selling and location blocks. Gaskets and beads: Installed as recommended by frame manufacturer. Gasket fit al corners: Tight, without gaps.

###### Insulating glazing units bead fixed with extruded gaskets

Glazing installation:

Insulating unit: Located centrally in surround using setting and location blocks. Gaskets and beads: Installed as recommended by frame manufacturer.

Gasket Iii at corners: Tight, without gaps. Drainage and ventilation holes: Unobstructed.

###### Insulating glazing units bead fixed with cellular adhesive sections

Glazing installation:

Insulating unit: Localed centrally in surround using setting and location blocks.

Glazing sections/ strips/ tapes : Applied to rebate upstands and beads in positions recommended by manufacture Beads: Installed using sufficient pressure to compress inner and outer sections/ slrips/ tapes and fixed securely. Drainage and ventilation holes: Unobstructed.

###### Insulating glazing units bead fixed with loadbearing tapes and sealant capping

Glazing installation:

Insulating unit: Located centrally in surround using setting and location blocks.

Glazing sections/ strips/ tapes: Applied to rebate upstands and beads finishing approximately 5 mm short of sight line to allow for capping sealant.

Beads: Installed using sufficient pressure to compress inner and outer sections/ strips/ tapes and fixed securely . Capping sealant: Applied to both sides of glazing unit and finish lo a smooth chamfer.

Drainage and ventilation holes: Unobstructed.

###### Insulating glazing units bead fixed with solid bedding

Glazing installation:

Insulating unit: Located centrally in surround using setting and location blocks and distance pieces. Inner sealant: Applied to full height of rebate.

Outer sealant: Applied to fill edge clearance void and space between unit and beads up to sight line. Finished thickness of back and front bedding after inserting glazing (minimum): 3 mm.

Beads: Bedded on outer sealant and fixed securely. Excess sealant: Trimmed to a smooth chamfer.

###### Single glazing into grooves with sealant capping

Glazing installation:

Glass: Located centrally in grooves using setting blocks and distance pieces of appropriate thickness .

Backing strip: Expanded polyethylene, inserted at head and jambs , ensuring a tight fit and allowing a minimum distance of 6 mm between strip and sight line.

Sill beads: Fixed securely with backing strip between bead and glazing.

Capping sealant: Applied to fill recesses on both sides of glass and finished to a smooth chamfer .

###### Internal tape glazing

Glazing installation: Beads bedded dry to rebate and glazing tape/ section and fixed securely. Tape trimmed flush with sight line on both sides.

###### Mirrors

Installation: Fixed accurately and securely without overtightening fasteners, to provide a flat surlace giving a distortion free reflection.

###### Window film

Application: Carried out by a firm approved by the film manufacturer in accordance with manufacturer's recommendations.

Evidence of applicator's competence and experience: Submit on request.

Sample area: Complete as part of the finished work, in an approved location and obtain approval of appearance before proceeding.

Ambient air temperature at time of application: Above 5 'C.

Installed film: Fully adhered to the glass with no peeling, and free from bubbles, wrinkles, cracks or tears.

Further contact with applied films: Avoid until bonding adhesive has cured. Cleaning and maintenance instructions: Submit copies.

###### Manifestation

Factory application: Acid etching or engraving to be carried out by the glass manufacturer or by a firm approved in accordance with manufacturer's recommendations.

Site application: Adhesive film or transfers to be applied by a firm approved by film manufacturer and in accordance with manufacturer's recommendations.

Sample area: Complete as part of the finished work, in an approved location, and obtain approval of appearance before proceeding.

Ambient air temperature at time of film/ transfer application: Above 5 'C.

Installed film: Fully adhered to the glass with no peeling, and free from bubbles, wrinkles, cracks or tears.

Further contact with applied films: Avoid until bonding adhesive has cured. Cleaning and maintenance instructions: Submit.

## M10 CEMENT BASED LEVELLING AND WEARING SCREEDS

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

##### PRODUCTS

###### Aggregates

Sand: To BS EN 13139.

Grading limit: In accordance with BS 8204-1, table B1.

Coarse aggregates for fine concrete levelling screeds: To BS EN 12620, Designation 4/10. Lightweight aggregates: In accordance with BS 8204-1, Annex A.

###### Cements

Cement types : In accordance with BS 8204-1, clause 5.1.3.

###### Admixtures

Standard: In accordance with BS 8204-1 , Table 1. Calcium chloride: Do not use in admixtures.

###### Self smoothing levelling screeds

Standard: In accordance with BS 8204-7.

###### Reinforcement

Steel fabric: To BS 4483 .

###### Overlay to conduits cast into or under screeds

Reinforcement: Select from:

500 mm wide strip of steel fabric to BS 4483, reference 049; or

welded mesh manufactured in rolls from mild steel wire minimum 1.5 mm diameter to BS 1052, mesh size 50 x 50 mm.

###### Building paper

Standard: To BS 1521.

###### Insulation

Mineral wool (MW) boards: To BS EN 13162.

Expanded polystyrene (EPS) boards: To BS EN 13163. Polyurethane (PUR) foam boards: To BS EN 13165.

##### EXECUTION

###### Suitability of substrates

General:

Suitable for specified levels and flatness/ regularity of finished surfaces. Consider permissible minimum and maximum thicknesses of screeds.

Sound and free from significant cracks and gaps.

Concrete strength: In accordance with BS 8204-1, Table 2. Cleanliness: Remove plaster, debris and dirt.

Moisture content: To suit screed type. New concrete slabs to receive fully or partially bonded construction must be dried out by exposure to the air for minimum six weeks.

###### Surface hardness of substrates to receive polymer modified wearing screeds

General: Substrates must restrain stresses that occur during setting and hardening of wearing screeds.

Test for surface hardness: To BS EN 12504-2 using a rebound hammer with compliance values selected from the following:

Screed thickness 15 mm or less: Rebound hammer value greater than 25. Screed thickness greater than 15 mm: Rebound hammer value greater than 30.

Report: Submit details of areas where substrate surface hardness does not comply with these values .

###### Proprietary levelling/ wearing screeds

General: Materials, mix proportions, mixing methods, minimum/ maximum thicknesses and workmanship must be in accordance with recommendations of screed manufacturer.

Standard: In accordance with BS 8204-3.

###### Conduits

Under floating screeds: Before laying insulation for floating screeds, haunch up in 1:4 cement:sand on both sides of conduits.

Cast into or under screeds: Overlay with reinforcement placed mid depth between top of conduit and screed surface. Screed cover over conduit: 25 mm (minimum).

###### Fully bonded construction

Preparation: Generally in accordance with BS 8204-1.

Removing mortar matrix: Shortly before laying screed, expose coarse aggregate over entire area of hardened substrate. Texture of surface: Suitable to accept screed and achieve a full bond over complete area.

###### Cement slurry bonding

Application: Shortly before laying screed, thoroughly wash clean the surface and keep well wetted for several hours. Remove free water then brush in cement slurry bonding coat of creamy consistency.

Screeding: While slurry is still wet.

###### Unbonded construction

Separation: Lay screed over sheet dpm or a separating layer.

Separating layer: Lay on clean substrate. Turn up for lull depth of screed at abutments with walls. columns. etc. Lap 100 mm at joints .

**Floating construction**

Insulation: Lay with tight butt joints. Continue up at perimeter abutments !or full depth of screed. Separating layer: Lay over insulation and turn up at perimeter abutments . Lap 100 mm at joints.

**Floating construction (thin sheet impact sound insulation)**

Substrate: Remove projections that may puncture the insulation.

Insulation: Lay on substrate. Turn up !or full depth of screed at perimeter abutments. Lap 100 mm at joints and seal with tape.

Perimeter: Maintain isolation of screed.

**Batching with dense aggregates** Mix proportions: Specified by weight. Batching: Select from:

Batch by weight.

Batch by volume: Permitted on the basis of previously established weight:volume relationships of the particular materials. Use accurate gauge boxes. Allow for bulking of damp sand.

**Mixing**

Water content: Minimum necessary to achieve full compaction, low enough to prevent excessive water being brought to surface during compaction.

Mixing: Mix materials thoroughly to uniform consistency. Mixes other than no-fines must be mixed in a suitable forced action mechanical mixer. Do not use a free fall drum type mixer.

Consistency: Use while sufficiently plastic for full compaction.

Ready-mixed retarded screed mortar: Use within working time and site temperatures recommended by manufacturer. Do not retemper .

**In situ crushing resistance (ISCR)**

Standards and category: In accordance with BS 8204-1 table 4.

* Testing of bonded and unbonded screeds: In accordance with BS 8204-1, Annex D. Testing of floating levelling screeds: In accordance with BS 8204-1, Annex E. Make arrangements for test to be witnessed/ certified.

**Adverse weather**

Screeds surface temperature: Maintain above 5 ° C for a minimum of four days after laying. Hot weather: Prevent premature setting or drying out.

**Flatness/ Surface regularity of floor screeds**

Standard: In accordance with BS 8204-1, Table 5. Test: In accordance with BS 8204-1, Annex C. Sudden irregularities: Not permitted.

**Screeding to falls**

Minimum screed cover: Maintain at lowest point. Falls: Gradual and consistent.

**Compaction of screeds**

General: Compact thoroughly over entire area.

Screeds over 50 mm thick: Lay in two layers of approximately equal thickness. Roughen surface of compacted lower layer then immediately lay upper layer.

**Stair screeds**

Construction: Fully bonded to treads, risers and landings. Risers: Form using fine finish formwork.

Wearing screed surfaces: Make good with compatible cement:sand mix. Wood float. When hardened remove laitance.

**Installation of reinforcement**

Steel fabric: In accordance with BS 8204-1 .

Strip reinforcement: Place between the two layers of screed and centre over joints. Lap ends 100 mm (minimum).

**Joints in levelling screeds**

Laying screeds: Lay continuously using 'wet screeds' between strips or bays. Minimize defined joints. Daywork joints: Form with vertical edge.

**Formed joints in wearing screeds**

Temporary forms: Square edged with a steel top surface and in good condition.

Placing screed: Compact thoroughly at edges to give level, closely abutted joints with no lipping.

**Crack inducing grooves in wearing screeds**

Groove depth: At least half the depth of wearing screed.

Cutting grooves: Straight, vertical and accurately positioned. Saw cut sufficiently early alter laying to prevent random cracking.

**Strip movement joints**

Installation: Set securely into screed to exact finished level of floor. Extend joints through to substrate.

###### Finishing

Timing: Carry out finishing operations at optimum times in relation to setting and hardening of screed material. Prohibited treatments to screed surfaces:

* Wetting to assist surface working.

Sprinkling cement.

Smooth floated finish: Even texture with no ridges or steps. Trowelled finish to levelling screeds:

Floating: To an even texture with no ridges or steps.

Trowelling: To a uniform, smooth but not polished surface. free from trowel marks and other blemishes, and suitable to receive specified flooring material.

Trowelled finish to wearing screeds:

Floating: To an even texture with no ridges or steps.

Trowelling: Successively trowel at intervals, applying sufficient pressure to close surface and give a uniform smooth finish free from trowel marks and other blemishes.

###### Curing

General: Prevent premature drying. Immediately after laying, protect surface from wind, draughts and strong sunlight. As soon as screed has set sufficiently, closely cover with polyethylene sheeting.

Curing period: Keep polyethylene sheeting in position for a minimum period of seven days.

Drying after curing: Allow screeds to dry gradually. Do not subject screeds to artificial drying conditions that will cause cracking or other shrinkage related problems.

###### Slip resistance testing of wearing screeds

Test:

To the relevant parts of BS 7976-1 and BS 7976-2 using a TRL Pendulum. Make arrangements for test to be witnessed/ certified.

Report: Submit. Include slip resistance values in the wet and dry states.

###### Abrasion testing of wearing screeds

Test method: To BS EN 13892-4.

## M13 CALCIUM SULFATE BASED SCREEDS

**GENER AL**

###### Cross-reference

General: Read with A90 General technical requirements.

## PRODUCTS

###### Sand

Standard: To BS EN 13139.

Grading limits: In accordance with BS 8204-1, table B.1.

###### Building paper

Standard: To BS 1521.

###### Insulation

Mineral wool (MW) board: To BS EN 13162.

Expanded polystyrene (EPS) board: To BS EN 13163. Rigid polyurethane (PUR) foam board: To BS EN 13165.

## EXECUTION

###### Suitability of substrates

General:

* Within tolerances for level and surface regularity. Moisture content: To suit type of screed.

Sound, clean and even textured.

Concrete strength: In accordance with BS 8204-1, table 2. Penetrations/ Outlets: Completed.

Movement joints: Correctly installed.

###### Conduits under floating screeds

Requirement: Haunch up on both sides of conduits in 1:4 cement:sand mortar. Timing: Before laying insulation.

###### Mixing screeds

Mixing:

Mechanical mixer: Suitable forced action. Do no\ use a free fall drum mixer . Proportions (synthetic anhydrite:sand): 1:4.25.

Materials: Mix thoroughly to uniform consistence.

Water content: Minimum necessary to achieve crystallisation of synthetic anhydrite and full compaction.

###### Screeding to falls

Screed cover: Maintain minimum thickness at lowest point. Falls: Gradual and consistent.

###### In situ crushing resistance

Standard: In accordance with BS 8204-1. table 4.

Testing of bonded and unbonded levelling screeds: To Annex D. Testing of floating levelling screeds: To Annex E.

###### Flatness/ Surface regularity of screeds

Standard: In accordance with BS 8204-1, table 5.

Testing: To Annex C.

Sudden irregularities: Not permitted.

###### Laying screeds

Trowelled screeds: Lay continuously using 'we\ screeds' between strips or bays. Compact thoroughly . Defined joints: Minimize.

###### Trowelled finish to screeds

Surface on completion: Uniform and smooth but not polished, suitable to receive specified flooring material.

###### Curing trowelled screeds

General: Prevent premature drying. Immediately after laying, protect surface from wind, draughts and strong sunlight. As soon as screed has set sufficiently, closely cover with polyethylene sheeting.

Curing period: Keep polyethylene sheeting in position for a minimum period of 48 hours.

Drying after curing: Allow screeds to dry gradually. Do not subject to artificial drying conditions that will cause cracking or other shrinkage related problems.

## M20A PLASTERED COATINGS

##### GENER AL

###### Cross-reference

General: Read with A90 general technical requirements.

##### PRODUCTS

###### Component materials for cement gauged plaster mortars

Lime:sand, ready-mixed: Lime to BS EN 459-1, type CL 90. Sand to BS EN 13139, grading 0/2 or *014* (GP or MP) with category 2 fines

Sand: To BS EN 13139; grading 0/2 or 0/4 (GP or MP) with category 2 fines.

Lime: To BS EN 459-1; type CL 90S.

Air entraining (plasticizing) admixtures: To BS EN 934-2 and compatible with other mortar constituents. Pigment for coloured mortars: To BS EN 12878.

Cement: Common Portland to BS EN 197-1; from GEM 1, slag GEM 11/S, fly ash GEM llN or W. White cement: Portland to BS EN 197-1, GEM 1

Sulfate resisting cement: Portland to BS 4027.

Masonry cement: To BS EN 998-1.

###### Component materials for lime:sand plaster mortars

Nonhydraulic ready prepared lime putty: Slaked directly from CL 90 (high calcium) quicklime to BS EN 459-1. Natural hydraulic lime (NHL): To BS EN 459-1.

Sand: To BS EN 13139; grading to approval.

###### Gypsum plasters

Lightweight gypsum plaster undercoats: To BS 8481. Gypsum plaster: To BS 8481.

Board finish plaster: To BS 8481. Finish plaster: To 8481.

###### Gypsum plasterboard backings

Plasterboard: To BS EN 520.

###### Beads, stops and lath

Galvanized steel: To BS EN 13658-1.

Stainless steel: To BS EN 10088-1, grade 1.4301 (304).

###### Isolating membranes

Building paper: To BS 1521 .

##### EXECUTION

###### Admixtures

Suitable admixtures:

Other than air entraining (plasticizing) admixtures to BS EN 934-2: Submit proposals. Prohibited admixtures: Calcium chloride and any admixture containing calcium chloride.

###### Mixing

Render mortars (site-made):

Batching: By volume. Use clean and accurate gauge boxes or buckets. Mix proportions: Based on damp sand. Adjust for dry sand.

Lime:sand: Mix thoroughly. Allow to stand, without drying out, for at least 16 hours before using.

Mixes: Of uniform consistence and free from lumps. Do not retemper or reconstitute mixes. Contamination: Prevent intermixing with other materials.

###### Site preparation of lime putty for lime:sand plaster mortars

Type: Slaked directly from CL 90 quicklime to BS EN 459-1, using an excess of water.

Maturation: In pits/ containers that allow excess water to drain away. Density of matured lime pulty: 1.3-1.4 kg/litre.

Maturation period before use (minimum): 90 days. Storage: Prevent drying out or wetting.Protect from frost.

###### Cold weather

General: Do not use frozen materials or apply coatings to frozen or frost bound backgrounds.

Internal work. Take all necessary precautions to enable internal coating work to proceed without damage when air temperature is below 3 "C.

###### Hair reinforcement for lime:sand plaster mortars

Proportions {approximate): 5 kg hair to 1 m3 of coarse stuff.

Condition: Clean, free from grease and other impurities. Well teased before adding to the mix. Distribution: Evenly throughout with no balling into lumps.

Storage period for haired mortar (maximum): Four weeks .

###### Suitability of substrates

Soundness: Free from loose areas and significant cracks and gaps.

Cutting, chasing, making good, fixing of conduits and services outlets and the like: Completed. Tolerances: Permitting specified flatness/ regularity of finished coatings.

Cleanliness: Free from dirt, dust, efflorescence and mould, and other contaminants incompatible with coatings.

###### Stipple key

Mix proportions (cement:sand): 1:1.5-2. Consistency: Thick slurry, well stirred.

Application: Brushed and stippled to form deep, close-textured key. Curing: Controlled to achieve a firm bond to substrate.

###### Bonding agent

General: Apply evenly to substrate to achieve effective bond of plaster coat. Protect adjacent joinery and other surfaces.

###### Removing defective existing plaster.

Plaster for removal: Detached, soft, friable, badly cracked, affected by efflorescence or otherwise damaged.

Hollow areas: Submit proposals. Stained plaster: Submit proposals.

Removing defective plaster: Cut back to square, sound edge.

Faults in substrate (structural deficiencies, damp, etc.): Submit proposals. Cracks:

Fine hairline cracking/ crazing: Leave.

Other cracks: Submit proposals.

Dust and loose material: Remove from exposed substrates and edges.

###### Existing damp affected plaster

Plaster affected by rising damp: Remove to a height of 300 mm above highest point reached by the damp or 1 m above dpc, whichever is higher.

Perished and salt contaminated masonry: Mortar joints: Rake out.

Masonry units: Submit proposals .

Faults in substrate (structural deficiencies, additional sources of damp, etc.): Submit proposals.

Drying out substrates: Established drying conditions. Leave walls to dry for as long as possible before plastering. Dust and loose material: Remove from exposed substrates and edges.

###### Gypsum plasterboard backings

Exposed surface and edge profiles: Suitable to receive specified plaster finish.

###### Fixing plasterboard backings to timber backgrounds

Fixings, accessories and installation methods: As recommended by board manufacturer. Fixing: At the following centres (maximum):

Nails: 150 mm.

Screws to partitions/ walls: 300 mm. Reduce to 200 mm at external angles. Screws to ceilings: 230 mm.

Position of nails/ screws from edges of boards (minimum): Bound edges: 1O mm

Cut/ unbound edges 13mm.

Position of nails/ screws from edges of supports (minimum): 6 mm.

Naill screw heads: Set below surface . Do not break paper or gypsum core.

###### Fixing plasterboard backings to metal framing/ furrings

Fixings, materials, accessories and installation methods: As recommended by board manufacturer.

###### Joints in plasterboard backings

Ceilings:

Bound edges: At right angles to supports and with ends staggered in adjacent rows. Two layer boarding: Stagger joints between layers.

Partitions/ Walls:

Vertical joints: Centre on studs. Stagger joints on opposite sides of studs. Two layer boarding: Stagger joints between layers.

Horizontal joints: Two layer boarding: Stagger joints between layers by at least 600 mm. Support edges of outer layer.

Joint widths (maximum): 3 mm.

###### Dampproof lathing

Fixing and sealing accessories: As recommended by the dampproof lathing manufacturer. Fixing: Secure and firm to provide a continuous, keyed backing for coatings.

Joints between lathing sheets and junctions with services, windows and other openings: Prevent penetration and bridging

of cavity by coatings.

###### Beads and stops generally

Location: External angles and stop ends, except where specified otherwise. Corners: Neat mitres at return angles.

Fixing: Secure, using longest possible lengths, plumb, square and true to line and level, ensuring full contact of wings with substrate.

Finishing: After coatings have been applied, remove surplus material while still wet, from surfaces of beads/ stops

exposed to view.

###### Crack control at junctions between dissimilar solid substrates

Locations: Where dissimilar solid substrate materials are in same plane and rigidly bonded or tied together but defined movement joints are not required.

Crack control materials:

Isolating layer: Building paper.

Metal lathing: Galvanized steel plain expanded metal with spacers.

Installation: Fix metal lathing over isolating layer. Staggerfixings along both edges of lathing. Width of installation over single junctions:

Isolating layer: 150 mm.

Lathing: 300 mm.

Width of installation across face of dissimilar background material (column, beam, etc. with face width not greater than 450 mm):

Isolating layer: 25 mm (minimum) beyond junctions with adjacent substrate. Lathing: 100 mm (minimum) beyond edges of isolating layer.

###### Fibrous plaster mouldings

Noggings, bearers, etc. to support mouldings: Position accurately. Fix securely. Installation: True to line and level.

Framing, fixing points and joints: Reinforce.

Finishing: Smooth, to correct profile and with flush joints.

###### Plastering application generally

Application of coatings: Firmly and in one continuous operation between angles and joints. Achieve good adhesion. Appearance of finished surfaces: Even and consistent. Free from rippling, hollows, ridges, cracks and crazing.

Accuracy: Finish to a true plane, to correct line and level, with angles and corners to a right angle unless specified otherwise, and with walls and reveals plumb and square.

Drying out: Prevent excessively rapid or localised drying out.

###### Flatness/ surface regularity

Sudden irregularities: Not permitted.

Deviation of plaster surlace: Measure from underside of a straight edge placed anywhere on surface.

Permissible deviation (maximum) for plaster not less than 13 mm thick: 3 mm in any consecutive length of 1800 mm.

###### Dubbing out

General: Correct substrate inaccuracies.

New smooth, dense concrete and similar surfaces: Dubbing out prohibited unless total plaster thickness is within range recommended by plaster manufacturer.

Thickness of any one coat (maximum): 10 mm. Mix: As undercoat.

Application: Achieve firm bond. Allow each coat to set sufficiently before the next is applied. Cross scratch surlace of each coat.

###### Undercoats generally

General: Rule to an even surlace. Cross scratch to provide a key for the next coat. Undercoats on metal lathing: Work well into interstices to obtain maximum key.

Undercoats gauged with Portland cement: Do not apply next coat until drying shrinkage is substantially complete.

###### Smooth finish

Appearance: A tight , matt, smooth surlace with no hollows, abrupt changes of level or trowel marks. Avoid water brush, excessive trowelling and over polishing.

###### Wood float finish

Appearance: An even overall texture. Finish with a dry wood float as soon as wet sheen has disappeared.

## M20B RENDERED AND ROUGHCAST COATINGS

##### GENER AL

###### Cross-reference

General: Read with A90 general technical requirements.

##### PRODUCTS

###### Component materials for cement gauged render mortars

Lime:sand, ready-mixed: Lime to BS EN 459-1, type CL 90. Sand to BS EN 13139, grading 0/2 or *014* (CP or MP) with category 2 fines.

Sand: To BS EN 13139; grading 0/2 or *014* (CP or MP) with category 2 fines. Coarse aggregates: Single size to BS EN 12620.

Lime: To BS EN 459-1; type CL 90S.

Air entraining (plasticizing) admixtures: To BS EN 934-2 and compatible with other mortar constituents. Pigment tor coloured mortars: To BS EN 12878.

Cement: Common Portland to BS EN 197-1; from CEM 1, slag CEM 11/S, fly ash CEM JIN or W.

White cement: Portland to BS EN 197-1, CEM 1. Sulfate resisting cement: Portland to BS 4027.

Masonry cement: To BS EN 998-1.

###### Component materials for lime:sand render mortars

Nonhydraulic ready prepared lime putty: Slaked directly from CL 90 (high calcium) quicklime to BS EN 459-1. Natural hydraulic lime (NHL): To BS EN 459-1.

Sand: To BS EN 13139; grading to approval.

###### Beads, stops and lath

Internal: Galvanized steel to BS EN 13658-1.

External: Stainless steel to BS EN 10088-1, grade 1.4301 (304).

###### Isolating membranes

Building paper: To BS 1521.

###### Dry dash finish

Coarse aggregate: To BS BS EN 12620. Well washed.

##### EXECUTION

###### Admixtures

Suitable admixtures:

Other than air entraining (plasticizing) admixtures to BS EN 934-2: Submit proposals. Prohibited admixtures: Calcium chloride and any admixture containing calcium chloride.

###### Mixing

Render mortars (site-made):

Ba1ching: By volume . Use clean and accurate gauge boxes or buckets. Mix proportions: Based on damp sand. Adjust for dry sand.

Lime:sand: Mix thoroughly. Allow to stand. without drying out, for at least 16 hours before using.

Mixes: Of uniform consistence and free from lumps. Do not retemper or reconstitute mixes. Contamination: Prevent intermixing with other materials.

###### Preparation of lime putty for lime:sand render mortars

Type: Slaked directly !ram CL 90 quicklime to BS EN 459-1, using an excess of water.

Maturation: In pits/ containers that allow excess water lo drain away . Density of matured lime putty: 1 .3-1.4 kg/litre.

Maturation period before use (minimum): 90 days. Storage: Prevent drying out or wetting. Protect from frost.

###### Cold weather

General: Do not use frozen materials or apply coatings to frozen or frost bound backgrounds.

External work: Avoid when air temperature is at or below 5"C and falling or below 3"C and rising. Maintain temperature of work above freezing until coatings have fully hardened.

###### Hair reinforcement

Proportions {approximate): 5 kg hair to 1 m3 of coarse stuff.

Condition: Clean, free from grease and other impurities. Well teased before adding to the mix. Mix: Well distributed throughout with no balling into lumps.

Storage period for haired mortar: 4 weeks (maximum).

###### Suitability of substrates

Soundness: Free from loose areas and significant cracks and gaps.

Cutting, chasing, making good, fixing of conduits and services outlets and the like: Completed. Tolerances: Permitting specified flatness/ regularity of finished coatings.

Cleanliness: Free from dirt, dust, efflorescence and mould, and other contaminants incompatible with coatings .

###### Stipple key

Mix proportions (cement:sand): 1:1.5-2. Consistency: Thick slurry, well stirred.

Application: Brushed and stippled to form deep, close-textured key. Curing: Controlled to achieve a firm bond to substrate.

###### Bonding agent

General: Apply evenly to substrate to achieve effective bond of render coat. Protect adjacent joinery and other surfaces.

###### Removing defective existing render

Render for removal: Detached, hollow, soft, friable, badly cracked affected by efflorescence or otherwise damaged: Removing defective render: Cut out to regular rectangular areas with straight edges.

Horizontal and vertical edges: Square cut or slightly undercut. Bottom edges to external render: Do not undercut.

Render with imitation joints: Cut back to joint lines.

Cracks:

Fine hairline cracking/ crazing: Leave. Other cracks: Submit proposals.

Dust and loose material: Remove from exposed substrates and edges.

###### Dampproof lathing

Fixing and sealing accessories: As recommended by the dampproof lathing manufacturer. Fixing: Secure and firm to provide a continuous, keyed backing for coatings.

Joints between lathing sheets and junctions with services, windows and other openings: Prevent penetration and bridging of cavity by coatings .

###### Beads and stops generally

Location: External angles and stop ends, except where specified otherwise. Corners: Neat mitres at return angles.

Fixing: Secure, using longest possible lengths, plumb, square and true to line and level, ensuring full contact of wings with substrate .

Finishing: After coatings have been applied, remove surplus material while still wet, from surfaces of beads/ stops exposed to view.

###### Crack control at junctions between dissimilar solid substrates

Locations: Where dissimilar solid substrate materials are in same plane and rigidly bonded or tied together but defined movement joints are not required.

Crack control materials:

Isolating layer: Building paper.

Metal lathing: Stainless steel ribbed expanded metal.

Installation: Fix metal lathing over isolating layer. Staggerfixings along both edges of lathing. Width of installation over single junctions:

Isolating layer: 150 mm. Lathing: 300 mm.

Width of installation across face of dissimilar background material (column, beam, etc. with face width not greater than 450

mm):

Isolating layer: 25 mm (minimum) beyond junctions with adjacent substrate. Lathing: 100 mm (minimum) beyond edges of isolating layer.

###### Rendering generally

Application of coatings: Firmly and in one continuous operation between angles and joints. Achieve good adhesion. Appearance of finished surfaces: Even and consistent. Free from rippling, hollows, ridges, cracks and crazing .

Accuracy: Finish to a true plane, to correct line and level, with angles and corners to a right angle unless specified otherwise, and with walls and reveals plumb and square.

Drying out: Prevent excessively rapid or localised drying out.

###### Flatness/ surface regularity of rendering to receive ceramic tiles

Sudden irregularities: Not permitted.

Deviation of render surface: Measure from underside of a 2m straight edge placed anywhere on surface.

Permissible deviation: 3 mm (maximum).

###### Dubbing out for rendering

General: Correct substrate inaccuracies. Thickness of any one coat: 16 mm (maximum).

Total thickness: 20 mm (maximum), otherwise obtain instructions.

Mix: As undercoat.

Application: Achieve firm bond. Allow each coat to set sufficiently before the next is applied. Comb surface of each coat.

###### Undercoats generally

General: Rule to an even surface. Comb to provide a key for the next coat. Do not penetrate the coat. Undercoats on metal lathing: Work well into interstices to obtain maximum key.

###### Thrown undercoats for lime:sand roughcast (harling)

Application of undercoats and dubbing out: Throw from a casting trowel or scoop. Finishing: Press back to give an even finish without smoothing the surface.

###### Final coat finish

Plain floated finish: Even, open texture free from laitance.

Scraped finish: Scraped to expose aggregate and achieve an even texture. Roughcast (harling) finish: Left as cast with an even thickness and texture.

Dry dash finish: Achieve firm adhesion to an even overall appearance. After throwing aggregate tap particles tightly into

coating.

###### Curing and drying renders generally

General: Prevent premature setting and uneven drying of each coat.

Curing coatings: Keep each coat damp by covering with polyethylene sheet and/ or spraying with water.

Curing period (minimum): 3--4 days.

Final coat: Hang sheeting clear of the final coat.

Drying: Allow each coat to dry thoroughly, with drying shrinkage substantially complete before applying next coat. Protection: Protect from frost and rain.

###### Curing and drying nonhydraulic lime:sand render

General: Prevent premature setting and uneven drying of each coat.

Curing coatings: Keep each coat damp by covering with damp hessian and polythene sheeting hung clear of coating. Spray with water until sufficiently firm.

Shrinkage: Thoroughly consolidate/ scour each coat one or more times as necessary to control shrinkage.

###### Substrates for waterproof renders

Leaks: Prevent leaks from cracks, porous patches and other defective areas subject to water pressure and liable to admit water.

Holes for fasteners: Minimize. Form and seal before coatings applied. Do not make any holes after coatings have been applied.

###### Application of waterproof renders

General: Achieve good adhesion and effective waterproofing. Joints: Minimize.

* Joints in successive coatings: Stagger by 100 mm (minimum) and splay edges. Do not locate joints at angles. Internal angles: Form fillets after applying first coat. Form smooth round coves after applying final coat.

Cross scratching/ combing coatings: Prohibited.

## M40 STONE, QUARR Y AND CERAMIC TILING OR MOSAIC

**GENER AL**

###### Cross-reference

General: Read with A90 General technical requirements.

# PRODUCTS

###### Tiles

Ceramic floor and wall tiles (including quarry tiles and ceramic mosaics): To BS EN 14411. Natural stone calibrated modular tiles: To BS EN 12057.

Natural stone not calibrated modular tiles: To BS EN 12057. Natural stone slabs: To BS EN 12058.

###### Bedding adhesive

Standard: To BS EN 12004.

###### Mortar bedding mix

Cement: Portland to BS EN 197-1, type GEM 1/42.5. Sand:

For bedding to walls: To BS EN 13139, with grading designation 0/2 (GP or MP) category 2 fines.

* For bedding to floors: To BS EN 13139, with grading designation 0/4 (MP) category 1 fines and between 20%-66% passing a 0.5 sieve.

Ready mixed lime:sand (coarse stuff) for bedding to floors: To BS EN 998-2.

###### Cement:sand grouting mix

Cement: Portland to BS EN 197-1, type GEM 1/42.5. Sand:

* Joint widths of 6 mm or more: To BS EN 13139, with grading designation 0/2 (FP or MP), category 2 fines.
* Joint widths of 3-6 mm: To BS 5385-5, table 1.

Mixing: Mix thoroughly. Use the minimum of clean water needed for workability.

###### Sealants

Standard: To BS EN ISO 11600, type F.

###### Crack control reinforcement

Standard: To BS 4483.

# EXECUTION

###### Adverse weather

Temperatures below 5"C or damp conditions: Do not fix tiles. Frozen materials: Do not use.

Frozen or frost bound substrates: Do not apply finishes. Inclement weather, frost and premature drying out: Protect work.

###### Suitability of backgrounds/ bases

Background/ base tolerances: To permit specified flatness/ regularity of finished surfaces given the permissible minimum and maximum thicknesses of bedding.

Background/ base drying times (minimum) before tiling:

* Concrete slabs, concrete walls and brick/ block walls: 6 weeks.
* Cement: sand screeds: 3 weeks. Rendering: 2 weeks.
* Gypsum plaster: 4 weeks.

###### Falls in bases

General: Give notice if falls are inadequate.

###### Existing backgrounds/ bases

Efflorescence, laitance, dirt and other loose material: Remove.

Deposits of oil, grease and other materials incompatible with the bedding: Remove. Tile, paint and other nonporous surfaces: Clean.

Wet substrates: Dry before tiling.

Loose or hollow portions: Cut out.

Plaster which is loose, soft , friable, badly cracked or affected by efflorescence: Remove. Cut back to straight horizontal and vertical edges.

Making good: Use plaster or nonshrinking filler.

Defective areas of glazed brick: Cu out. Loose or hollow sounding tiles: Remove.

Paint with unsatisfactory adhesion: Remove so as not to impair bedding adhesion.

###### New in situ concrete

Mould, oil, surface retarders and other materials incompatible with bedding: Remove.

###### New plaster

Plaster: Dry, solidly bedded, free from dust and friable matter. Plaster primer: Apply if recommended by adhesive manufacturer.

###### Plasterboard

Boards: Dry, securely fixed and rigid with no protruding fixings and face to receive decorative finish exposed.

###### Smoothing underlayment

Condition: Allow to dry before tiling .

###### Intermediate substrate

Joints: Close butt. Penetrations: Seal.

Substrate surface: Secure, true and even.

###### Fixing

Colour/ Shade: Unintended variations within tiles for use in each area/ room are not permitted. Variegated tiles: Mix thoroughly.

Adhesive: Compatible with background/ base. Prime if recommended by adhesive manufacturer.

Use of admixtures with cementitious adhesives: Only admixtures approved by adhesive manufacturer. Cut tiles: Neat and accurate.

Fixing: Provide adhesion over entire background/ base and tile backs. Final appearance:

Before bedding material sets, adjust tiles and joints to give true, regular appearance when viewed under final lighting conditions.

Width, plane and alignment of joints between mosaic sheets: To match joints between mosaic tiles.

Surplus bedding material: Clean from joints and face of tiles without disturbing tiles.

###### Setting out

Joints: True to line, continuous and without steps.

Walls: Horizontal, vertical and aligned round corners.

Floors: If setting out is not indicated on drawings, parallel to the main axis of the space or specified features. Adjoining floors/ walls and adjoining floors/ skirtings: Align.

Cut tiles: Minimize number, maximize size and position unobtrusively . Movement joints: If locations are not indicated, submit proposals.

###### Flatness and regularity of tiling/ mosaics

Sudden irregularities: Not permitted.

Deviation of surfaces: Measure from underside of a 2 m straightedge with 3 mm thick feet placed anywhere on the surface. The straightedge must not be obstructed by the tiles and no gap should be greater than 6 mm, i.e. a tolerance of plus or minus 3 mm.

###### Level of tiling across joints

Deviation between tile surfaces either side of a joint (maximum): 1 mm for joints less than 6 mm wide.

2 mm for joints 6 mm or greater in width.

###### Bedding mortar

Batching: Select from: Batch by weight.

Batch by volume: Permitted on the basis of previously established weight:volume relationships of the particular materials. Use accurate gauge boxes. Allow for bulking of damp sand.

Mixing: Thoroughly to achieve uniform consistence. Use a suitable forced action mechanical mixer. Do not use a free fall

type mixer.

Application: Within two hours of mixing at normal temperatures . Do not use after initial set. Do not retemper.

###### Crack control reinforcement

Installation: Place centrally in depth of bed. Lap not less than 100 mm and securely tie together with steel wire. Corners: Avoid a four layer build at corners.

###### Skirtings

Coved tile skirtings: Bed solid to wall before laying floor tiles. Sit-on tile skirtings: Bed solid to wall after laying floor tiles.

###### Semidry cement:sand bed (floors)

Water content: A film of water must not form on surface of bed when fully compacted.

###### Movement joints

General: Extend through tiles and bedding to base/ background. Rigid joint sections: Set to exact finished level of floor.

Structural joints: Centre movement joint over joints in base/ background.

###### Grouting

Sequence: Grout when bed/ adhesive has set sufficient to prevent disturbance of tiles. Joints: 6 mm deep (or depth of tile if less). Free from dust and debris.

Grouting: Fill joints completely, tool to profile, clean off surface. Leave free from blemishes. Polishing: When grout is hard, polish tiling with a dry cloth.

Coloured grout:

* Staining of tiles: Not permitted.

Evaluating risk of staining: Apply grout to a few tiles in a small trial area. If discolouration occurs apply a protective sealer to tiles and repeat trial.

**M50 RUBBER, PLASTICS, CORK, LINO, AND CARPET TILING AND SHEETING**

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

##### PRODUCTS

###### PVC (vinyl) flooring

PVC (vinyl) homogenous and heterogeneous flooring: To BS EN 649. PVC (vinyl) faced, felt backed sheet flooring: To BS EN 650.

PVC (vinyl) faced, PVC foam backed sheet flooring: To BS EN 651.

PVC (vinyl) particle based enhanced slip resistance flooring: To BS EN 13845. Classification: To BS EN 685.

###### Rubber flooring

Smooth rubber flooring: To BS EN 1817. Relief rubber flooring: To BS EN 12199. Classification: To BS EN 685.

**Linoleum flooring** Standard: To BS EN 548. Classification: To BS EN 685.

###### Piled carpet tile and sheet flooring

Classification: To BS EN 1307.

###### Needled carpet tile and sheet flooring - Flat surface

Classification: To BS EN 1470.

###### Needled pile carpet tile and sheet flooring - Pile surface

Classification: To BS EN 13297.

###### Flexible underlays for textile floor coverings

Standard: To BS 5808 and BS EN 14499.

###### Rigid sheet (fabricated) underlays

Hardboard: To BS EN 622-2.

Plywood: To an approved national standard.

* Bonding quality: To BS EN 314-2.
* Appearance class: To BS EN 635.

Medium density fibreboard (MDF): To BS EN 622-5.

##### EXECUTION

###### Roll materials

Setting out of seams: Before ordering roll materials, submit proposals.

###### Conditioning

General: Condition materials as necessary to ensure that floor covering will not shrink, expand, curl or otherwise distort after laying.

Method: Submit proposals for storing and unpacking materials, conditioning time and storage temperature.

###### Commencement

Condition of works prior to laying materials: Building: Weathertight and well dried out. Wet trades: Finished.

Paintwork: Finished and dry. Conflicting overhead work: Complete.

Floor service outlets, duct covers and other fixtures around which materials are to be cut: Fixed.

Notification: Submit not less than 48 hours before commencing laying.

###### Environment

Temperature and humidity: Before, during and after laying, maintain approximately at levels which will prevail after building is occupied.

Ventilation: Before during and after laying, maintain adequate provision.

###### Floors with underfloor heating

Commencement of laying: 48 hours (minimum) after heating has been turned off.

Post laying start up of heating system: Slowly return heating to its operative temperature.

Timing: 48 hours (minimum) after completing laying.

###### New bases

Condition after preparation: Rigid, dry, sound, smooth and free from grease, dirt and other contaminants.

Suitability of bases and conditions within any area: Commencement of laying of coverings indicates acceptance of suitability.

###### Moisture content testing of new wet laid substrates:

Timing: Four days (minimum) after drying aids have been switched off.

Moisture content test: In accordance with BS 5325, Annexe A or BS 8203, Annexe A.

Locations for readings: In all corners, along edges, and at various points over area being tested.

Commencement of laying coverings: After all readings show 75% (maximum) relative humidity.

###### Existing bases

Notification: Before commencing work, confirm that existing bases will, after preparation, be suitable to receive coverings. Bases from which existing floor coverings have been removed: Clear of covering and as much adhesive as possible.

Preparation: Skim with smoothing underlayment compound to give a smooth, even surface.

Existing floor coverings to be overlaid:

Preparation: Make good by local resticking and patching or filling with smoothing underlayment compound to give a smooth, even surface.

Wood block flooring: Clean and free from wax with all blocks sound and securely bonded.

Preparation: Fill hollows with smoothing compound to give a smooth, even surface.

Missing and loose blocks: Replace and reset in adhesive to match existing. Sand or plane to make level.

Timber boarding/ strip flooring: Boards securely fixed and acceptably level.

Protruding fasteners: Not permitted.

Preparation: Plane, sand or apply smoothing compound to give a smooth, even surface.

Particleboard flooring: Boards securely fixed, level and free from surface sealers and contaminants.

Gaps between boards: 1 mm (maximum).

###### Fabricated hardboard underlay

Existing floor boards: Securely fixed and level with no gross irregularities or protruding fasteners. Conditioning of sheets: Prior to fixing.

Requirement: To restrict in situ expansion and prevent consequential disfigurement lo floor coverings.

Timing: Allowed to dry before covering.

Joints: Not coincident with joints in substrate. Cross joints staggered.

Joints in underlay for rubber, plastics, cork, linoleum flooring: Butted. Joints in underlay for carpet sheet and tiles: 1-2 mm wide.

Fasteners: Set flush with surface.

General fixing: At 150 mm grid centres over area of each sheet. Perimeter fixing: At 100 mm centres, set in 12 mm from edge.

###### Fabricated plywood underlay

Existing floor boards: Securely fixed and level with no gross irregularities or protruding fasteners. Joints: Not coincident with joints in substrate. Cross joints staggered.

Joint width: 0.5-1 mm.

Fasteners: Set flush with surface.

General fixing: At 150 mm grid centres over area of each sheet. Perimeter fixing: At 100 mm centres, set in 12 mm from edge.

###### Medium density fibreboard underlay

Existing lloor boards: Securely fixed and level with no gross irregularities or protruding fasteners. Joints: Not coincident with joints in substrate. Cross joints staggered.

Joints in underlay for rubber, plastics, cork, linoleum flooring: Butted.

* Joints in underlay for carpet sheet and tiles: 1-2 mm wide. Fasteners: Set flush with surface.

General fixing: At 150 mm grid centres over area of each sheet. Perimeter fixing: At 100 mm centres, set in 12 mm from edge.

###### Setting out tiles

Method: Set out from centre of area.

* Tiles along opposite edges: Of equal size.

Edge tiles: Greater than 50% of full tile width where possible. Edges at thresholds: Centred on door leaf.

###### Adhesive fixing

Application: As necessary to achieve good bond. Finished surface irregularities: Not permitted.

###### Edgings and cover strips

Fixing: Secure using matching fasteners where exposed to view.

Edge of covering: Fully gripped.

###### Stair nosings and trims

Fixing: Secure, level and with mitred joints.

Packing: Continuous hardboard or plywood. Adjust to suit thickness of covering. Bedding: Gap-filling adhesive recommended by nosing manufacturer.

###### Skirtings

Fixing: Secure with top edge straight and parallel with floor. Corners: Mitred joints.

###### Trafficking after laying

Traffic free period: Until adhesive is set.

##### COMPLETION

###### Finishing linoleum, plastics, cork linoleum, and PVC surfaced cork flooring

Cleaning solution: Water with neutral detergent.

Heavily soiled areas: Lightly scrub.

Rinsing: Clean water.

Surplus rinse water: Remove.

###### Finishing rubber flooring

Cleaning solution: Recommended by flooring manufacturer. Residue: Remove.

Rinsing: Clean water.

Surplus rinse water: Remove.

###### Finishing untreated and resin reinforced cork tile flooring

Preparation: Lightly sand joints to remove lipping.

Finish: Match original.

Cleaning solution: Water with neutral detergent. Rinsing: Clean water.

Surplus rinse water: Remove.

###### Finished coverings

Joints: Tight, smooth and accurately fitted. Bonding: Secure.

Air bubbles, rippling, adhesive marks and stains: Not permitted.

###### Spares

Spare covering material: Hand over selected pieces to Employer.

## M60 PAINTING AND CLEAR FINISHING

**GEN ER AL**

###### Cross-reference

General: Read with A90 General technical requirements.

## PRODUCTS

###### Coating materials

Preparation materials: Types recommended by their manufacturers and the coating manufacturer for the situation and surfaces being prepared.

Knotting: To BS 1336.

Primers:

Aluminium primer for woodwork: To BS 4756. Calcium plumbate: To BS 3698.

Metallic zinc rich primer: To BS 4652.

* Water/ Organic solvent based primers for wood: To BS 7956.

Cold applied bitumen based coatings (excluding use in contact with potable water): To BS 6949. Paint manufacturer selected by contractor: Submit names before commencement of any coating work.

###### Other materials

Biocides: Types listed as surface biocides in current Health and Safety Executive (HSE) online publications covering non­ agricultural approved pesticides.

## EXECUTION

###### Handling and storage

Coating materials: Deliver in sealed containers, labelled clearly with brand name, type of material and manufacturer's batch number.

Materials from more than one batch: Give notice. Store separately and allocate to distinct parts or areas of the work.

###### Protection

'Wet paint' signs and barriers: Provide where necessary to protect other operatives and general public, and to prevent damage to freshly applied coatings.

###### Preparation generally

Standard: To BS 6150.

Substrates: Sufficiently dry in depth to suit coating. Efflorescence salts: Remove.

Dirt, grease and oil: Remove. Give notice if contamination of surfaces/ substrates has occurred. Surface irregularities: Abrade to a smooth finish.

Joints, cracks, holes and other depressions: Fill with stoppers/ fillers. Work well in and finish off flush with surface. Abrade to a smooth finish.

Dust, particles and residues from abrasion: Remove. Water based stoppers and fillers:

Apply before priming unless recommended otherwise by manufacturer.

If applied after priming, patch prime.

Oil based stoppers and fillers : Apply after priming.

Junctions of walls and ceilings with architraves, skirtings and other trims: Fill with water based acrylic filler. Doors, opening windows and other moving parts:

Ease, if necessary , before coating.

Prime resulting bare areas.

Fixtures and fittings:Before commencing work: Remove from surfaces to be coated. Existing ironmongery: Refurbishment: Remove old coating marks. Clean and polish.

Hinges: Do not remove.

Replacement: Refurbish as necessary; refit when coating is dry.

Organic growths:

Dead and loose growths and infected coatings: Scrape off and remove from site.

* Treatment biocide: Apply appropriate solution to growth areas and surrounding surfaces. Residual effect biocide: Apply appropriate solution to inhibit re-establishment of growths.

Wall coverings:

Retained wallcoverings : Check that they are in good condition and well adhered to substrate. Previously covered walls: Wash down to remove paper residues, adhesive and size.

###### Previously coated surfaces generally

Preparation: To BS 6150, 11.5.

Removing coatings: Do not damage substrate and adjacent surfaces or adversely affect subsequent coatings. Loose, flaking or otherwise defective areas: Carefully remove lo a firm edge.

Alkali affected coatings: Completely remove.

Contaminated sur1aces: Give notice of: Coatings suspected of containing lead.

Substrates suspected of containing asbestos.

Significant rot, corrosion or other degradation of substrates .

Retained coatings: Thoroughly clean to remove dirt , grease and contaminants. Abrade gloss coated surfaces to provide a key.

Partly removed coatings: Apply additional preparatory coats to restore original coating thicknesses. Abrade junctions to give a flush surface.

Completely stripped surfaces: Prepare as for uncoated surfaces.

###### Previously coated surfaces

Burning off:

Risk assessment and action plan: Prepare, and obtain approval before commencing work. Adjacent areas: Protect from excessive heat and falling scrapings.

Exposed resinous areas and knots: Apply two coats of knotting.

Removed coatings: Dispose of safely.

Galvanized, sherardized and electroplated steel:

White rust: remove.

Pretreatment: Apply one of the following: 'T wash'/ mordant solution to blacken whole surface; or, etching primer recommended by coating system manufacturer.

Steel:

Defective paintwork: Remove to leave a fimi edge and clean bright metal. Sound paintwork: Abrade to provide key for subsequent coats.

Corrosion and loose scale: Abrade back to bare metal. Residual rust: Treat wilh a proprietary removal solution. Bare metal: Apply primer as soon as possible.

Remaining areas: Degrease.

Preprimed steel:

Areas of defective primer, corrosion and loose scale: Abrade back to bare metal. Reprime as soon as possible.

Wood:

Degraded or weathered surface wood: Abrade to remove.

Degraded substrate wood: Repair with sound material of same species. Exposed resinous areas and knots: Apply two coats of knotting.

Preprimed wood:

Areas of defective primer: Abrade back to bare wood and reprime.

###### Uncoated surfaces

Aluminium, copper and lead:

Surface corrosion: Remove and lightly abrade surface.

Pretreatment: Etching primer if recommended by coating system manufacturer.

Concrete:

Release agents: Remove. Repair major surface defects .

Masonry and render :

Surface contaminants, loose and flaking material: Remove.

Plaster:

Nibs, trowel marks and plaster splashes: Scrape off. Overtrowelled 'polished' areas: Abrade lightly.

Plasterboard:

Depressions around fixings : Fill with stoppers/ fillers.

Plasterboard to receive textured coating:

Joints: Fill, tape and feather out with materials recommended by textured coaling manufacturer.

PVC-U:

Dirt and grease: Remove. Do not abrade surface .

Steel - manual cleaning:

Oil and grease : Remove.

Corrosion, loose scale, welding slag and spatter : Abrade to remove. Residual rust: Treat with a proprietary removal solution.

Primer: Apply as soon as possible.

Wood:

General: Abrade to a smooth, *even* finish with arrises and moulding edges lightly rounded or eased. Heads of fasteners: Countersink sufficient to hold stoppers/ fillers .

Resinous areas and knots: Apply two coats of knotting.

###### Existing frames

Previously painted window frames :

Paint encroaching beyond glass sight line: Remove. Putty:

Loose and defective putty: Remove.

Putty cavities and junctions between previously painted surfaces and glass: Clean thoroughly .

Finishing: Patch prime, reputty as necessary and allow to harden. Seal and coat as soon as sufficiently hard. External sealant pointing:

Defective sealant pointing: Remove.

Joint depth: Approximately half joint width; adjust with backing strip if necessary .

###### Existing gutters

Dirt and debris: Remove from inside of gutters.

Defective joints: Clean and seal with suitable jointing material.

###### Coating generally

Application standard: To BS 6150, Clause 9.

Conditions: Maintain suitable temperature, humidity and air quality during application and drying. Surfaces: Clean and dry at time of application.

Thinning and intermixing of coatings: Not permitted unless recommended by manufacturer. Overpainting: Do not paint *over* intumescent strips or silicone mastics.

Priming coats: Thickness to suit surface porosity. Apply as soon as possible on same day as preparation is completed. Finish: Even, smooth and of uniform colour . Free from brush marks, sags, runs and other defects . Cut in neatly.

###### Coating of concealed surfaces

Workshop coating of joinery: Apply coatings to all surfaces of components.

Site coating of joinery: After priming/ sealing, apply additional coatings to surfaces that will be concealed when component is fixed in place.

Site coating of metal surfaces: Apply additional coatings to surfaces that will be concealed when component is fixed in place.

Bottom edges of external doors: Prime/ seal and coat before hanging doors.

###### Coating of wood

End grain: Before assembly, seal with primer or sealer, as appropriate. Allow lo dry . Staining:

Sealer: Apply if recommended by stain manufacturer.

Application: In flowing coats and brush out excess stain to produce uniform appearance.

Varnishing:

First coat: For solvent based varnishes, thin with white spirit. Brush well in and lay off, avoiding aeration. Subsequent coats: Rub down lightly along the grain between coats.

###### Coating for glazing elements

Bead glazed coated wood: Before glazing. apply first two coats to rebates and beads. Setting glazing compounds:

Sealer: Apply two coats to rebates.

Setting: Allow compound to set for seven days.

Sealing: Within a further 14 days, seal with a primer as recommended by the glazing compound manufacturer. Fully protect glazing compound with coating system as soon as it is sufficiently hard. Extend finishing coats on to glass up to sight line.

## N11 GENER AL FIXTURES FURNISHINGS AND EQUIPMENT

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

##### PRODUCTS

###### Fitted kitchen units

Standards:

General: To BS 6222 and BS EN 14749.

Structural performance: To BS 6222-2 and BS EN 14749 . Dimensions: To BS EN 1116.

Surface finishes: To BS 6222-3.

###### Domestic kitchen sinks

Design and manufacture: In accordance with BS EN 13310. Wastes: To BS EN 274.

Traps: To BS EN 274.

Depth of seal (minimum): 75 mm.

##### EXECUTION

###### Moisture content of wood and wood based boards

Air temperature and humidity: Maintain conditions to suit specified moisture content of wood components during delivery, storage, fixing, and up to handover.

Testing: When instructed, test components with a moisture meter to manufacturer's recommendations.

###### Installation generally

Fixing and fasteners: As reference specification section Z20.

###### Taps

Fixing: Form secure, watertight seal with the appliance.

Positioning: Install hot tap to left of cold tap as viewed by appliance user.

###### Wastes and overflows

Bedding: Waterproof jointing compound.

Fixing: Insert resilient washer between appliance and backnut.

###### Sealant pointing

Application: As reference specification section Z22.

###### Trims

General: Wherever possible, use continuous lengths for open runs and between angles. Running joints: Where unavoidable, obtain approval of location and method of jointing. Angle joints: Mitre, unless specified otherwise.

## N13 SANITAR Y APPLIANCES AND FITTINGS

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirem ents.

##### PRODUCTS

###### Baths

Acrylic baths: To BS EN 198. Pressed steel baths: To BS 1390.

Enamelled cast iron baths: To BS 1189.

###### Bidets

Pedestal bidets: To BS EN 35 and BS 5505-3. Wall hung bidets: To BS EN 36 and BS 5505-3 .

###### Disabled user WC package

Type approval certificate: Submit.

###### Jointing and bedding compounds

Types : Recommended by manufacturers of appliances/ accessories/ pipes being jointed or bedded.

###### Sealant for pointing

To BS EN ISO 11600.

###### Shower units

Shower units: To BS EN 251.

* Glazed screens: Either safety glass, Class 3 to BS EN 12600, or safety plastics, Class C to BS 6206. Shower hoses: To BS EN 1113.

###### Sinks

Fireclay sinks: To BS 1206. Kitchen sinks: To BS EN 13310.

###### Urinals and cisterns

Rimless vitreous china bowl urinals: To BS 5520. Automatic flushing urinal cisterns:To BS 1876.

###### Wash basins

Fireclay and vitreous china: To BS 1188. Wash basins: To BS 5506-3.

Connecting dimensions for basins: Pedestal wash basins: To BS EN 31.

* Wall hung wash basins:To BS EN 32.
* Wall hung hand rinse basins: To BS EN 111.

###### Wastes and traps

To BS EN 274-1, -2 and -3.

###### WCs and cisterns

General: To DEFRA WC suite performance specification or approved by relevant water company .

Pan: To BS EN 997 for close coupled pans and BS EN 37 and BS EN 997 for pans with independent water supply. Seat and cover (where not specified otherwise) : To BS 1254.

Pan connector : To BS 5627.

Cisterns (replacement only): To BS 1125 or BS 7357.

##### EXECUTION

###### Installation generally

Standards : To BS 6465-1, -2 and -3.

Assembly and fixing : Surfaces designed to falls to drain as intended. Fasteners: Nonferrous or stainless steel.

Supply and discharge pipework: Fix before appliances . Appliances :

Fix securely to structure. Do not support on pipework. Do not use or stand on appliances .

Noggings, bearers, etc. to support sanitary appliances and fittings : Position accurately . Fix securely.

Jointing and bedding compounds : Recommended by manufacturers of appliances, accessories and pipes being jointed or bedded.

On completion : Components and accessories working correctly with no leaks. Labels and stickers: Remove.

###### Installing cisterns

Cistern operating components: Obtain from cistern manulacturer. Float operated valve: Matched to pressure of water supply .

Overllow pipe: Fix to falls and locate to give visible warning al discharge.

Location: Agreed, where not shown on drawings

###### Installing taps

Fixing: Securely against twisting. Seal with appliance: Watertight.

Positioning: Hot tap to left of cold tap as viewed by user of appliance.

###### Installing wastes and overflows

Bedding: Waterproof jointing compound .

Fixing: With resilient washer between appliance and backnut.

###### Installing WC pans

Floor mounted pans: Screw fix and Iii *cover* caps over screw heads. Do not use mortar or other beddings. Seat and cover: Stable when raised.

###### Tiled backgrounds other than splashbacks

Timing: Complete before lixing appliances. Fixing appliances: Do not overstress tiles.

## P20 UNFRAMED ISOLATED TRIMS SKIRTINGS AND SUNDR Y ITEMS

**GENER AL**

###### Cross-reference

General: Read with A90 General technical requirements.

# PRODUCTS

###### Wood architraves, skirtings, window boards and trims

Quality of wood and fixing: To BS 1186-3. Moisture content at time of fixing: To BS EN 942.

Exterior trim: 12-19%.

* Interior trim to continuously heated rooms, temperatures of 12-19QC: 9-13%. Interior trim to continuously heated rooms, temperatures of 20-24QC: 6-10%.

###### Sheet materials

Fibreboards:

* Hardboard: To BS EN 622-2.
* Medium board: To BS EN 622-3.

Dry processed boards (Medium density fibre board): To BS EN 622-5.

Particleboards: To BS EN 312. Plywood:

* Appearance class, hardwood: To BS EN 635-2.
* Appearance class, softwood: To BS EN 635-3.
* Bond quality: To BS EN 314-2. Plastics veneered board: To BS 4965.

Durability class: D2. Laminate grade: VG.

# EXECUTION

###### Installation

Straight runs: Form in single lengths wherever possible.

Location and method al forming running joints: Submit proposals. Joints at angles: Mitre, unless shown otherwise.

Position and level of trims: Submit proposals.

**P21 DOOR AND WINDOW IRONMONGERY**

**GENER AL**

###### Cross-reference

General: Read with A90 General technical requirements.

**PRODUCTS**

###### Ironmongery selected by contractor

Source: Single co-ordinated range. Submit details of selected range, manufacturer and/ or supplier.

###### Samples

Timing: Before placing orders with suppliers obtain list of required samples from Contract Administrator. Submission: Submit labelled examples of required samples.

Conformity: Retain samples on site for the duration of the contract. Ensure conformity of ironmongery as delivered with labelled samples.

###### Ironmongery for fire doors

Relevant products: Ironmongery fixed to, or morticed into, the component parts of a fire resisting door assembly. Compliance: Ironmongery included in successful tests to BS 476-22 or BS EN 1634-1 on door assemblies similar to those proposed.

Certification: Submit evidence of successful testing by CERTIFIRE or other UKAS accredited laboratory.

Melting point of components (except decorative non functional parts): 800"C (minimum).

###### Door bolts

Standard: To BS EN 12051.

###### Door closing devices (controlled)

Overhead closers and floor springs: To BS EN 1154.

Door closing devices to fire/ smoke control doors : CE marked.

###### Door coordinators

Standard: To BS EN 1158.

Door co-ordinators to fire/ smoke control doors: CE marked.

###### Door hinges

Single axis door hinges: To BS EN 1935.

Hinges to doors on escape routes and fire/ smoke control doors: CE marked.

###### Door latches

General: To BS EN 12209.

###### Door lever handles and knobsets

Standard: To BS EN 1906.

###### Door locks

General: To BS EN 12209.

Thief resistant: To BS 3621, Kitemark certified.

###### Door track and running gear

Standard: To BS EN 1527.

###### Electromagnetic hold open devices

Standard: To BS 5839 or to BS EN 1155.

###### Electromagnetic hold open/ swing-free devices

Standard: To BS EN 1155.

Electromagnetic devices to fire/ smoke control doors: CE marked.

**Emergency/ Panic exit devices** Emergency exit devices: To BS EN 179. Panic exit devices: To BS EN 1125.

Emergency/ Panic exit devices for locked doors on escape routes: CE marked.

###### Letter plates

Standard: To BS EN 13724.

###### Padlocks

Standard: To BS EN 12320.

###### Pull handles

Standard: To BS 8424.

###### Window hinges

Single axis hinges to access windows (window doors): To BS EN 1935.

## EX ECUTIO N

###### Overhead door closers

Operational adjustment:

* Variable power: Matched to size, weight and location of doors. Latched doors: Override latches and/ or door seals when fitted. Unlatched doors: Hold shut under normal working conditions.
* Closing against smoke seals of fire doors: Positive. No gaps.

**Floor springs**

Operational adjustment :

* Variable power: Matched to size, weight and location of doors. Latched doors: Override latches and/ or door seals when fitted.

Unlatched doors: Hold shut under normal working conditions.

Closing against smoke seals of fire doors: Positive. No gaps.

**Electromagnetic hold open/ swing-free devices**

Means of release: Alarm system and/ or failure of power supply. Test switch: Localed in a convenient position adjacent to door. Operational adjustment for devices with integral closer:

* Variable power: Matched to size, weight and location of doors. Latched doors: Override latches and/ or door seals when fitted.
* Unlatched doors: Hold shut under normal working conditions.

**Door coordinators**

Application: To all single swing double doors with rebated meeting stiles and fitted with self closers.

**Uncontrolled door closers**

Operation:

Power: To suit the size and weight of doors to which they are fitted. Unlatched doors: Hold closed under normal conditions .

**P30 TRENCHES, PIPEWAYS AND PITS FOR BURIED ENGINEERING SERVICES**

**GENER AL**

**Cross-reference**

General: Read with A90 General technical requirements.

**PRODUCTS**

**Access covers and frames**

Standard: To BS EN 124.

**Proprietary access and inspection chambers**

Standard: To BS EN 13598-1.

**Perforated gas collection pipework**

Vitrified clay: To BS EN 295-5, Kitemark certified, perforated, strength FN22, with flexible mechanical joints.

**Pipeducts**

Material:

* Vitrified clay: To BS 65.

PVC-U: To BS EN 1401-1, class SN4, Kitemark certified.

* Twin wall HDPE: To BS EN 50086-2-4 or Agrement certified.

**Small surface access boxes**

Standard: To BS 5834-2.

Pipeguard: Cutlrom 110 mm outside diameter PVC-U pipe to BS EN 1401-1, class SN4.

**Large surface access boxes**

Standard: To BS 750 (2006), BS 5834-3, or BS EN 124, subject to requirements of service undertaker, highway authority or fire brigade as appropriate.

**Granular material for bedding or surrounds**

Standard: To BS EN 12620.

• Size: 4/10.

**Draw lines**

Material: To the requirements of service undertakers .

###### Warning marker tapes

Standard: To BS EN 12613.

Type : Continuous colour coded, heavy gauge polyethylene identification tapes.

**EXECUTION**

###### Routes of services below ground

Locations of new service runs and pipeducts:

Temporary marking : Indicate new service runs and pipeducts with 75 x 75 mm softwood posts painted white and projecting not less than 600 mm above ground level, or with clearly vis ible waterproof markings on hard surfaces.

###### Excavation for services in public roads and pavings

Excavation and backfilling :

England, Wales and Scotland: To Highways Authorities and Utilities Committee (Stationery Office) 'Specification for the reinstatement of openings in highways' .

Northern Ireland: To Northern Ireland Road Authority and Utilities Committee (Stationery Office) 'Specification for the reinstatement of openings in roads'.

###### Service trenches

Trench width: As small as practicable.

Trench bottoms: Remove mud, rock projections, boulders and hard spots. Trim level. Give notice:To inspect trench for each section of the work .

###### Tree roots in service trenches

Protected area: The larger of the branch spread of the tree or an area with a radius of half the tree's height, measured from the trunk .

Roots in protected area: Do not cut.

Roots exceeding 25 mm diameter (all areas): Give notice and do not cut without permission. Cutting:

Use a hand saw to make clean smooth cuts. Minimise wound area and ragged edges.

Pare cut surfaces smooth with a sharp knife.

Unintentionally severed roots: Give notice and form a new clean cut slightly nearer the trunk . Backfilling to trenches containing intact or cut tree roots: Topsoil, well watered.

###### Laying pipeducts

General: Lay straight to line, true to gradient or level on an even continuous bed. Clearance between pipeducts where they cross: 50 mm (minimum) .

Drawlines: Thread through pipeducts. Leave in place for future pulling through of services.

Seal: Ends of pipeducts terminating inside buildings .

Material: Mortar.

Protection: Protect from ingress of debris. During construction, temporarily seal all exposed ends.

###### Pipeduct bedding and surround - selected as-dug material

Location: General use.

As-dug bed: Trimmed by hand, level or to accurate gradient. Replace overdig with compacted spoil. Bedding: Selected as-dug material thoroughly compacted by hand in 150 mm (maximum) layers.

* Thickness : 150 mm (minimum).

Surround: Selected as-dug material. Lay and compact to 150 mm (minimum) above pipeduct crown.

###### Pipeduct bedding and surround - granular material

Location: Where specified.

Bedding: Granular material thoroughly compacted by hand in 150 mm (maximum) layers.

* Thickness: 100 mm (minimum).

Surround: Granular material. Lay and compact to 150 mm (minimum) above pipeduct crown.

###### Pipeduct structural/ protective surround - concrete

Location: Close to buildings (where structural stability may be affected by the trench, or where a pipeduct needs protection).

Concrete blinding: 25 mm thick over full width of trench. Allow to set. Pipeducts:

* Temporary support : Folding wedges of compressible board. Prevent flotation.

Height above blinding: 100 mm (minimum).

Surround, to full width of trench :

Depth: To 150 mm above crown of pipeduct or as shown on drawings.

Vertical construction joints : At face of flexible pipeduct joints using 18 mm thick compressible board pre-cut to pipeduct profile.

###### Concrete surround for shallow pipeducts under buildings

Locations: Where pipeduct crowns are less than 300 mm below underside of slab. Timing: Excavate trench al\er hardcore has been laid and compacted.

Concrete blinding: 25 mm thick over full width of trench. Allow to set. Pipeducts:

Temporary support: Folding wedges of compressible board. Prevent flotation.

Height above blinding: 100 mm (minimum).

Surround: Cast integral with slab. Extend surround to within 150 mm of nearest flexible joint.

###### Installing proprietary access and inspection chambers and surface boxes

Setting out relative to adjacent construction features: Square and tightly jointed . Permissible deviation in level of external covers and gratings: +O to -6 mm.

Raising pieces (clay and concrete units): Joint with 1 :3 cemenl:sand mortar . Exposed openings: Fil purpose made temporary caps. Protect from traffic.

###### Bedding of frames for access covers and surface boxes

Bedding: Solidly in mortar. centrally over opening and level with surrounding finishes .

In road or pavement finishes: Flush, and square with block or slab joints.

In grassed areas: Se\ 30 mm below soil surface. Haunch back edge of bedding so that it is not visible.

###### Backfilling generally

Backfill from top of pipeduct surround: Material excavated from the trench.

Backfilling: Lay and compact in 300 mm (maximum) layers. Do not use heavy compactors before backfill is 600 mm deep.

###### Backfilling under new roads and pavings

Backfill from top of pipeduct surround: Granular sub-base material to Highways Agency Specification for highway works, clause 803 (Type 1).

Backfilling: Lay and compact in 150 mm (maximum) layers.

###### Warning marker boards, tapes and tiles

Installation: During backfilling.

Depth: Continuously, 200-300 mm above service pipe or cable or to requirements of service undertaker if diflerent.

Pipelines deeper than 2 m: Lay additional marker 600 mm above the top of the pipeline or lo requirements of service undertaker if different.

###### Additional requirements for water and gas mains

Anchor blocks: Provide at all bends, tapers, cap ends and junctions.

###### Service testing

Timing: Where services require testing undertake tests before backfilling.

###### Documentation

Record drawings: Submit.

###### Perforated or slotted gas collection piping

Position: Lay just below floor slab in venting hardcore layer.

###### Brick radon sumps

Construction: Rectangular chamber. Lay perforated bricks on edge in honeycomb bond with mortar in bed joints only. Cap with paving slab. Enclose and seal end of vent pipe within sump.

Position: Centrally below ground floor slab, 15 m maximum from farthest point of area served.

Area served (maximum): 250 m2•

###### Plastics radon sumps

Position: Centrally below ground floor slab, 15 m maximum from farthest point of area served.

Area served (maximum): 250 m2•

## P31 HOLES, CHASES, COVER S AND SUPPORTS FOR SERVICES

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

##### EXECUTION

###### Ducts, chases and holes generally

General: Wherever possible, form during construction rather than by cutting.

###### Holes and chases in concrete

Holes larger than 1O mm diameter and chases: Cast in. Holes smaller than 10 mm diameter: Drilling is permitted.

###### Holes in structural steelwork

General: Culling and drilling are not permitted.

###### Holes, recesses and chases in masonry

Locations: Select to maintain integrity of strength , stability and sound resistance ol construction. Sizes: Minimum needed to accommodate services .

Holes: 300 x 300 mm (maximum).

Walls ol hollow or cellular block: Do not chase. Walls ol other materials:

Vertical chases: No deeper than one third of single leaf thickness, excluding finishes.

Horizontal or raking chases: No longer than 1 m. No deeper than one sixth of the single leaf thickness, excluding finishes.

Chases and recesses: Do not set back to back. Offset by a clear distance at least equal to the wall thickness.

Culling: Do not cut until mortar is fully set. Cut carefully and neatly. Do not spall, crack or otherwise damage surrounding structure.

###### Notches and holes in structural timber

General: Avoid if possible.

Sizes: Minimum needed to accommodate services. Position: Do not locate near knots or other defects .

Notches and holes in the same joist : 100 mm apart horizontally (minimum) .

Notches in joists: Locate at top. Form by sawing down to a drilled hole.

Depth: One eighth of joist depth (maximum).

Distance from supports: In zone between one twelth and one quarter of span.

Holes in joists: Locate on neutral axis.

Diameter: One quarter of jo ist depth (maximum) . Centres: 3 x diameter of largest hole (minimum) .

Distance from supports: In zone between one quarter and two fifths of span.

Notches in roof rafters, struts and columns: Not permitted. Holes in struts and columns: Locate on neutral axis.

Diameter: One quarter (maximum) of smallest width of member. Centres: 3 x diameter of largest hole (minimum) .

Distance from ends: In zone between one quarter and two fifths of span.

###### Floor ducting and trunking

Fixing: Pack ducting and trunking level and true before screeding.

###### Pipe sleeves

Sleeves: Exlend through full thickness of wall or floor . Position accurately .

Generally: Clearance around service pipe:20 mm (maximum) or diameter of service, whichever is the lesser. Installation: Bed solid.

Exposed to view: Finish bedding and sealing neatly.

###### Access covers/ gratings and frames

Vertical positioning of frames: Level, or marry in with levels of surrounding surfaces. Permissible deviation in level of external covers and frames: +O to -6 mm.

# COMPLETION

###### Meter cabinets

Keys: At completion, hand over to Employer .

**010 KERBS, EDGINGS, CHANNELS AND PAVING ACCESSORIES**

**GENER AL**

###### Cross-reference

General: Read with A90 General technical requirements.

# PRODUCTS

###### Precast concrete kerbs, edgings and channels

Standard: To BS EN 1340.

###### Drainage channel systems with gratings

Loading grade standard: To BS EN 124.

###### Concrete for foundations and haunching

Slandard: To BS 8500-2.

###### Steel bar dowels for haunching

Standard: To BS 4482.

###### Mortar for bedding and jointing

Portland cement: To BS 12, Class 42.5.

Sand: To BS EN 12620, Grade 0/4 or 0/2 (MP).

**EXECUTION**

###### Laying kerbs, edgings and channels

Cutting: Neat, accurate and without spalling. Form neat junctions.

Long units (450 mm and over) minimum length after cutting: 300 mm.

Short units minimum length after cutting: The lower of one third of their original length or 50 mm.

Bedding: Position true to line and level along top and front faces, in a mortar bed on accurately cast foundations. Securing: After bedding has set, secure with a continuous haunching of concrete.

###### Haunching dowels

Size: 12 mm diameter, 150 mm long.

Installation: While concrete is plastic, insert dowels vertically into foundation.

Centres: 450 mm.

Distance from back face of kerb: 50 mm. Projection: 75 mm.

Haunching: Rectangular cross section, cast against formwork, fully enclosing and protecting dowels.

###### Channels

Installation: Lay to an even gradient. Avoid ponding and backfall. Lowest points of channels: 6 mm above drainage outlets.

###### Drainage channel systems

Installation:

Constant depth channels: Lay to an even gradient. Avoid ponding and backfall. Commence laying from outlets.

Channel systems with a built in fall: Lay with top of channels level, installed in correct sequence to form an even gradient without ponding or backfall. Commence laying from outlets.

Silt and debris: Immediately before handover, remove from entire system.

Washing and detritus: Safely dispose without discharging into sewers or watercourses.

###### Accuracy

Deviations (maximum): Level: ± 6 mm.

Horizontal and vertical alignment: 3 mm in 3 m.

###### Mortar joints

Jointing: As laying proceeds, butter ends of units with bedding mortar. Completely fill joints.

Narrow mortar joints: Tightly butt. Clean off surplus mortar immediately. Tooled mortar joints: Tool to a neat flush profile.

###### Road marking

Standard: To Road Safety Markings Association (RSMA) StanSpec 2003: Standard specification document for road marking and road studs incorporating European standards BS EN 1436, BS EN 1824 and BS EN 1871.

**Q20 GRANULAR SUB-BASES TO PAVINGS**

##### GENER AL

###### Cross-reference

General: Read with A90 General Technical requirements.

## PRODUCTS

###### Granular material

Quality: Free from excessive dust , well graded, all pieces less than 75 mm in any direction. minimum 10% lines value of 50 kN when tested in a soaked condition to BS 812-111.

In any one layer only one of the following groups:

Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together .

Crushed concrete, crushed brick or tile, free from plaster, timber and metal. Crushed non-expansive slag.

Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.

* Well-burned non-plastic colliery shale. Natural gravel.

Natural sand .

###### Highways Agency material

Standard: Highways Agency 'Specification for highway works'.

Type 1 material: To HA specification clause 803.5. Type 2 material: To HA specification clause 804.6.

###### Non frost susceptible material

Definition (non frost susceptible material): To Highways Agency 'Specification for highway works' clause 705.5.

## EX ECUTION

###### Excavation of subgrades

Final excavation to formation/ subformation level: Carry out immediately before compaction of subgrade. Soft spots and voids: Give notice.

Wet conditions: Do not excavate or compact when the subgrade may be damaged or destabilised.

###### Preparation/ compaction of subgrades

Timing: Immediately before placing sub-base.

Soft or damaged areas: Excavate and replace with sub-base material, compacted in layers 300 mm (maximum) thick. Compaction: Thoroughly, by roller or other suitable means, adequate to resist subsidence or deformation of the subgrade during construction and of the completed pavings when in use. Take particular care to compact fully at intrusions, perimeters and where local excavation and backfilling has taken place.

###### Compaction of sub-base

Proposals: Well in advance of starting work submit details of: Maximum depth of each compacted layer.

Type of plant.

Minimum number of passes per layer.

Preparation: Remove loose soil, rubbish and standing water.

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

Laying: Spread and level in layers. As soon as possible thereafter thoroughly compact each layer. At drainage fittings, inspection cover bases and at perimeters: Take particular care to compact fully.

After compaction and immediately before overlaying: The sub-base surface must be uniformly well closed and free from loose material, cracks, ruts or hollows.

###### Blinding

Finish: Vibrate to provide a close, smooth surface.

###### Cold weather working

Frozen materials : Do nol use.

Freezing conditions: Do not place fill on frozen surfaces. Remove material affected by frost . Replace and recompact if not damaged after thawing.

###### Protection

Sub-bases: As soon as practicable, cover with subsequent layers, specified elsewhere.

Subgrades and sub-bases: Prevent degradation by construction traffic, construction operations and inclement weather.

## 022 ASPHALT PAVINGS

**GENER AL**

###### Cross-reference

General: Read with A90 General Technical requirements.

**PRODUCTS**

###### Chippings

Standard: To BS EN 13043 and PD 6682-2 . Binder:

Bitumen emulsion: To BS 434-1. Cutback bitumen: To BS EN 12591.

###### Asphalt concrete

Standard: To BS EN 13108-1.

##### EXECUTION

###### Laying generally

Standard: To BS 594987.

Preparation: Remove loose material, rubbish and standing water. Adjacent work: Form neat junctions. Do not damage.

Channels, kerbs, inspection covers: Keep clean. New paving:

Keep traffic-free until cooled to prevailing atmospheric temperature. Prevent damage . Do not allow rollers to stand on paving at any time.

Lines and levels: With regular falls to prevent ponding.

Overall texture : Smooth, even and free from dragging, tearing or segregation . Surface treatmenl to existing paving:

Surface to receive dressing : Clean and dry. All patching complete.

###### Accuracy

Permissible deviation from required levels, falls and cambers in accordance with BS 594987, Table 7.

###### Contractor's use of pavements

Timing: Defer laying of final surfacing until as late as practicable.

Immediately before laying final surfacing: Clean and make good the base/ binder course. Allow to dry. Uniformly apply, without puddles, a tack coat of sprayed bitumen emulsion of a suitable grade to BS 434-1 at 1.5-2.0 kg/m2• Allow emulsion to break completely before applying surfacing.

###### Uncoated chippings for surface dressing

Applying binder:

Rate: In accordance with Transport Research Laboratory Road Note 39. Cutback bitumen: Do not use at temperatures below 15"C.

Modified binders: Do not use without prior approval. Adjust rate in accordance with manufacturer's instructions.

Applying chippings:

Coverage: 100-105% shoulder to shoulder to BS 598-108. Compaction: Roll. Do not crush chippings.

Excess chippings: Remove before traffic is allowed. Chippings loosened by traffic: Remove, when instructed.

## Q23 GRAVEL, HOGGIN AND WOODCHIP DRIVES AND PAVINGS

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements .

##### PRODUCTS

###### Bonded Chippings

Standard: To BS EN 13043.

Compatibility: Chippings suitable for use with respective binders/ emulsions.

###### Hoggin

Material: Naturally occurring material consisting of sand and gravel, with minimum clay content required to bind the material together, with no large lumps of clay.

Grading for use in sur1ace course: 85% (minimum) by weight passing a 10 mm BS sieve.

###### Woodchips

Quality: Free from pests, disease, weeds and any additives.

###### Bitumen emulsions for bonded chippings

Standard: To BS 434-1, class K1 60.

##### EXECUTION

###### Blinding to sub-bases

Laying: Compact. Seal interstices . Provide free drainage.

###### Herbicide to paving

Type: Suitable for the application, location and conditions of use. Weeds and moss: Grub up.

###### Laying generally

Channels, gullies, etc: Keep clear.

Completion: Compact to produce a firm, regular surface, stable in use. Finished surfaces:

Lines and levels: To prevent ponding. Overall texture: Even.

State at completion: Clean.

###### Cold weather working

Frozen materials: Do not use.

Freezing conditions: Do not lay pavings.

Cold bituminous surface dressings: Do not apply when ambient temperature is below 1O"C.

###### Drainage falls

Sealed surfaces.

Falls and cross falls : 1:40 (minimum). Camber : 1:50 (minimum).

Unsealed surfaces: 1:30 (minimum).

###### Granular surfaces in vehicular areas

Permissible deviation from required levels, falls and cambers: ±20mm (maximum).

General: Spread and level in 150 mm (maximum) layers. As soon as possible compact each layer. Dry weather: Lightly water layers during compaction.

###### Granular surfaces in pedestrian areas and cycle tracks

Permissible deviation from required levels, falls and cambers: ±12 mm (maximum).

General: Spread and level in 100 mm (maximum) layers. As soon as possible compact each layer. Dry weather: Lightly water layers during compaction.

###### Gravel

General: Loose laid and raked to uniform thickness.

###### Laying bonded chippings

Base course:

Vehicular use: Cover with clean chippings at specified rate and compact. Pedestrian and cycle use: Cover with stone dust or sand. Brush into interstices.

Consolidation: Before application of surface course, allow surface to dry and consolidate.

Surface course: Uniformly spray binder at specified rate. Cover with clean chippings. Provide 100-105% shoulder to shoulder coverage to BS 598-108 and compact.

Compaction to all layers: By heavy roller or other appropriate means, adequate to resist subsidence or deformation of the

completed roads/ pavings when in use. Do not crush chippings . Completion: Before trafficking, remove excess chippings.

###### Protection from traffic and plant

Paved areas: Restrict access to prevent damage.

## 024 INTERLOCKING BRICK OR BLOCK ROADS OR PAVINGS

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

##### PRODUCTS

###### Concrete blocks

Standard: To BS 6717.

###### Clay pavers

Standard: To BS EN 1344.

###### Bedding sand

Standard: Naturally occurring clean sharp sand in accordance with BS 7533-3, clause 4.3.1 and 4 .3.2 . Grading category: To BS 7533-3, Annex D

Category IB: Industrial pavements and loading bays.

Category II: Roads. pedestrian areas/ footpaths receiving regular heavy traffic, car parks receiving some heavy traffic. Category Ill: Pedeslrian areas receiving occasional heavy traffic , car parks with no heavy vehicles.

Calegory IV: Privale drives, dedicated pedestrian areas, footpaths subject only to occasional vehicle overriding.

Purity: Free from deleterious sails, contaminants and cement. Procurement: Obtain from one source and ensure consistenl grading.

**Jointing sand**

Siandard: Clean lree flowing dried silica sand in accordance with BS 7533-3 . Purity: Free from deleterious salts, conlaminanls and cement.

**Concrete for in situ surrounds**

Standard: To BS 8500-2. C35 air entrained concrete, maximum aggregate size 10 mm.

**Mortar for in situ infill, bedding and haunching**

Cement: To BS EN 197-1, Portland CEM 1.

Sand: To BS EN 13139, 0/4, (grading MP) with fines category 1.

**EXECUTION**

**Colour variation of paving units**

Method for avoiding banding and palches in laid paving: Submil proposal.

**Samples**

General: Before ordering, submit samples of all paving units that are representative of colour and appearance .

**Levels of paving**

Permissible deviation from specified levels: Generally: ±6 mm.

Height of finished paving above features:

At drainage channels and kerbs: +3 to +6 mm.

**Condition of sub-bases and bases before laying sand bedding course**

Granular surfaces:

Sound, clean, smooth and close-texlured enough lo prevent migration of sand bedding into the sub base/ overlay during compaction and use.

Free from movemenl under compaction plant and free from compaclion ridges, cracks and loose material.

Prepared existing and new bound bases (roadbases): Sound, clean, free from rutting or major cracking and cleared of sharp stones, projections or debris.

Bound base (roadbase) surface tolerance: +O -12 mm. Levels and falls: Accurate and within specified tolerances.

Drainage outlets: Wilhin +O to -10 mm of required finished level.

Edge restrainls, manhole covers, drainage outlets and the like: Complete, to required levels, and adequalely bedded and haunched in morlar that has reached sufficient slrength.

Haunching lo gullies, manhole covers and inside face of edge reslraints: Verlical, so that paving does not 'ride up' when compacted.

**Mortar bedded units**

General: Fully bedded and secured with continuous mortar haunching.

Joints: Complelely filled with bedding mortar. Movemenl joints at 4.5-6 m centres to clay paver edgings and features and to mortar jointed concrete edging unils.

**Geotextile sheet**

Laying: Fitted neally at edge restrainls and other features that interrupt lhe sand bedding course, e.g. drainage fittings, channels, manholes and kerbs.

Edge detail: Sheet turned up to form an upstand against fealures, height not less than thickness of sand bedding.

**Laying bedding generally**

Depth of loose bedding malerial needed to ensure specified bedding course thickness afler final compaction of paving: Determined by trials.

Bedding materials: Do not deliver to working area over uncompacled paving.

Bedding course prepared area: 1m (minimum) to 3 m (maximum) in advance of laying face. and 1m (maximum) al end of working period.

Salurated bedding: Not allowed. Remove and replace or allow to dry before laying paving.

Protection of prepared bedding course: Do not allow lraffic or leave exposed. Fill, re-screed and recompact areas dislurbed by removal of screed rails or trafficking. Lay blocks/ pavers/ sells immediately.

###### Compaction and jointing of paving units

Compaction:

Standard: To BS 7533-3 .

Method: Submit proposal for achieving even compaction overall and without damaging kerbs and adjacent work. Neoprene sole plate: Use if recommended by paving unit manufacturer.

Areas not to be compacted: Within 1 m of working face and within 1 m of unrestrained edges. Jointing material: Brush into joints , revibrate surface and repeat as necessary to completely fill joints .

**Completed paving**

General: Thoroughly compacted and interlocked, of even overall appearance with regular joints of even width, and accurate to line, level and profile.

Colour variation : Evenly spread without banding or patches. Infill at edge restraints: Completed as work proceeds.

Cut units: Accurately sized and shaped, not less than 1/3 of full size block. Cut edges: Turned inwards; away from edge restraints or other features.

Kerbs and adjacent work : Securely bedded and undamaged.

Paving units adjacent to obstructions: Trimmed neatly and accurately around drainage fittings and other obstructions. Do not reduce thickness of paving units.

**Completion of paving with sand filled joints**

Vacuum cleaning machines : Not allowed.

**Removal and reinstatement of block paving** Methods: As recommended in BS 7533-3, annex A. Removing units: Minimize breakage.

Replaced units: Matched in with existing and slightly proud to allow for bedding in.

**Q40 FENCING**

**GENER AL**

**Cross-reference**

General: Read with A90 General technical requirements .

**PRODUCTS**

**Fencing types**

Chain link fencing :

Standard: To BS 1722-1. Cleft chestnut pale fencing:

Standard: To BS 1722-4. Close boarded wood fencing :

Standard: To BS 1722-5.

Wood palisade fencing: Standard: To BS 1722-5.

Wood post and rail fencing :

Standard: To BS 1722-7.

Carbon steel vertical bar fencing: Standard: To BS 1722-9.

Anti intruder fencing:

Standard: To BS 1722-10.

Prefabricated wood panel fencing : Standard: To BS 1722-11.

Steel palisade fencing :

Standard: To BS 1722-12. Open mesh steel panel fencing:

Standard: To BS 1722-14.

**Gates/ gate posts**

Wood gates, stiles and gate posts to footpaths and bridleways: Standard: To BS 5709.

Steel gates and gate posts:

Steel: As section Z11.

* Jointing: Welded. Domestic steel gates:

Standard: To BS 4092-1.

**Concrete to post holes and sills**

Standard: To BS 8500-2.

Concrete: Designated, not less than GEN1 or standard prescribed concrete not less than ST2.

Alternative mix for small quantities: 50 kg Portland cement, class 42 .5 to 150 kg fine aggregate to 250 kg 20 mm nominal maximum size coarse aggregate, medium workability .

Admixtures: Not permitted.

###### Hot-dip galvanizing

Standard: To BS EN ISO 1461.

###### Plastics powder coating

Standard: To BS 1722-16.

##### EXECUTION

###### General

Installation:

Alignment: Straight lines or smoothly flowing curves.

* Tops of posts: Following profile of the ground.

Setting posts: Rigid, plumb and to specified depth, or greater where necessary to ensure adequate support. Fixings: All components securely fixed.

###### Competence

Operatives: Contractors must employ competent operatives .

Qualifications: Submit certification of training and experience of Sector Scheme 2A for the design, supply, installation and repair of fences .

###### Setting out

Wood post and rail fencing:

Morticed fences: Posts maximum 2850 mm centres. Nailed fences: Posts maximum 1800 mm centres.

Close boarded wood fencing:

* With gravel board: Posts maximum 3000 mm centres.
* Without gravel board: Posts maximum 2400 mm centres.

Wood palisade fencing: Posts maximum 3000 mm centres. Mild steel vertical bar fencing : Posts maximum 2750 mm centres.

Open mesh steel panel fencing : Posts maximum 3000 mm centres.

###### Chain link mesh

Joining: Interweave a spiral and restore knuckle or barb to top and bottom.

###### Size of fencing post holes for concrete foundation/ surround (normal ground conditions)

Chain link fencing (general purpose): Straining posts:

Up to 1400 mm high fencing: 450 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in

ground.

1400-2150 mm high fencing: 450 mm square or 450 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Struts: Minimum 300 x 450 mm hole, base of strut to be a minimum 450 mm depth in ground .

Intermediate posts:

Up to 1400 mm high fencing: 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.

1400-2150 mm high fencing: 450 mm square or 450 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Gate posts: Depths as for fence straining posts, minimum 450 mm square holes.

Cleft chestnut pale fencing: Straining posts:

Up to 1350 mm high fencing: 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in

ground.

Over 1350 mm high fencing: 450 mm square or 450 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Struts: Minimum 300 x 450 mm hole, base of strut to be a minimum 450 mm depth in ground. Intermediate posts:

Up to 1350 mm high fencing: Minimum 75 mm concrete surround to all sides, 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.

Over 1350 mm high fencing: Minimum 75 mm concrete surround to all sides, 300 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Close boarded wood fencing:

Up to 1500 mm high fencing: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.

Over 1500 mm high fencing: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Wood palisade fencing:

Up to 1500 mm high fencing: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.

Over 1500 mm high fencing: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Wood post and rail fencing (sawn or cleft posts):

Up to 1100 mm high fencing (or 1050 mm high for fencing with cleft rails): Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.

Over 1100 mm high fencing (or 1250 mm high for fencing with cleft rails): Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 700 mm depth in ground.

Carbon steel vertical bar fencing:

Up to 1000 mm high fencing: Allow for 100 mm concrete bed (below post) and surround, minimum 450 mm embedded length in ground.

1000-1400 mm high fencing: Allow for 100 mm concrete bed (below post) and surround, minimum 550 mm embedded length in ground.

Over 1400 mm high fencing: Allow for 100 mm concrete bed (below post) and surround, minimum 600 mm embedded length in ground.

Gate posts: In accordance with BS 1722-9 table 4.

Prefabricated wood panel fencing:

Up to 1400 mm to top of panel: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 500 mm depth in ground.

Over 1400 mm to top of panel: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.

Anti intruder fencing:

Straining posts: 450 mm square or 450 mm diameter (augered) post hole, minimum 750 mm depth in ground. Struts: Minimum 300 mm wide x 450 mm deep hole, base of strut to be a minimum 450 mm depth in ground.

Intermediate posts: 300 mm square or 300 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Steel palisade fencing, general purpose (GP):

Up to 1800 mm high (GP) fencing: Minimum 350 mm square or 450 mm diameter (augered) post hole, minimum 525 mm embedded length.

2100 mm high (GP) fencing: Minimum 350 mm square or 450 mm diameter (augered) post hole, minimum 625 mm embedded length.

2400 mm high (GP) fencing: Minimum 350 mm square or 450 mm diameter (augered) post hole, minimum 725 mm embedded length.

3000 mm high (SP) fencing: Minimum 450 mm square or 600 mm diameter (augered) post hole, minimum 925 mm embedded length.

3600 mm high (SP) fenci11g: Minimum 450 mm square or 600 mm diameter (augered) post hole, minimum 1125 mm embedded length.

Open mesh steel panel fencing:

Up lo 1800 mm high general purpose (category 1) fencing: Minimum 450 mm square or 300 mm diameter (augered) post hole, to allow not less than 75 mm concrete surround to post, minimum 600 mm depth in ground.

*Over* 1800 mm high general purpose (category 1) fencing: Minimum 450 mm square or 450 mm diameter (augered) post hole, to allow not less than 75 mm concrete surround to post, minimum 750 mm depth in ground.

Gate posts: Minimum 450 mm square post hole, minimum 750 mm depth in ground. Abnormal ground conditions: Give notice.

**Foundation/ surround to fencing posts set in concrete**

Setting in: Position posl/ strut and fill hole with concrete to not less than specified depth, well rammed and consolidated as filling proceeds.

Post holes not completely filled with concrete: Backfill with excavated material, well rammed and consolidated.

Exposed concrete foundations not subsequently covered by paving: Compact until air bubbles cease to appear on upper surface, weather to shed water, and trowel smooth.

Chain link fencing (category 1, general purpose):

Intermediate and straining posts: Minimum two thirds depth of post hole.

Gate post holes: Completely fill with rammed concrete to 50 mm above adjacent ground level, weather to shed water, and trowel smooth.

Cleft chestnut pale fencing (straining posts and intermediate posts): Concrete surround: Minimum half depth of post hole.

Close boarded wood fencing:

Concrete surround: Minimum half depth of post hole.

Wood palisade fencing:

Concrete surround: Minimum half depth of post hole.

Wood post and rail fencing (sawn or cleft posts): Concrete surround: Minimum half depth of post hole.

Carbon steel vertical bar fencing:

Concrete bed: Minimum 100 mm below post. Concrete surround: Full depth of post hole.

Anti intruder fencing:

Concrete surround: Minimum two thirds depth of post hole.

Prefabricated wood panel fencing:

Concrete surround: Minimum half depth of post hole.

Steel palisade fencing, general purpose (GP):

Concrete surround: Full depth of post hole.

Open mesh steel panel fencing, general purpose (category 1):

Concrete surround: Minimum half depth of post hole.

Gate post holes: Completely fill with rammed concrete to 50 mm above adjacent ground level, weather to shed water, and trowel smooth.

**Setting posts in earth**

Post holes: Excavate neatly, with vertical sides and as small as practicable to allow refilling. Setting in: Position posts/ struts and replace excavated material, ramming well as filling proceeds.

**Driving wood posts**

Preparation: Posis pointed 225 mm length at base.

Protection: Minimize damage to heads of posts when driving and repair by neatly finishing post tops after installation.

**Nailed rails to wood post and rail fencing**

Minimum span: Nol less than two bays, with joints in adjacent rails staggered. Nailing: Nail each length of rail to each post with two 100 mm galvanized wire nails. Rails with split ends: Replace.

**Cleft wood rails to wood post and rail fencing**

Length: Maximum 3050 mm.

Mortice position: Centre line of 150 mm face of post.

Rail fixing: Shape to adequately fill post mortice and fix to prick post with two 4 x 100 mm galvanized clenched wire nails. Rails with split ends: Replace.

**Arris rails**

Rail end: Shape to adequately fit the post mortice or recess. Fixing to recessed posts: Bolt.

Top rails: Fix at both ends.

**Site cutting of wood**

Site cutting: Keep to a minimum, with no culling where timber is to be used below or near ground level.

Cul surfaces: Treat surfaces exposed by minor culling and drilling with two flood coats of a solution recommended for the pu1pose by main preservative treatment solution manufacturer.

###### Completion

Conformity: Submit manufacturer's and installer's certificates in accordance with the appropriate part of BS 1722.

**R10 RAINWATER DRAINAGE SYSTEMS**

**GEN ER AL**

###### Cross-reference

General: Read with A90 General technical requirements.

###### Completion of design

Standard: To BS EN 12056-3, clauses 3-7 and National Annexes.

Collection and distribution of rainwater : Complete, and without leakage or noise nuisance.

# PRODUCTS

###### Gutters

Aluminium : Agrement certified or otherwise submit proposals. Cast iron:

Half round: To BS 460.

Other than standard half round sections: To BS 460 except for shape.

PVC-U: To the relevant parts of BS EN 607 and BS EN 1462, Kitemark certified.

###### Pipework

Aluminium : Agrement certified or otherwise submit proposals. Cast iron - flexible couplings: To BS EN 877, Agrement certif ied. Cast iron spigot and socket:

Round: To BS 460.

Shape other than round: To BS 460 except for shape.

PVC-U:

External : To BS EN 12200- 1, Kitemark certified.

Sealed: To BS EN 1329-1 or BS 4514, Kitemark certified.

###### Insulation to internal gutters and pipelines

Fire performance : Class 1 spread of flame when tested to BS 476-7 .

# EXECUTION

###### Preparation

Work to be completed before commencing work specified in this section:

Below ground drainage. Alternatively, make temporary arrangements for dispersal of rainwater without damage or disfigurement of the building fabric and surroundings.

Painting of surfaces which will be concealed or inaccessible.

###### Installation generally

Electrolytic corrosion: Avoid contact between dissimilar metals where corrosion may occur. Plastics and galvanized steel pipes: Do not bend.

Allowance for thermal and building movement: Provide and maintain clearance as fixing and jointing proceeds. Protection:

Fit purpose made temporary caps to prevent ingress of debris.

Fit access covers, cleaning eyes and blanking plates as the work proceeds.

###### Fixing and jointing gutters

Brackets: Securely fixed.

Additional brackets: Where necessary to maintain support and stability, provide at joints in gutters and near angles and outlets.

Roofing underlay : Dressed into guller .

###### Setting out eaves gutters

Setting out to level: Level and as close as practical to the roof.

Setting out to falls: To true line and even gradient to prevent ponding or backfall. Position high points of gutters as close as practical to the roof and low points 50 mm (maximum) below the roof.

Outlets: Aligned with connections to below ground drainage.

###### Installing rainwater outlets

Fixing: Secure. Fix before connecting pipework.

Junctions between outlets and pipework: Accommodate movement in structure and pipework.

###### Fixing pipework

Pipework: Fix securely, plumb and/ or true to line.

Branches and low gradient sections: Fix with uniform and adequate falls to drain efficiently. Externally socketed pipes and fittings: Fix with sockets facing upstream.

Additional supports: Provide as necessary to support junctions and changes in direction. Vertical pipes:

Provide a loadbearing support at least at every storey level.

Tighten fixings as work proceeds so that every storey is self supporting. Wedge joints in unsealed metal pipes to prevent rattling.

Wall and floor penetrations: Isolate pipework from structure .

Pipe sleeves: As section P31.

Masking plates: Fix at penetrations ii visible in the finished work .

Expansion joint pipe sockets: Fix rigidly to buildings. Elsewhere, provide brackets and fixings that allow pipes to slide.

###### Jointing pipework and gutters

General: Joint with materials and fittings that will make effective and durable connections . Jointing differing pipework and gutter systems: Use adaptors intended for the purpose.

Cut ends of pipes and gutters: Clean and square . Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets.

Jointing or mating surfaces: Clean and, where necessary, lubricate immediately before assembly. Junctions: Form with fittings intended for the purpose.

Jointing material: Strike off flush. Do not allow it to project into bore of pipes and fittings. Surplus flux, solvent jointing materials and cement: Remove.

###### Cutting coated pipework and gutters

Cutting: Recoat bare metal.

###### Fixing insulation to internal pipelines and gutters

Fixing: Secure and neat. Provide continuity at supports and leave no gaps. Fix split pipe insulation with the split on 'blind' side of pipeline.

Timing: Do not fit insulation until completion of pipe airtightness or leakage testing.

###### Electrical continuity - pipework

Joints in metal pipes with flexible couplings: Clips (or suitable standard pipe couplings) supplied for earth bonding by pipework manufacturer to ensure electrical continuity.

###### Internal pipework test - England, Wales, Ireland and Northern Ireland

Preparation: Temporarily seal open ends of pipework with plugs.

Test apparatus: Connect a 'U' tube water gauge and air pump to pipework via a plug. Testing: Pump air into pipework until gauge registers 38 mm.

Required performance:

Allow a period for temperature stabilization, after which the pressure of 38 mm is to be maintained without loss for at least 3 minutes.

###### Internal pipework test - Scotland

Standard: To BS EN 12056-2, National Annex NG.

###### Gutter test

Preparation: Temporarily block all outlets.

Testing: Fill gutters to overflow level and after 5 minutes closely inspect for leakage.

**R11 ABOVE GROUND FOUL DRAINAGE SYSTEMS**

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

###### Completion of design

Standards: To BS EN 12056-1 and BS EN 12056-2, and in accordance with BS EN 12056-2 National Annexes NA-NG. System type to BS EN 12056-2: System Ill ('single stack' system).

###### Collection and distribution of foul water

General: Quick, quiet and complete, self-cleansing in normal use, without blockage, crossflow, backfall, leakage, odours, noise nuisance or risk to health.

Pressure fluctuations in pipework (maximum): ±38 mm water gauge. Water seal retained in traps (minimum): 25 mm.

##### PRODUCTS

###### ABS pipework

Standard: To BS 5255, Kitemark certified: or Standard: To BS EN 1455-1, Kitemark certified.

Application area code: B.

Opening dimensions of access fittings, design of swept fittings, stand off dimensions of pipe and fitting brackets and requirements for adaptors and plugs: To BS 4514.

###### Cast iron pipework - flexible couplings

Standard: To BS EN 877.

###### MUPVC pipework

Standard: To BS 5255. Kitemark certified,

###### PVC-C pipework

Standard: To BS EN 1566-1, Kitemark certified.

Application area code: B.

Opening dimensions of access fittings, design of swept fittings, stand off dimensions of pipe and fitting brackets and requirements for adaptors and plugs: To BS 4514 .

###### Polypropylene pipework

Standard: To BS 5255, Kitemark certified; or Standard: To BS EN 1451-1, Kitemark certified.

Application area code: B.

Opening dimensions of access fittings, design of swept fittings, stand off dimensions of pipe and fitting brackets and requirements for adaptors and plugs: To BS 4514 .

###### PVC-U pipework

Standard: To BS 4514 (82.4 mm OD only); or Standard: To BS EN 1329-1, Kitemark certified.

Weather resistance, connectors to WC pans, opening dimensions of access fittings, design of swept fittings, stand off dimensions of pipe and fitting brackets and requirements for adaptors and plugs: To BS 4514.

###### Air admittance valves

Standard: To BS EN 12380 or Agrement certified.

Minimum air flow rate: To BS EN 12056-2.

##### EXECUTION

###### Installation generally

Standard: To BS EN 12056-5.

Components: From the same manufacturer for each type of pipework.

Electrolytic corrosion: Avoid contact between dissimilar metals where corrosion may occur. Plastics and galvanized steel pipes: Do not bend.

Allowance for thermal and building movement: Provide and maintain clearance as fixing and jointing proceeds. Concealed or inaccessible surfaces: Decorate before starting work specified in this section.

Protection:

Purpose made temporary caps: Fit to prevent ingress of debris.

Access covers, cleaning eyes and blanking plates: Fit as the work proceeds

###### Pipe routes

General: The shortest practical, with as few bends as possible.

Bends in wet portion of soil stacks: Not permitted.

Routes not shown on drawings: Submit proposals before commencing work.

###### Fixing pipework

Pipework: Fix securely plumb and/ or true to line. Fix discharge stack pipes at or close below socket collar or coupling. Branches and low gradient sections: Fix with uniform and adequate falls to drain efficiently.

Externally socketed pipes and fittings: Fix with sockets facing upstream.

Additional supports: Provide as necessary to support junctions and changes in direction.

Vertical pipes: Provide a load bearing support not less than every storey level. Tighten fixings as work proceeds so that every storey is self supporting.

Wall and floor penetrations: Isolate pipework from structure, e.g.with pipe sleeves.

Masking plates: Fix at penetrations if visible in the finished work.

Expansion joint sockets: Fix rigidly lo the building. Fixings: Allow the pipe to slide.

###### Jointing pipework - generally

General: Joint with materials, fittings and techniques that will make effective and durable connections. Jointing differing pipework systems: With adaptors intended for the purpose.

Cul ends of pipes: Clean and square. Remove burrs and swart . Chamfer pipe ends before inserting into ring seal sockets . Jointing or mating surfaces: Clean and. where necessary, lubricate immediately before assembly.

Junctions: Form with fittings intended for the purpose.

Jointing material: Do not allow it to project into bore of pipes and fittings. Surplus flux, solvent jointing materials and cement: Remove from joints.

**Electrical continuity**

Joints in metal pipes with flexible couplings: Make with clips (or suitable standard pipe couplings) supplied for earth bonding by pipework manufacturer to ensure electrical continuity.

**Identification of internal foul drainage pipework**

Markings: To BS 1710:

Type: Integral lettering on pipe wall, self-adhesive bands or identification clips.

Locations: At 500 mm centres, junctions and both sides of slabs, valves, appliances, bulkheads and wall penetrations.

**Discharge and ventilating stacks**

Terminations: Perforated cover or cage that does not restrict airflow.

**Installing air admittance valves**

Position: Vertical, above flood level of highest appliance served and clear of insulation materials (other than the manufacturer's insulating cover).

Connection to discharge stack: Allow removal for rodding, e.g. ring seal.

Roof spaces and other unheated locations: Fit manufacturer's insulating cover.

**Pipework airtightness test**

Preparation:

Open ends of pipework: Temporarily seal using plugs.

Test apparatus: Connect a 'U' tube water gauge and air pump to pipework via a plug or through trap of an appliance.

Testing: Pump air into pipework until gauge registers 38 mm.

Required performance: Pressure of 38 mm is to be maintained without loss for at least three minutes.

**Prehandover checks**

Temporary caps: Remove.

Permanent blanking caps, access covers, rodding eyes, floor gratings and the like: Secure complete with fixings.

**R12 BELOW GROUND DRAINAGE SYSTEMS**

**GENER AL**

**Cross-reference**

General: Read with A90 General technical requirements.

**DESIGN**

**Completion of design by contractor**

Below ground drainage systems: In accordance with BS EN 752, BS EN 1295-1 and BS EN 1610. Land drainage systems: In accordance with relevant parts of BS 4428 and BS EN 752.

**PRODUCTS**

**Adaptors for above ground drainage**

To plastics drainage pipes: Plastics to BS 4660 and Kitemark certified or to BS EN 1401-1 and Kitemark certified. To clay drainage pipes: Polypropylene to BS EN 295-1 and Kitemark certified.

**Access covers and frames**

Standard and cover loading grade: To BS EN 124.

**Concrete (general)**

Standards: To BS 8500-1 and -2.

Usage: In small quantities for general purposes including bedding of gullies and small accessories, backfilling and mass concrete surrounds to tanks.

Mixes:

Ready mixed concrete: Designated concrete GEN1. Submit proposals if requesting higher strength mixes used elsewhere in the project to be considered.

Site mixed concrete: Standardized prescribed concrete ST2.

**Concrete (structural)**

Usage: Foundations to manholes, pipe surrounds, benching/ toppings in manholes. Mixes: See reference specification section E10 and associated work items.

**Concrete manholes and inspection chambers**

Standards: To BS 5911-3 and BS EN 1917 and Kitemark certified; or to BS 5911-4 and BS EN 1917.

Cover loading grade: To BS EN 124.

Concrete for backfilling and surrounds to tanks in nonagressive soils: Concrete (general).

###### Flexible couplings

Standard: To BS EN 295-4 or Water Industry Standard WIS 04-41-01 and Kitemark certified, or Agrement certified.

###### Granular material

Standard: To BS EN 12620.

Grade: Dependent on location - see Execution clauses in this section, and in sections R13, R16 and R17, if used.

###### Granular sub-base material

Standard: To Highways Agency Volume 1, 'Specification for Highway Works', Type 1 Unbound mixtures for sub-base.

###### Grease traps and converters

Standards: In accordance with BS EN 1825-1 and to BS EN 1825-2 and Kitemark certified, or Agrement certified.

###### Gullies

One piece gullies/ One piece gullies and covers/ Composite gullies: To BS EN 1253-1, -2, -3, -4 and -5; or Cast iron: To BS 437 and Kitemark certified, or Agrement certified.

Clay: To BS EN 295-1 and Kitemark certified, or Agrement certified.

Plastics: To BS 4660 and Kitemark certified, or Agrement certified. Polypropylene:To BS EN 1852-1.

One piece gullies/ One piece gullies and covers: To BS EN 1253-1, -2, -3, -4 and -5; or Concrete: To BS 5911-6 and Kitemark certified, or Agrement certified.

One piece gullies and covers/ Composite gullies:

Cover loading grade: To BS EN 124.

###### Manhole steps

Standard: To BS EN 13101.

###### Pipes, bends and junctions

Supply of pipes and fittings: From same manufacturer for each pipeline. Material and standards:

Cast iron - grey: To BS EN 877, Kitemark certified, with double spigot joints and proprietary coupling system. Vitrified clay - flexible joints: To BS EN 295-1, Kitemark certified.

Plastics - structured wall: To BS EN 13476-1 and -2 or -3 with supplementary testing to Water Industry Standard WIS 4

-35-01 issue 2, Kitemark or Agrement certified.

PVC-U solid wall: To BS EN 1401-1, class SN4 or SNS, with flexible joints.

###### Plastics access points

Standard: To BS 4660 and Kitemark certified, to BS EN 13598-1, or Agrement certified.

Cover loading grade: To BS EN 124.

###### Plastics inspection chambers

Standard: To BS 7158 or BS EN 13598-1, or Agrement certified.

Cover loading grade: To BS EN 124.

###### Plastics oil and petrol separator units

Standards: To Environment Agency Pollution Prevention Guidelines PPG 3 and BS EN 858-1, with oil level alarm.

**Precast concrete seatings for access covers and frames** Standards: To BS 5911-3 and BS EN 1917 and Kitemark certified. Opening sizes: To suit access covers.

###### Rodding points

Standards:

Clay: To BS EN 295-1 and Kitemark certified, or Agrement certified. Plastics: To BS 4660 and Kitemark certified, or Agrement certified.

###### Saddle connectors

Standards:

Cast iron: To BS 437 and Kitemark certified, or Agrement certified. Clay: To BS EN 295-1 and Kitemark certified, or Agrement certified. Concrete: To BS 5911-6 and Kitemark certified, or Agrement certified. Plastics: To BS 4660 and Kitemark certified, or Agrement certified.

###### Storage tanks - foul water

Standard: To BS EN 12566-1.

###### EXECUTION

**General**

Standard: In accordance with BS EN 752, with National Annex NA, and BS EN 1610.

###### Stripping out

Exposed ends of existing drainage to be abandoned: Seal with concrete (general).

###### Existing drains

Selling out: Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against drawings. Report discrepancies.

Protection: Protect existing drains to be retained and maintain normal operation ii in use.

###### Excavated material

Turt, topsoil, hardcore, etc: Set aside for use in reinstatement.

###### Selected fill for backfilling

Selected fill: As-dug material, free from vegetable matter, rubbish, frozen soil and material retained on a 40 mm sieve.

Compaction: By hand in 100 mm layers.

###### Lower part of trench - general

Trench up to 300 mm above crown of pipe: Vertical sides, width as small as practicable.

* Width: External diameter of pipe plus 300 mm (minimum).

###### Type of subsoil

General: Where type of subsoil at level of crown of pipe differs from that stated for the type of bedding, surround or support, give notice.

###### Formation for beddings

Timing: Excavate to formation immediately before laying beddings or pipes.

Mud, rock projections, boulders and hard spots: Remove. Replace with consolidated bedding material. Local soft spots: Harden by tamping in bedding material.

Inspection of excavated formations: Give notice.

###### Class D bed

Usage: Rigid pipework (clay, concrete or grey iron) laid on a natural bed. Trench: Excavate slightly shallower than final levels.

Trimming: By hand to accurate gradients. Replace overdig with compacted spoil.

Pipes: Rest uniformly on barrels, adjust to line and gradient. Do not use hard packings under pipes. Backfilling:

Material: Protective cushion of selected fill.

Depth: 150 mm (250 mm for adoptable sewers) above crown of pipe. Compaction: By hand in 100 mm layers.

###### Class F bedding

Usage: Rigid pipework (clay, concrete or grey iron) requiring granular bedding. Granular material:

Pipe sizes DN 100 and DN 150: Size 4/10.

Pipe sizes DN 225 and DN 300: Size 4/10 or 10/20. Pipe sizes DN 375-500: Size 10/20.

Pipe sizes DN 600 and above: Size 10/20 or 20/40.

Bedding:

Material: Granular, compacted overlull width of trench.

Thickness: 50 mm (minimum) for sleeve jointed pipes, 100 mm (minimum) for socket jointed pipes. Where trench bottom is uneven, increase thickness by 100 mm.

Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.

Backfilling:

Material: Protective cushion of selected fill.

Depth: 150 mm (250 mm for adoptable sewers) above crown of pipe. Compaction: By hand in 100 mm layers.

###### Class N bedding

Usage: Rigid pipework (clay, concrete or grey iron) requiring as-dug material bedding. Bedding:

Material: As-dug material with a compaction fraction of not more than 0.3 (granular material, size 0/4 or 0/10, may be substituted) .

Compaction : Over full width of trench.

Thickness : 50 mm (minimum) for sleeve jointed pipes, 100 mm (minimum) for socket jointed pipes. Where trench bottom is uneven, increase thickness by 100 mm.

Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.

Backfilling:

Material: Protective cushion of selected fill.

Depth: 150 mm (250 mm for adoptable sewers) above crown of pipe. Compaction : By hand in 100 mm layers.

###### Class 0 support

Usage: Plastics pipework requiring a full depth granular support (single size material only). Granular material:

Pipe sizes ON 100 and ON 150: Size 4/10.

Pipe sizes ON 225 and ON 300: Size 4/10 or 10/20.

Bedding:

Material: Granular, compacted over full width of trench.

• Thickness: 100 mm (minimum) .

Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient. Support:

Material: Granular.

Depth: To slightly above crown of pipe. Compaction: By hand.

Backfilling:

Material and depth: Protective cushion of selected fill to 300 mm above crown of pipe; or Additional granular material, to 100 mm above crown of pipe.

Compaction: By hand in 100 mm layers.

###### Class P support

Usage: Plastics pipework requiring a full depth granular support (single size or graded material). Granular material:

Pipe sizes ON 100 and ON 150: Size 4/10.

Pipe sizes ON 225 and ON 300:Size 4/10, 10/20 or 4/20.

Bedding:

Material: Granular, compacted over full width of trench. Thickness : 100 mm (minimum).

Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.

Support:

Material: Granular.

Depth: To slightly above crown of pipe. Compaction: By hand.

Backfilling:

Material and depth: Protective cushion of selected fill to 300 mm above crown of pipe; or Additional granular material, to 100 mm above crown of pipe.

Compaction: By hand in 100 mm layers.

###### Class Q surround

Usage: Plastics pipework requiring a granular surround with protection (typically shallow pipes with 600 mm cover or less in landscaped areas).

Granular material:

Pipe sizes DN 100 and DN 150: Size 4/10.

Pipe sizes DN 225 and DN 300: Size 4/10, 10/20 or 4/20.

Bedding:

Material: Granular, compacted over full width of trench. Thickness: 100 mm (minimum).

Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust lo line and gradient.

Surround:

Material: Granular.

Depth: To 75 mm (minimum) above crown of pipe. Compaction: By hand.

Compressible material:

Laying: Continuously over completed surround before laying protection slabs.

Precast concrete protection slabs: Bearing: 300 mm (minimum).

Backfilling: Soil or topsoil, as appropriate.

###### Class W surround

Usage: Plastics pipework requiring a granular surround (typically under solid ground floors where the cover from the underside of the slab is 300 mm or more).

Timing: Excavate trench after hardcore has been laid and compacted. Granular material:

Pipe sizes DN 100 and DN 150: Size 4/10.

Pipe sizes DN 225 and DN 300: Size 4/1O or 10/20.

Bedding:

Material: Granular, compacted over full width of trench.

* Thickness: 100 mm (minimum).

Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient. Surround:

Material: Granular.

Depth: To 100 mm above crown of pipe. Compaction: By hand.

Backfilling:

Material: Hardcore as section D20, or granular. Depth: Up to slab formation.

Compaction: In 300 mm (maximum) thick layers.

###### Class Y surround

Usage: Pipework below solid ground floors, requiring a concrete surround cast integrally with a floor slab (cover from the underside of the slab is less than 300 mm).

Timing: Excavate trench after hardcore has been laid and compacted. Blinding:

Material: Concrete (general). Thickness: 25 mm (minimum).

* Width: Full width of trench.

Allow to set before proceeding.

Pipes:

Temporary support: Folding wedges of compressible board. Prevent flotation. Clearance under pipes: 100 mm (minimum).

Adjust pipes to line and gradient.

Surround, cast integrally with slab:

Material: Concrete of same mix as slab.

Width: External diameter of pipe plus 200 mm (minimum). Extent of surround: To within 150 mm of nearest flexible joint .

###### Class Z surround

Usage: Pipework requiring a concrete surround to ensure the stability of adjacent structures . Blinding:

Material: Concrete (general).

Thickness (minimum): 25 mm (minimum). Width: Full width of trench.

Allow to set before proceeding.

Pipes:

Temporary support: Folding wedges of compressible board. Prevent flotation. Clearance under pipes (minimum): 100 mm (minimum).

Adjust pipes to line and gradient.

Surround:

Material: Concrete (general).

Depth: To 150 mm above crown of pipe. Width: Full width of trench.

Vertical construction joints:

Location: At face of flexible pipe joints.

Material: 18 mm thick compressible board precut to profile of pipe.

Socketed pipes: Fill gaps between spigots and sockets with resilient material to prevent entry of concrete.

###### Concrete surround for pipe runs near foundations

Class Z surround: Provide in locations where bottom of trench is lower than bottom of foundation and as follows (horizontal clear distance between nearest edges of foundations and pipe trenches):

Trenches less than 1 m from foundations: Top of concrete surround not lower than bottom of foundation.

Trenches more than 1 m from foundations: Top of concrete surround not lower than D mm below bottom of foundation, where D mm is horizontal distance of trench from foundation, less 150 mm.

###### Laying pipelines

Laying pipes: To true line and regular gradient on even bed for full length of barrel with sockets (if any) facing up the gradient.

Ingress of debris: Seal exposed ends during construction. Timing: Minimize time between laying and testing.

###### Jointing pipelines

Connections: Durable, effective and free from leakage.

Junctions, including to differing pipework systems: With adaptors intended for the purpose.

Cut ends of pipes: Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets. Jointing or mating surfaces: Clean and, where necessary, lubricate immediately before assembly.

Allowance for movement: Provide and maintain appropriate clearance at ends of spigots as fixing and jointing proceeds. Jointing material: Do not allow to project into bore of pipes and fittings.

###### Pipelines passing through structures

Pipelines that must be cast in or fixed to structures (including manholes, catchpits and inspection chambers): Provide 600 mm long rocker pipes adjacent to the external face of the structure (or both faces where appropriate, e.g. walls to footings), with flexible joints at both ends.

Distance to rocker pipe from structure: 150 mm (maximum).

Provision for movement for pipelines that need not be cast in or fixed to structures (e.g. walls to footings): Rocker pipes as specified above; or

Openings in the structures to give 50 mm (minimum) clearance around the pipeline. Closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin.

###### Bends at base of soil stacks

Bedding: Do not impair flexibility of pipe couplings.

Material: Concrete (general).

###### Direct connection of ground floor WCs to drains

Drop from crown of WC trap to invert of drain (maximum): Comply with Building Regulations Approved/ Technical guidance documents.

Horizontal distance from the drop to a ventilated drain (maximum): 6 m.

###### Backdrop pipes outside manhole walls

Excavation beneath backdrop pipe: Backfill.

Material: Concrete (general).

Pipe encasement:

Material: Concrete (general).

Thickness (minimum): 150 mm (minimum).

###### Installing flexible couplings

Ends of pipes to be joined: Cut cleanly and square.

Outer surfaces ol pipes to be joined: Clean and smooth. Where necessary, e.g. on concrete or iron pipes, smooth out mould lines and/ or apply a cement grout over the sealing area.

Clamping bands: Tighten carelully to make gaslight and watertight seals .

###### Initial testing of pipelines

Before testing:

Cement mortar jointing: Leave 24 h. Solvent welded pipelines: Leave 1 h.

Method: Block open ends ol pipelines to be tested and pressurise. Air test short lengths to BS EN 1610.

###### Backfilling to pipelines

Backlilling above top of surround or protective cushion: Material excavated from trench, compacted in layers 300 mm (maximum) thick.

Heavy compactors: Do not use before there is 600 mm (total) ol material over pipes.

###### Backfilling under roads and pavings

Backfilling from top ol surround or protective cushion up to formation level: Granular sub-base material, laid and compacted in 150 mm layers.

###### Public roads and pavings - E+W, Scot

Excavating and backlilling ol trenches: To Department for Transport 'Specification for the reinstatement of openings in highways'.

###### Public roads and pavings - NI

Excavating and backfilling of trenches: To Northern Ireland Road Authority and Utilities Committee 'Specification for the reinstatement of openings in highways'.

###### Laying warning marker tapes

Installation: During backfilling, Jay continuously over pipelines. Depth: 300-400 mm.

Pipelines deeper than 2 m: Lay an additional tape 600 mm above the top of the pipeline.

###### Installing access points and gullies

Setting out relative to adjacent construction features: Square and tightly jointed. Permissible deviation in level of external covers and gratings: +O to -6 mm.

Raising pieces (clay and concrete units): Joint with 1:3 cement:sand mortar. Exposed openings: Fit purpose made temporary caps. Protect from site traffic.

###### Installing rodding points

Bedding and surround:

Material: Concrete (general).

Thickness (minimum): 100 mm (minimum).

Permissible deviation in level of external covers and gratings: +O to -6 mm.

###### Installing oil and petrol separator units

Installation: Fill tank with water then encase tank and access shafts with concrete (general) to fully support tank.

###### Fixing manhole steps

Fixing: Bed in joints.

Positioning: 300 mm vertical centres staggered 300 mm horizontally, with lowest step 300 mm (maximum) above benching and top step 450 mm (maximum) below top of cover.

###### Jointing concrete manhole chamber sections

Inner joint surface: Trim surplus jointing material extruded into chamber and point neatly.

###### Laying conventional channels, branches and benching

Main channel: Bed solid in 1:3 cement:sand mortar.

Branches: Connect to channel, preferably at hall pipe level, so that discharge flows smoothly in direction of main flow. Branches greater than nominal size 150 mm: Connect the branch soffit level with the main drain soflit.

Connecting angles more than 45 ° to direction of flow: Use three-quarter section channel bends.

Concrete benching:

Profile: Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10%

to walls.

Topping: Concrete or 1:3 Cement:Sand mortar.

Application of topping: Before benching concrete has set, and with dense smooth uniform finish.

###### Laying preformed plastics channels, branches and benching

Main channel: Bed solid in 1 :3 cement:sand mortar.

Branches: Connect to channel. preferably at half pipe level, so that discharge !lows smoothly in direction of main flow. Connecting angles more than 45°to direction ol flow: Use three-quarter section channel bends.

Bedding: 1:3 cement:sand mortar. Use clips or ensure adequate mechanical key. Benching:

Material: Concrete (general).

Profile: Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.

Topping: Concrete or 1:3 Cement:Sand mortar.

Application of topping: Before benching concrete has set, and with dense smooth uniform finish.

###### Installing access covers and frames

Bedding and haunching of frames: Continuously.

Top of haunching: 30 mm below surrounding surfaces.

Horizontal positioning of frames: Centred over openings.

Square with joints in surrounding paving.

Vertical positioning of frames:

Level; or

marry in with levels of surrounding paving.

Permissible deviation in level of external covers and frames: +O to -6 mm.

###### Exposed openings in inspection chambers, access points, fittings and equipment

General: Fit purpose made temporary caps. Protect from site traffic.

###### Removal of debris and cleaning

Preparation: Lift covers to manholes, inspection chambers and access points. Remove mortar droppings, debris and loose wrappings.

Timing: Before cleaning, final testing, CCTV inspection if specified, and immediately before handover.

Cleaning: Thoroughly flush pipelines with water to remove silt and check for blockages. Rod pipelines between access points if there is any indication that they may be obstructed.

Washings and detritus: Do not discharge into sewers or watercourses. Covers: Securely replace after cleaning and testing.

###### Temporary measures

Water used to stabilize tanks and the like during installation: Drain.

###### Testing and inspection

Dates for testing and inspection: Give notice.

###### Final testing of private gravity drains and sewers up to DN 300

Before testing:

Cement mortar jointing: Leave 24 h. Solvent welded pipelines: Leave 1 h.

Standard: Comply with Building Regulations Approved/ Technical guidance documents. Method: Air or water, Contractor's choice.

###### Water testing of manholes and inspection chambers

Timing: Before backfilling. Standard:

Exfiltration: To BS EN 1610. Testing with water (Method W). Infiltration: No identifiable flow of water penetrating the chamber.

###### Water testing of ancillary components

Standard: To BS EN 1610.

## S90 HOT AND COLD WATER SUPPLY SYSTEMS

##### GENER AL

###### Cross-reference

General: Read with A90 General technical requirements.

###### Design and detailing by contractor

Standard: To BS 6700 or BS EN 806-2.

##### PRODUCTS

###### Equipment

Solar collectors: To BS EN 12975-1 and -2.

Controls: To BS EN 60730-1, BS EN 60730-2-14 and -2-9.

Instantaneous water heaters - gas: To BS EN 26.

Instantaneous water heaters and shower units - electric: To BS EN 60335-2-35, BEAB approved and/ or accepted by water supply undertaker.

Storage water healers - gas: To BS EN 89.

Storage water heaters - electric: To BS EN 60335-2-21, BEAB approved and/ or accepted by water supply undertaker.

###### Cisterns

Nonpotable water storage and feed & expansion tanks: With removable cover.

Moulded plastics: To BS 4213.

Grp: To BS EN 13280.

Potable water storage: To BS 7181, insulated with secured cover, screened air inlet and screened warning pipe termination assembly.

Moulded plastics: To BS 4213.

Cistern valves: Float operated diaphragm type to BS 1212-2 or -3.

Float: Plastics to BS 2456 size to suit water pressure.

###### Hot water storage cylinders

Direct: To BS 1566-1, Kitemark certified.

Double feed indirect: To BS 1566-1, Kitemark certified. Single feed indirect: To BS 1566-2, Kitemark certified. Separate insulating jacket: To BS 5615.

###### Insulated combination units

Standard: To BS 3198, Kitemark certified.

Combination units for hot and cold water linked to a boiler: Provide a feed and expansion cistern unless integral cistern included.

###### Indirectly heated unvented hot water storage

Standard: To BS EN 12897.

###### Immersion heaters

Standard: To BS EN 60335-2-73, BEAB approved.

###### Metal flue pipes

Standard: To BS 715 for gas fired appliances.

###### Copper pipe and fittings

Tube: To BS EN 1057, Kitemark certified. General use: Half hard temper R250.

General use wall thickness (nominal): 6, 8, 10 and 12 mm pipes: 0.6 mm.

15 mm pipes: 0.7 mm.

22 and 28 mm pipes: 0.9 mm.

35 and 42 mm pipes: 1.2 mm.

Underground use: Solt coil temper R220 or half hard temper R250. Underground use wall thickness (nominal):

6, 8, 10 and 12 mm pipes: 0.8 mm.

15 mm pipes: 1.0 mm.

22 and 28 mm pipes: 1.2 mm.

35 and 42 mm pipes: 1.5 mm.

Capillary fittings: To BS EN 1254-1, Kitemark certified. Compression fittings: To BS EN 1254-2, Kitemark certified. Fittings with threaded ends: To BS EN 1254-4, Kitemark certified. Plastics coated copper pipelines for use below ground:

Coating: Seamless polyethylene, to BS 3412.

###### Chromium plated copper pipe

Tube: To BS EN 1057, Kitemark certified, hall hard temper R250.

Finish: Chromium plate. to BS EN ISO 1456, service condition 2.

Wall thickness (nominal):

6, 8, 1O and 12 mm pipes: 0.6 mm.

15 mm pipes: 0.7 mm.

22 and 28 mm pipes: 0.9 mm.

35 and 42 mm pipes: 1.2 mm.

Compression fittings: To BS EN 1254-2, Kitemark certified, Type A .

Finish: Chromium plate to BS EN ISO 1456, service condition 3.

Fittings with threaded ends: To BS EN 1254-4, Kitemark certified.

###### Stainless steel pipe

Tube: To BS EN 10312.

Fluxes containing chlorides or borides: Not permitted.

###### Thermoplastics pipe and fittings

Polybu\ylene (PB): To BS 7291-1 and BS 7291-2, or Water Regulations Advisory Scheme (WRAS) approved and Agrement certified.

Cross-linked polyethylene (PE-X): To BS 7291-1 and BS 7291-3, or Water Regulations Advisory Scheme (WRAS) approved and Agrement certified.

###### Polyethylene pipe for use below ground

Tube: Blue polyethylene to BS 6572, Kitemark certified (superseded but remains current) or BS EN 12201-2.

Jointing: Compression fittings to BS EN 12201-3.

###### Pipeline insulation

Fire performance: Class 1 spread of flame to BS 476-7.

###### Timers and thermostats

Standards: To relevant parts of BS EN 60730 and C, BEAB approved.

###### Valves

Generally: Approved by local water supply undertaker and of appropriate pressure and/ or temperature ratings. For isolation control: With handwhee/s.

For isolation and regulation: With lockshields. Ball valves: To BS EN 331.

Stop valves and draw-off taps for above ground use: Copper alloy to BS 1010-2, Kitemark certified. Stop valves for below ground use: DZR copper alloy CZ 132 to BS 5433.

Gate valves: Copper alloy to BS 5154, Series B, Kitemark certified or BS EN 12288.

Double check valve assemblies: Copper alloy check valves to BS 6282-1 or BS EN 13959 with intervening test cock to BS 2879.

Draining taps: Copper alloy to BS 2879, Type 1, hose connection pattern, Kitemark certified. Gas plug cocks: To BS 1552.

##### EXECUTION

###### Hot and cold water services for domestic use

Standard: To BS 6700 or BS EN 806-4.

###### Gas services

Standard: To BS 6891.

###### Installation generally

Performance: Free from leaks and audible effects of expansion, vibration and water hammer.

Fixing of equipment, components and accessories: Secure, parallel or perpendicular to building structure. Preparation: Clear debris and projections before installing tanks and cisterns on floors or platforms.

Corrosion resistance: Use corrosion resistant fittings/ fixings and avoid contact between dissimilar metals.

###### Dezincification

Fittings used below ground or in concealed or inaccessible locations: Gunmetal or another material resistant to dezincification.

###### Flue pipe

Joints and bends: Minimize number.

Slope: Not more lhan 30°from the vertical. Joints:

Sockets: Uppermost.

Supports: Fully supported and fixed securely with brackets supplied for lhe purpose. Sealing: Gas-tight, in accordance with manufacturer's instructions.

Joints within floor void: Not permitled.

Expansion and contraction: Accommodate thermal movemenl. Fire safety: Locate a safe distance from combustible materials. Roof junction: Weatherproof.

###### Balanced flue terminal

Opening in external wall: Submit proposals for position. Flue guard: Required if flue may be touched.

###### Cisterns

Outlet positions: 30 mm (minimum) above bottom. Access clear space:

Cistern does not exceed 450 mm in any dimension: 225 mm (minimum) above. Cistern does exceed 450 mm in any dimension: 350 mm (minimum) above.

###### Warning/ overflow pipes to cisterns

Normal water level and overflow level difference (minimum):

Cold waler storage cisterns: The greater of 32 mm or the bore of warning pipe.

Feed and expansion cisterns: To allow 20% increase in the volume of water plus 25 mm.

Supply inlet above overflow level: Bore of warning pipe (minimum). Fall: 1 in 10 (minimum).

Support: To prevent sagging.

Exposed end: Prominent position with turned down end.

Cistern end: Turned down to terminate 50 mm below normal water level. Insulation: Insulate within the building where subject to freezing.

###### Vent pipes over cisterns

Route: No restrictions or valves.

Slope: Rising continuously from system connection to discharge over cistern. Internal diameter: 20 mm (minimum).

###### Unvented hot water storage discharge pipes

Discharge pipe size: To suit outlet on safely device and length and configuration of pipe.

Fall: 1 in 80 (minimum).

Discharge: Via an air break and tundish.

###### Water softeners

Supply continuity: Fit bypass pipe and stop valves. Drains: Overflow/ drain lines to trap and waste.

Back siphonage: Prevent back siphonage during regeneration.

###### Pipelines

Generally to :

BS 8000-15. clause 3.7: BS 5g55-8, clause 6.11 ;

BS 6700, section 6 or BS EN 806-4; and

BRE Defect Action Sheets 120 and 121.

Notches and holes in timber to:

BS 6700 , Figure 15 or BS EN 806-4 clauses 4.5 and 4.7. Building Regulations E&W Approved Document A , section 1B6. Building Regulations NI Technical Booklet D, section 2.6.

Position:

Arrangement : Straight, and parallel or perpendicular to building elements . Location: Within floor, ceiling and/ or roof voids.

Access: To facilitate installation of equipment, accessories and insulation without compression. Maintenance: Allow sufficient space for access.

Where routed together horizontally : Hot pipelines above cold. Heating pipelines: Do not run cold water pipelines near.

Heated spaces: Do not run cold water pipelines through. Electrical enclosures: Do not run water pipelines through. Electrical equipment: Do not run water pipelines above.

###### Pipelines fixing

Fixing: Secure and neat.

Joints, bends and offsets: Minimize. Pipeline support: Prevent strain.

Drains and vents : Fix pipelines to falls. Fit draining taps at low points and vents at high points.

Thermal expansion and contraction: Allow for thermal movement. Isolate from structure. Prevent noise or abrasion. Pipelines passing through walls , floors or other building elements: Sleeve.

Dirt, insects or rodents: Prevent ingress.

###### Support for copper/ stainless steel pipelines

Fixing: Secure and true to line. Support centres (maximum):

15 and 22 mm pipe: Horizontal 1200 mm, vertical 1800 mm.

28 and 35 mm pipe: Horizontal 1800 mm, vertical 2400 mm.

42 and 54 mm pipe: Horizontal 2400 mm, vertical 3000 mm.

Additional supports: Locate within 150 mm of connections, junctions and changes of direction.

###### Supports for exposed thermoplastics pipelines

Fixing: Secure and true to line. Support centres (maximum):

Up to 16 mm pipe: Horizontal 300 mm, vertical 500 mm. 17-25 mm pipe: Horizontal 500 mm, vertical 800 mm.

26-32 mm pipe: Horizontal 800 mm, vertical 1000 mm.

Additional supports: Locate within 150 mm of connections, junctions and changes of direction.

###### Bends in thermoplastics pipelines

Bends: Do not use goo elbow fittings. Large radius bends: Support at maximum centres. go 0 bends: Fix pipe clips either side of bend.

Small radius bends: Fully support go 0 bends with cold form bend fixtures .

###### Polyethylene pipelines for use below ground

Jointing: Compression fittings recommended by tube manufacturer.

###### Pipeline spacing

Clearance (minimum) to face of wall-fixed pipes or pipe insulation: From floor: 150 mm.

From ceiling: 50 mm. From wall: 15 mm.

Between pipes: 25 mm.

From electrical conduit, cables, etc: 150 mm.

###### Joints in copper/ stainless steel pipelines

Preparation: Cut pipes square . Remove burrs. Joints: Neal, clean and fully sealed.

Pipe ends: inserted to full depth.

Formed bends: Do not use on exposed pipework, except for small offsets. Changes of direction: Use radius fittings .

Adaptors for connecting dissimilar materials: Purpose designed. Substrate and plastics pipes and fittings: Do nol damage.

Flux residue: Clean off.

###### Capillary joints in plastics coated pipes

Plastics coating: Do not damage.

Completed join!: When cool, wrap with PVC tape of matching colour, half lapped.

###### Joints in thermoplastics pipelines

Fittings and accessories for joints: Purpose designed. Preparation: Cut pipes square. Remove burrs.

Joints: Neat, clean and fully sealed. Pipe ends: inserted to full depth. Compression fittings: Do not overtighten.

Transition joints to boilers, circulators and adjacent to radiant heat sources: 300 mm long (minimum) copper transition tube, diameter as heating pipeline, compression jointed to pipeline and fitting.

###### Pipelines entering buildings

Depth: Lay pipes 750 mm (minimum) below finished ground level.

Pipelines rising into building within 750 mm of the external face of the external wall or passing through a ventilated void below floor level: Insulate from finished floor level to 600 mm beyond external face of building.

Ends of pipeducts: Seal both ends to a depth of 150 mm (minimum).

###### External supply pipelines

Pipelines exposed to air and less than 750 mm below finished ground level: Insulate.

###### Insulation to pipelines

Standard: In accordance with BS 5970.

Cold water pipelines: Insulate in unheated spaces and to potable cold water pipelines.

Hot water pipelines: Insulate, except for short lengths in prominent positions next to appliances.

Appearance: Fix securely and neatly. Make continuous over fittings and at supports . Locate split on 'blind' side of pipeline. Gaps: Not permitted.

Timing: Fit insulation after testing.

###### Insulation to cisterns

Standard: In accordance with BS 5970.

General: Fix securely to sides and top of cisterns. Gaps: Not permitted.

Access cover: Allow removal of cover with minimum disturbance to insulation. Underside of cistern: Insulate where exposed in unheated spaces.

###### Valves

Isolation and regulation valves: Provide on equipment and subcircuits. Location: Next to equipment to be isolated.

Access: Locate for ease of operation and maintenance.

Connection to pipework: Fit with joints to suit pipe material.

##### COMPLETION

###### System disinfection

Disinfection: To BS 6700 or BS EN 806-4.

###### Testing and commissioning

Testing and commissioning: To BS 6700 or BS EN 806-4.

Notice: 3 days (minimum).

Preparation: Secure and clean pipework and equipment. Fit cistern/ tank covers. Flushing and filling: To BS 6700 or BS EN 806-4.

Leak testing: Start and run until all parts are at normal operating temperatures, allow to cool to cold condition for a period of 3 hours.

Pressure testing: At both hot and cold joints, fittings and components free from leaks and signs of physical distress when tested for 1 hour (minimum) as follows:

Systems fed directly from the mains and systems downstream of a booster pump: Test pressure of 1.5 times the designed maximum operating pressure.

Systems fed from storage: Test pressure equal to storage cistern filled to normal maximum operating level. Inaccessible or buried pipelines: Hydraulic pressure test to twice the maximum operating pressure.

Equipment, controls and safety devices: Check and adjust operation.

Outlets: Check operation, rate of flow and temperature.

###### Testing gas pipelines

Testing and purging: To BS 6891.

###### Documentation

Manufacturers' operating and maintenance instructions: Submit for equipment and controls.

System operating and maintenance instructions: Submit for the system as a whole giving optimum setlings for controls. Record drawings: Submit drawings showing the location of circuits and operating controls.

###### Operating tools

Tools: Supply for operation, maintenance and cleaning purposes. Valve keys: Supply for valves and vents.

###### Labels

Isolating and regulating valves on primary circuits: Label with statement of function.

## T90 HEATING SYSTEMS

**GENER AL**

###### Cross-reference

General: Read with A90 General technical requirements.

# DESIG N

###### Basic domestic room design temperatures at given ventilation rates

Living rooms: Temperature 21 "C.

* + Air changes: 1.5 per hour. Dining rooms: Temperature 21 "C.
  + Air changes: 1.5 per hour. Bedsitting rooms: Temperature 21 "C.

Air changes: 1.5 per hour. Bedrooms: Temperature 18"C.

Air changes: 1 per hour.

Halls and landings: Temperature 18"C.

* + Air changes: 1.5 per hour. Kitchens: Temperature 18"C.

Air changes: 2 per hour.

Bathrooms: Temperature 22"C.

* + Air changes: 2 per hour. Toilets: Temperature 18"C.
  + Air changes: 2 per hour.

###### Thermal insulation of building fabric - heat loss determined by contractor

Heat loss calculations: Based on U values in the specified source documents or calculated from the fabric described elsewhere.

Submit: Heat loss calculations for each room using the HEVACOMP suite of programmes or an agreed equivalent.

###### System capacity

Output of total heating surface area in any space: As near as practicable to, but not less than, design heat loss for that space.

Boiler output (minimum): Total calculated heat loss, including emission from system pipelines and sufficient to meet hot water supply requirements.

Total heat loss calculations: Allow for intermittent use, exposure, and the like.

# PRODUCTS

###### Central heating boilers

Gas fired:

Standard boiler: To relevant parts of BS 5258-1, BS EN 483 or BS EN 297. Combination boiler: To BS 5258-15, BS EN 297 or BS EN 483 and BS EN 625.

Solid fuel fired:

Undergrate ash removal: To BS 4433-1. Gravity feed: To BS 4433-2.

Oil fired: To OFS A 100 (Oil Firing Technical Association [OFTEC] Standard), BS 799-2 or BS 799-3 and BS EN 15035.

###### Roomheaters

Solid fuel, with or without back boiler: To BS 3378.

###### Fires

Gas:

* Gas fire: To BS 7977-1.

Gas fire with back boiler: To BS 7977-2.

Inset live fuel effect gas lire: To BS EN 509 and BS 7977-1. Decorative fuel effect gas appliance: To BS EN 509 and BS 7977-1.

**Cookers**

Solid fuel with boiler: To BS 1252.

**Chimneys and flues**

Insulated chimneys with stainless steel linings for solid fuel fired appliances: To BS EN 1856-1, tested to BS EN 1859. Insulated chimneys with stainless steel linings for oil fired appliances: To BS EN 1856-1, tested to BS EN 1859.

Flue liners: Flexible, spiral wound, austenitic stainless steel tube.

Metal flues for gas fired appliances: To BS 715, BS EN 1856-1 and BS 5440-1.

**Oil storage tanks**

Steel: To BS 799-5 and BS 5410-1.

Plastics: To OFS T100 (OFTEC) and BS 5410-1.

**Cisterns**

Feed and expansion cisterns with removable cover:

* Moulded plastics: To BS 4213.
* GAP: To BS EN 13280.

Cistern valves: Float operated diaphragm type to BS 1212-2 or -3. Float: Plastics to BS 2456, size to suit water pressure.

**Circulating pumps**

Standard: To BS EN 1151 and BS EN 60335-2-51.

**Radiators**

Standard: To BS EN 442.

**Convectors**

Natural convectors: To BS EN 442.

Fan assisted convectors: To BS EN 442 and BS 4856.

**Copper pipelines for general use**

Standard: To BS EN 1057, Kitemark certified.

* Temper: Half hard temper R250. Wall thickness (nominal):
* 6, 8, 10 and 12 mm nominal O.D. pipes: 0.6 mm. 15 mm nominal O.D. pipes: 0.7 mm.
* 22 and 28 mm nominal O.D. pipes: 0.9 mm.
* 35 and 42mm nominal O.D. pipes: 1.2 mm.

**Microbore copper pipelines**

Standard: To BS EN 1057, Kitemark certified. Temper: Solt coil temper R220.

Wall thickness (nominal):

* 6 and 8 mm nominal 0.D. pipes: 0.6 mm. 10 mm nominal O.D. pipes: 0.7 mm.

**Plastics coated copper pipelines**

Standard: To BS EN 1057, Kitemark certified.

* Coating: Seamless polyethylene, to BS 3412. Temper: Half hard temper R250.

Wall thickness (nominal): As copper pipelines for general use.

**Fittings for copper pipelines**

Jointing:

Integral lead free solder ring capillary fittings: To BS EN 1254-1, Kitemark certified.

Connections to appliances and equipment:

Compression fittings: To BS EN 1254-2, Kitemark certified. Fittings with threaded ends: To BS EN 1254-4.

**Thermoplastic pipe and fittings**

Polybutylene (PB): To BS 7291-2.

Cross linked polyethylene (PE-X): To BS 7291-3.

**Pipeline insulation**

Material: Preformed flexible plastics closed cell foam or mineral fibre split tube. Thermal conductivity: 0.04 W/m 2·K (maximum).

Thickness:

Heating and primary pipelines: Equal to the outside diameter of the pipe up to 40 mm (maximum). Internal cold water pipelines: 25 mm.

Roof space cold water pipelines: 32 mm. External cold water pipelines: 38 mm.

Fire performance: Class 1 spread of flame to BS 476-7.

###### Controls

Programmers : To relevant parts of BS EN 60730 and BS EN 61058 , BEAB approved.

Timers and thermostats: To relevant parts BS EN 60730 and BS EN 61058, BEAS approved.

Types: Recommended for purpose .

###### Valves

Generally:

Types: Approved for the purpose by local water supply undertaker and of appropriate pressure and temperature ratings. Control of valves: Fit with handwheels for isolation and lockshields for isolation and regulation of circuits or equipment.

Motorized valves : To relevant parts of BS EN 60730 and BS EN 61058 , BEAS approved.

Manual radiator valves: Copper alloy to BS 2767.

Thermostatic radiator valves: To BS EN 215-1 and capable of providing isolation.

**EXECUTION**

###### System performance

Control:

Controls: Compatible with each other and with the central heating boiler. Temperature and time control: Fully automatic and independent.

Domestic heating systems: To Water Supply Regulations/ Byelaws and the requirements of the water supply undertaker.

###### Installation generally

Performance: Free from leaks and the audible effects of expansion, vibration and water hammer.

Fixing of equipment, components and accessories: Fix securely, parallel or perpendicular to the structure of the building. Preparation: Clear debris and projections before installing tanks and cisterns on floors or platforms.

Corrosion resistance: Use corrosion resistant fittings/ fixings and avoid contact between dissimilar metals. Electrical work: To BS 7671.

Fire resisting pipe sleeves:

Types and sizes: Recommended by manufacturer.

Sealing around services: Fill space completely. Finish neatly. Decoration and other work: Drop radiators when required.

**Gas fired boilers** Installation: To BS 6798. Space around the boiler:

Ensure sufficient air circulation for draught diverter operation. Ensure sufficient air for combustion and cooling.

Sufficient for maintenance and servicing.

Combustible material: Either 75 mm clear of the boiler, or lined with non-combustible material. Combination boilers:

Expansion vessel connection pipework: Locate the neutral point of the system in the return pipework close to the heat generator.

Fill point location: Between the expansion vessel connection point and circulation pump inlet.

###### Solid fuel fired roomheaters with backboiler

Installation: To BS 8303-3.

Hearth: Place appliances wholly or partially upon constructional hearths or upon finished hearths constructed of non­ combustible materials.

Existing flues: Ensure flue is clean, clear of obstructions, in a sound condition and of adequate size.

###### Gas fires

Type: With or without back boiler.

Installation: To BS 5871-1.

Room sealing: Room seal appliances installed in spaces containing baths, showers or beds.

###### Fuel effect gas fires

Installation: To BS 5871-2.

Siting: Stand on a hearth or floor. or secure to wall.

Existing chimneys: Remove dampers or res\rictor plates in \he chimney, or where this is no\ practicable, permanently fix in the fully open position.

Live fuel effect gas fires:

Sealing: To eliminate the entry of excess air into the flue, seal lire into position.

Decorative fuel effect gas fires:

Servicing: Install appliances so they can be removed for servicing.

###### Flue pipes

Installation: To BS 5440-1.

Joints and bends: Minimize number.

Slope: Not more than 30° from the vertical.

Joints: Install with sockets uppermost, fully supported and fixed securely with brackets supplied for the purpose. Do not locate joints within the depth of floors.

Seals: Seal to provide a gas-tight installation.

Expansion and contraction: Accommodate thermal movement. Fire safety: Locate a safe distance from combustible materials.

Roof junction: Weatherproof. Fit terminal and flashings, collars etc.

**Flexible flue liners** Installation: Complete, gas tight. Flue: Unobstructed and clean. Liner: One piece.

Fixing: Fix securely at top of stack and to boiler with purpose-made clamps.

Joint at boiler: Seal. Fill completely with jointing material.

###### Existing chimneys

Preparation: Clean thoroughly. Check for obstructions and blockages. Tests: Carry out core ball test and smoke test.

Programme: Give notice.

Obstructions or leaks: Submit proposals for making good.

###### Air supply to contractor design appliances

Air supply requirements: Submit details.

Sizes and locations of vents: Submit proposals.

###### Oil storage tanks

Installation: To BS 5410-1.

###### Feed and expansion cisterns

Installation: To BS 6700.

Outlet positions: 30 mm (minimum) above base. Access clear space (minimum):

Cistern does not exceed 450 mm in any dimension: 225 mm above.

Cistern does exceed 450 mm in any dimension: 350 mm above.

Mounting height (minimum): One metre above highest point of circulation system, unless boiler manufacturer's recommendations allow less.

Location: Sufficient space for cleaning and maintenance, with enough clearance above the tank to service the valve and accommodate the expansion pipe.

Plinth: Firm and level. Ensure adequate distribution of the load - especially if required to be carried by trussed rafters.

Installation of insulation:

General: Fix securely to sides and top of cisterns. Leave no gaps.

Access cover: Allow removal of cover with minimum disturbance to insulation. Underside of cistern: Insulate where exposed in unheated spaces.

###### Warning and overflow pipes to feed and expansion cisterns

Difference (minimum) between normal water level and overflow level:

Feed and expansion cisterns: Sufficient to allow 20% increase in the volume of water in the tank, plus 25 mm.

Vertical distance (minimum) of water supply inlet above overflow level: Bore of warning pipe. Fall: 1 in 10 (minimum).

Installation: Support to prevent sagging. Terminate pipes separately in prominent positions with turned down ends . Turn down within the cistern. Terminate 50 mm below normal water level.

Insulation: Insulate within the building where the pipe is in an un-insulated space and subject to freezing.

###### Vent pipes over feed and expansion cisterns

Route: Install with no restrictions or valves and rising continuously from system connection to discharge over cistern. Internal diameter: 20 mm (minimum).

###### Circulating pumps

Location: Readily accessible positions. Installation: As recommended by manufacturer .

###### Radiators

Towel warmers: Install on primary hot water circuit.

###### Pipelines

Generally to:

BS 8000-15, clause 3.7;

BS 5955-8, clause 6.11;

BS 6700, clause 2.8 and

BRE Defect Action Sheets 120 and 121.

Notches and holes in timber to: BS 6700, Figure 15.

Building Regulations E&W Approved Document A, section 186. Building Regulations NI Technical Booklet D, section 2.6.

Position:

Arrangement: Straight, and parallel or perpendicular to building elements. Location: Within floor, ceiling and/ or roof voids.

Access: To facilitate installation of equipment, accessories and insulation without compression. Maintenance: Allow sufficient space for access.

* Where routed together horizontally: Hot pipelines above cold. Heating pipelines: Do not run cold water pipelines near. Heated spaces: Do not run cold water pipelines through. Electrical enclosures: Do not run water pipelines through. Electrical equipment: Do not run water pipelines above.

###### Pipelines fixing general

Fixing: Secure and neat.

Joints, bends and offsets: Minimize. Pipeline support: Prevent strain.

Drains and vents: Fix pipelines to falls. Fit draining taps al low points and vents at high points.

Thermal expansion and contraction: Allow for thermal movement. Isolate from structure. Prevent noise or abrasion. Pipelines passing through walls, floors or other building elements: Sleeve.

Dirt, insects or rodents: Prevent ingress.

Spacing:

Clearance (minimum) to face of wall-fixed pipes or pipe insulation: From floor: 150 mm.

From ceiling: 50 mm. From wall: 15 mm. Between pipes: 25 mm.

From electrical conduit, cables, etc: 150 mm.

###### Copper and plastics coated copper pipelines

Jointing:

Preparation: Cut pipes square. Remove burrs.

Joints: Neat, clean and fully sealed. Install pipe ends into joint fittings tolull depth.

Bends: Do not use formed bends on exposed pipework, except for small offsets. Form changes of direction with radius fittings.

Adaptors for connecting dissimilar materials: Purpose designed.

Substrate and plastics pipes and fittings: Do not damage, e.g. by heat when forming soldered joints. Flux residue: Clean off.

Capillary joints in plastics coated pipelines:

Plastics coating: Do not damage, e.g. by direct or indirect heat. Wrap completed joint (when cool) with PVC tape of matching colour, hall lapped.

Support centres (maximum):

15 and 22 mm pipes: Horizontal 1200 mm, vertical 1800 mm.

28 and 35 mm pipes: Horizontal 1800 mm, vertical 2400 mm.

42 and 54 mm pipes: Horizontal 2400 mm, vertical 3000 mm.

Additional supports: Within 150 mm of connections, junctions and changes of direction.

###### Thermoplastics pipelines

Bends:

goo elbow fillings to form bends: Not permitted. Large radius bends: Support at maximum centres. go 0 bends: Fix pipe clips either side of bend.

Small radius bends: Fully support go 0 bends with cold form bend fixtures.

Support centres (maximum):

Up lo 16 mm pipes: Horizontal 300 mm, vertical 500 mm. 17-25 mm pipes: Horizontal 500 mm, vertical 800 mm.

26-32 mm pipes: Horizontal 800 mm, vertical 1000 mm.

Fixing: Secure and true to line.

Additional supports: Provide as necessary within 150 mm of connections, junctions and changes of direction.

###### Bends in thermoplastics pipelines

Bends: Do not use goo elbow fittings. Large radius bends: Support at maximum centres. go 0 bends: Fix pipe clips either side of bend.

Small radius bends: Fully support go 0 bends with cold form bend fixtures.

###### Insulation to pipelines

Cold water pipelines: Insulate in unheated spaces and to potable cold water pipelines.

Hot water pipelines: Insulate, except for short lengths in prominent positions next to appliances.

Appearance: Fix securely and neatly. Make continuous over fittings and at supports. Leave no gaps. Locate split on 'blind' side of pipeline.

Gaps: Not permitted.

Timing: Fit insulation alter testing.

###### Reflective aluminium foil

Installation: Cut neatly to size 25 mm smaller than radiator and fix behind radiators.

###### Valves

Isolation and regulation valves: Provide on equipment and subcircuits. Location: Next to equipment to be isolated.

Access: Locate for ease of operation and maintenance. Connection to pipework: Fit with joints to suit the pipe material. Lockshield valves: Fitted to return side of radiators.

##### COMPLETION

###### Testing and commissioning

Notice: 3 days (minimum).

Preparation: Secure and clean pipework and equipment. Fit cistern/ tank covers.

Leak testing: Start and run until parts are at normal operating temperatures, allow to cool to cold condition for a period of 3 hours.

Pressure testing: At both hot and cold joints, fittings and components free from leaks and signs of physical distress when tested for 1 hour (minimum) as follows:

Systems fed directly from the mains and systems downstream of a booster pump: Test pressure of 1.5 times the designed maximum operating pressure.

Systems fed from storage: Test pressure equal to storage cistern filled to normal maximum operating level.

Inaccessible or buried pipelines: Hydraulic pressure test to twice the maximum operating pressure.

Equipment, controls and safety devices: Check and adjust operation.

###### Testing gas pipelines

General: Test and purge. Standard: To BS 68g1.

###### Documentation

Manufacturers' operating and maintenance instructions: Submit for equipment and controls.

System operating and maintenance instructions: Submit for the system as a whole giving optimum settings for controls. Record drawings: Submit drawings showing the location of circuits and operating controls.

Water Regulations/ Byelaws notifications and certificates: See Preliminaries, section A33. Gas installation certification: See Preliminaries, section A33.

###### Operating tools

Tools: Supply for operation, maintenance and cleaning purposes. Valve keys: Supply for valves and vents.

###### Labels

Isolating and regulating valves on primary circuits: Label with statement of function.

**V90 ELECTRICAL INSTALLATION**

**GENER AL**

###### Cross-reference

General: Read with section A90 General technical requirements .

# DESIGN

###### General electrical installation

Standard: To BS 7671.

###### Internal lighting

Standard: To CIBSE 'Code for lighting'.

###### External lighting

Standards: To BS 5489-1, CIBSE 'Code for lighting' and 'Lighting Guide 6'.

###### Emergency lighting

Standard: To BS 5266-1 .

###### Photovoltaic systems

Standards:

* Generally: To IEC 60364-7-712, and in accordance with ENA Engineering recommendation G59/1 or ENA Engineering Recommendation G83/1, and DTI Report No S/P2/00282 .
* Roof mounted: To BS EN 1991-1-4 and in accordance with BRE Digests 489 and 495 .

###### Small scale wind generating systems

Wind turbines: To BS EN 61400-2.

# PRODUCTS

###### Conduit and trunking

Types and sizes: Suitable for operating conditions.

Steel conduit and fittings: To BS 4568-1 or BS EN 61386-1. PVC conduit and fittings: To BS 4607-1 or BS EN 61386-21 . Steel surface trunking systems: To BS EN 50085-1 and -2-1 .

PVC surface trunking systems: To BS 4678-4 or BS EN 50085-1 and -2-1. Steel underfloor ducting system: To BS 4678-2.

###### Cable Tray

Standard: To BS EN 61537.

Types and sizes: Suitable for operating conditions .

###### Cables

Standard: BASEC certified. Types and sizes: To BS 7671.

**Consumer control units and distribution boards** Consumer control units: To BS EN 60439-3, ASTA certified. Distribution boards: To BS EN 60439-3, ASTA certified.

Main control rating: Suit maximum demand.

Number of ways: Permanently label each way to identify circuit function, cable size and protective device rating.

Circuit protection: Miniature circuit breakers to BS EN 60898-1 or fuses to BS 88-2, BS 88-3, BS 88-6, BS 1361, or BS 3036.

Additional circuit protection: To BS EN 61008-1 or BS EN 61009-1 .

###### Equipment and accessories

Minor accessories needed to complete the installation: Types recommended for purpose by relevant manufacturer . Electrical accessories: Complete with mounting boxes.

Choice of manufacturer: Submit details of selected manufacturer with relevant catalogues.

Thirteen amp socket outlets: To BS 1363-2. Socket outlets with integral RCD: To BS 7288. Fused connection units: To BS 1363-4.

Shaver outlets: Single voltage to BS 4573, dual voltage to BS EN 61558-2-5.

Coaxial cable socket outlet: To BS 5733 and BS EN 60669-1 .

Wall mounted switchplates: To BS EN 60669-1 .

Ceiling mounted pullcord switches: To BS EN 61058-2-1.

Ceiling roses: To BS 67.

Bayonet cap lampholde1 s To BS EN 61184.

Edison screw lampl1olders: To BS EN 60238.

Compact fluorescent lampholders: To BS EN 60061-2.

Photoelectric control units for control of individual lights or lighling circuits: To BS 5972.

Television anlennae: To BS 5640-1 and -2.

Electric thermal storage heaters: To BS EN 60335-2-61, BEAB approved. Electric room heaters: To BS EN 60335-2-30, BEAB approved.

Electric heated towel rails and sauna heaters: To BS EN 60335-2-43, BEAB approved. Time switches: To BS EN 60730-1 and BS EN 60730-2-7, BEAB approved.

Photoelectric control units for control of individual lights or lighting circuits: To BS 5972.

**Emergency lighting systems**

Luminaires and related components: Registered under Industry Committee for Emergency Lighting (ICEL) Product Registration Scheme.

Luminaires. including self contained emergency lighting luminaires: To BS EN 60598-2-22.

Luminaires modified for emergency use: Certified to ICEL 1004.

**Photovoltaic systems**

Crystaline silicon terrestrial photovoltaic (PV) modules: To BS EN 61215.

Thin film terrestrial photovoltaic (PV) modules: To BS EN 61646.

Junction Boxes and switchgear assemblies: To BS EN 60439-1 or to BS EN 61439-1 and -2.

**EXECUTION**

###### Circuits

Arrangement: Divide installation into separately controlled circuits. Subdivide further where necessary.

**Installation generally**

Performance: Provide a safe, well insulated, earth protected system capable of supplying the anticipated maximum demand.

Supports and fasteners: Corrosion resisting where moisture is present or may occur. Avoid contact between dissimilar metals.

**Switchgear**

Clearance in front of switchgear (minimum): 1 m.

Labelling: Permanently label each way, identifying circuit function, rating and cable size. Enclosure identification: Label with project reference.

**Cable trays**

Access: Provide space encompassing cable trays to permit access for installing and maintaining cables. Cutting: Along an unperforated line. Minimize. Make good edges. Treat surface as the tray.

**Cable baskets**

Access: Provide space encompassing cable trays to permit access for installing and maintaining cables. Cutting: Side action bolt croppers. Minimize. Make good cut edges by treating to same standard as the basket.

**Conduit and fittings**

Fixing: Fix securely. Fix boxes independently of conduit.

Location: Position vertically and horizontally in line with equipment served, and parallel with building lines. Locate where accessible.

Jointing:

Number of joints: Minimize by using maximum practicable lengths of conduit. Cut ends: Remove burrs, and plug during building works.

Movement joints in structure: Manufactured expansion coupling.

Threaded steel conduits: Tightly screw to ensure electrical continuity, with no thread showing.

Conduit connections to boxes and items of equipment. other than those with threaded entries: Earthing coupling/ male brass bush and protective conductor.

Changes of direction: Use site machine formed bends, junction boxes and proprietary components. Do not use elbows or tees. Alternatively, use conduit boxes.

Connections to boxes, trunking, equipment and accessories: Use appropriate screwed couplings, adaptors, connectors and glands. Provide rubber bushes at open ends.

**Conduit in concrete**

Fixing: Securely to reinforcement. Boxes lo lormwork to prevent displacement. Concrete cover: As for reinforcement .

###### Drainage of conduit

Drainage outlet locations: At lowest poinls in conduit inslalled externally and where condensation may occur.

###### Trunking/ Ducting/ Cable management systems

Positioning: Accuralely wilh respect to equipment served and, where relevant, floor level.

Access: Provide space around cable lrunking to permit access for installing and maintaining cables. Jointing:

Number of joints: Minimize by using maximum practicable lengths of conduit.

Sleel syslems: Use mechanical couplings: do not weld. Fit a copper link at each joint to ensure electrical continuity. Movemenl joints in structure: Manufactured expansion coupling.

Fixing: Fix securely. Restrain floor mounted syslems lo prevenl movement during screeding. Junctions and changes of direction: Use proprietary units.

Cable exit holes: Fit grommets, bushes or liners.

Protection: Do not damage components. Fit temporary blanking plates to prevent ingress of screed and other extraneous materials.

Service outlet units: Fit when cables are installed.

###### Fire stopping of trunking/ ducting

Trunking/ ducting passing through fire resisting construction: Seal internally.

Sealing material: Submit proposals.

###### Cable routes

Cables generally: Conceal wherever possible:

Concealed cable runs to wall switches and outlets: Vertically in line with the accessory.

Exposed cable runs: Submit proposals.

Orientation: Straight, vertical and/ or horizontal and parallel to walls.

Distance from other services running parallel: 150 mm minimum.

Position cables below heating pipes.

###### Installing cables

General: Install cables neatly and securely. Protect against accidental damage, adverse environmental conditions, mechanical stress and deleterious substances.

Timing: Do not start internal cabling until building enclosure provides permanently dry conditions. Jointing: At equipment and terminal fittings only.

Cables passing through masonry walls: Sleeve with conduit bushed at both ends. Cables surrounded or covered by insulation: Derate.

###### Protective conductors

Type: Cable conductors.

###### Armoured cables

Temperature: Do not start installation if cable or ambient temperature is below O"C, or has been below O"C during the previous 24 hours.

Galvanized steel guards: Fit where cables are vulnerable to mechanical damage. Earthing: Bond armour to equipment and main earthing system.

Connections to apparatus: Moisture proof. Use sealed glands and PVC shrouds.

###### PVC sheathed cables

Low temperatures: Do not install if ambient temperature is below 5"C.

###### MICC cables

Bending: Do not corrugate sheath.

Equipment and boxes: Connect with PVC shrouded glands.

Cable fasteners: Clips and spacings recommended by manufacturer and within 150 mm of bends and connections. Testing: Test each length immediately afler fixing. Repeat 24-48 hours later.

###### Cables laid directly in the ground

Cable bedding: 75 mm of sand.

Backfilling: 75 mm of sand over cables, then as-dug material. Marker tape: nominally 250 mm above cable.

Multiple cables in same trench: Set 150 mm apart.

Cables below roads and hardstandings: Ducted, derate if longer than 1O m.

###### Cables entering buildings from below ground

Pipeducts: Seal at both ends. Method: Submit proposals.

###### Cables in plaster

Cover: Galvanized steel channel. Nail to substrate.

###### Cables in vertical trunking/ ducts

Support: Pin racks or cleats at each floor level or at 5 m vertical centres. whichever is less. Heat barrier centres (maximum): 5 m.

Heal barriers: Required except where fire resisting barriers are not provided.

###### Cables in accessible roof spaces

Cables running across ceiling joists: Fasten to timber battens fixed to joists.

###### Fixing electrical accessories/ equipment

Location: Coordinate with other wall or ceiling mounted equipment. Positions: Accurate. Square to vertical and horizontal axes.

Alignment: Place adjacent accessories on the same vertical or horizontal axis. as appropriate.

###### Multigang switches

Connection: Provide a logical relationship with luminaires. Fil blanks to unused switch spaces. Segregation: Internally segregate each phase with phase barriers and warning plates.

Location: To suit requirements of Building Regulations.

###### Luminaires, lamp holders and pendant sets

Supports: Adequate for weight of luminaire. Lamps: Provide.

###### External luminaires and lighting columns

Cleanliness: Check seals for particle ingress and clean before sealing. Columns: Install to Highways Agency 'Specification for highway works'.

###### Earth bars

Location: At incoming electrical service position. Mounting: Wall mounted on insulated supports .

###### Labelling

Identification and notices generally: Standards: To BS 5499-5 and BS 5378-2.

Equipment: Label when a voltage exceeding 230 V is present.

Distribution boards and consumer units: Card circuit chart within a reusable clear plastic cover. Fit to the inside of each unit. Include typed information identifying the outgoing circuit references, their device rating, cable type, size, circuit location and details. Label each outgoing way corresponding to the circuit chart .

Sub-main cables: Label at both ends and to both sides of wall/ floor penetrations with proprietary cable markers. Photovoltaic systems:

Provide dual supply warning notices (grid connected systems only) stating that the system is energized from more than one source.

PV modules: Label with warning notices describing the presence of live terminals.

A.G. isolation switches: Label with notices stating 'PV system - Point of emergency switching'. Circuit diagram: Provide at point of interconnection.

Details of protective settings incorporated in the PCU: Provide at point of interconnection. Fuses, terminal blocks and other assembly components: Label describing their purpose.

Spare fuses: Label, describe their rating and purpose.

Small scale wind generators:

Content of turbine nameplate: Wind turbine manufacturer and country; production year; rated power; reference wind speed; hub height operating wind speed range; operating temperature range; wind turbine class; rated voltage at the wind turbine terminals; frequency al the wind turbine terminals or frequency range in the case where normal variation is greater than 2%.

###### Emergency lighting systems

Standards: To the most onerous requirements of BS 5266-1, BS EN 1838, BS EN 50171, BS EN 50172 and the Health and Safety (Safety Signs and Signals) Regulations .

###### Emergency luminaires

Permanent electrical supplies: Derive from adjacent local lighting circuit. Charge indicator: Position in a conspicuous location.

###### Engraving

Metal and plastic accessories: Engrave, indicating their purpose. Emergency lighting test key switches: Describe their function.

Multigang light switches: Describe the luminaire arrangement.

###### Photovoltaic modules

Fix independently of any other systems installation with zinc electroplated fasteners indoors and stainless steel fasteners outdoors.

###### Small scale wind generators

Standard: To BS EN 61400-2.

General: Separate dissimilar materials to prevent bi-metallic corrosion.

Building mounted turbine support poles and fixings: Do not fix fasteners into mortar courses.

##### COMPLETION

###### Inspection and testing

Testing and commissioning: To BS 7671. Notice before testing (minimum): 24 hours.

Labels and signs required by Regulations: Fix securely in correct locations before system is tested. Evidence: System log books, inspection and completion certificates.

Emergency lighting system: Standard: To BS 5266-1.

Test certificates: To BS 5266-1 , Annex C.

System log book: To BS 5266-1 .

External lighting system:

Standard: In accordance with CIBSE Lighting guide 6.

Method: Test resulls based on average illuminance measurement method using a full grid.

Photovoltaic systems :

Generally : To International Electrotechnical Commission IEC 60364-7-712, ENA Engineering recommendation G59/1 or ENA Engineering recommendation G83/1, and DTI Report No S/P2/00282.

###### Final fix

Accessory faceplates , luminaires and other equipment : Fit after completion of decorations .

###### Cleaning

All electrical equipment: Clean immediately before handover.

###### Training

General: Before Completion, explain and demonstrate the purpose, function, operation and maintenance of the facility to end user nominees.

Scope: Use items and procedures listed in the Building Manual as the basis for instruction. Times and locations: Submit proposals. Include for items requiring seasonal operation.