Winfrith COB - Maritime & Coastguard Agency - Reference Specification

08 Feb 2018

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A90 GENERAL TECHNICAL REQUIREMENTS

GENERAL

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 Administrator or Project Manager.
Reference specification: 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 jointing 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 to that 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.
Agrément 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: ±10 mm.
- Floors to receive dry board/ panel work with little or no tolerance on thickness: ±10 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.

C20 DEMOLITION

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

EXECUTION

Report and method statement

Content: Cover relevant matters under CDM as outlined in Health and Safety Executive publications L144 'Construction (Design and Management) Regulations 2007 Approved Code of Practice' and 'Health and Safety in Construction' HS(G) 150, and as follows:

- Condition survey of structures including neighbouring properties, boundaries, etc. Also including the presence, or anticipated presence, of protected species (bats, barn owls, breeding birds, and others listed in any relevant biodiversity plan).
- Deconstruction and/ or demolition methods of the structures.
- Site waste management plan, if applicable.
- Considerations arising from adoption of the Demolition Protocol, if applicable.
- Removal, transportation and disposal methods of toxic or hazardous materials, including gypsum based products and asbestos-containing materials that do not require a licence for removal (e.g. certain types of textured coatings).
- Type and location of adjoining or surrounding premises which may be adversely affected by the work.
- Identification and location of services above and below ground.
- Storage and protection of reclaimed materials for use either on or off site.

Bench marks

Unrecorded bench marks and other survey information: Give notice when found. Do not move or destroy.

Services regulations

Work carried out to or which affects new or existing services: Carry out in accordance with Byelaws or Regulations of the relevant Statutory Authority.

Location and marking of services

Standard: in accordance with National Joint Utilities Group (NJUG) Volume 1 'Guidelines on the positioning and colour coding of underground utilities' apparatus'.

Drains in use

Drains, manholes, inspection chambers, gullies, vent pipes and fittings still in use: Protect. Keep free of debris and spillages.
Damage: Make good damage arising from demolition work. Leave clean and in working order at completion.

Bypass connections

Services to occupied areas of the same and adjoining properties: Maintain continuity.
Shutdown: Give 72 hours (minimum) notice to occupiers if shutdown is necessary during changeover.

Services which are to remain

Damage: Give notice and notify service authority or owner of damage arising from the execution of the works.
Repairs: Complete as directed, and to the satisfaction of the service authority or owner.

Workmanship

Demolition or deconstruction of structures: In accordance with BS 6187.
Site staff responsible for supervision and control of the work: Experienced in assessment of risks involved and methods of demolition or deconstruction to be used.
Operatives: Appropriately skilled and experienced for the type of work and holding, or in training to obtain, relevant CITB Certificates of Competence.

Gas or vapour risks

Fire or explosion caused by gas or vapour: Prevent.

Dust and mud

General: Reduce dust by periodically spraying demolition works with an appropriate wetting agent. Keep neighbouring roads and footpaths clear of mud and debris.

Health hazards

Health hazards associated with vibration, dangerous fumes and dust arising during demolition: Protect site operatives and general public.

Removal of asbestos-containing materials

Planning and execution: To HSE publications L127 'The Management of asbestos in non-domestic premises' and L143 'Work with materials containing asbestos'.

Adjoining property
Temporary support and protection: Provide. Maintain and alter as necessary as work progresses.
Damage: Minimize. Promptly repair.

- Leave no unnecessary or unstable projections.
- Make good to ensure safety, stability, weather protection and security

Support to foundations: Do not disturb.
Defects exposed or becoming apparent: Give notice.

Structures to be retained
Parts to be retained: Protect.
Cutting away and stripping out: Minimize. Carry out with care.
Amount of making good: Minimize.

Partly demolished structures
General: Leave in stable condition, with adequate temporary support at each stage to prevent uncontrolled collapse. Keep safe outside of working hours.
Temporary works: Prevent debris from overloading.
Unauthorised persons: Prevent access.

Dangerous openings
General: Illuminate and protect. Keep safe outside of working hours.

Unforeseen hazards
Unrecorded voids, tanks, chemicals, etc. discovered during demolition: Give notice.
Methods for safe removal, filling etc: Submit details.

D20 EXCAVATING AND FILLING

GENERAL

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 fill

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, and complying with one of the following requirements:

- 10% (minimum) fines value of 50 kN when tested in a soaked condition to BS 812-111 (partly replaced but remains current).
- Impact value SZ of 24 when tested to BS EN 1097-2.

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, trafficking 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, if 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 not 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) to receive sheet overlays or concrete, blind with:

- Sand or fine gravel applied to fill interstices. Moisten as necessary before final rolling to provide a flat, closed, smooth surface.
- Permissible deviations on surface level: +0 -25 mm.

K40 DEMOUNTABLE SUSPENDED CEILINGS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Suspended ceiling components

Standard: To BS EN 13964.

- Aluminium sheet, strip and plate: To BS EN 485.
- Aluminium bars, tubes and sections: To BS EN 573, BS EN 755, and BS EN 12020.

Softwood edge battens

Standard: To BS EN 942.

- Moisture content at time of fixing: 15% ± 2%.

EXECUTION

Setting out

General:
A continuous and even surface, jointed (where applicable) at regular intervals. Infill and access units, integrated services: Fitted correctly and aligned.
Edge/ Perimeter infill units size (minimum): Half standard width or length.
Corner infill units size (minimum): Half standard width and length.
Grid: Position to suit infill unit sizes. Allow for permitted deviations from nominal sizes of infill units.
Infill joints and exposed suspension members: Straight, aligned and parallel to walls, unless specified otherwise.
Suitability of construction: Give notice where building elements and features to which the ceiling systems relate are not square, straight or level.

Protection

Loading: Do not apply loads for which the suspension system is not designed.
Ceiling materials: When necessary, remove and replace correctly using special tools and clean gloves, etc. as appropriate.

Installing hangers

Wire hangers: Straighten and tension before use.
Installation: Install vertical or near vertical without bends or kinks. Do not allow hangers to press against fittings, services, or insulation covering ducts/ pipes.
Obstructions: Where obstructions prevent vertical installation, either:

- Brace diagonal hangers against lateral movement; or
- Hang ceiling system on an appropriate rigid sub-grid bridging across obstructions and supported to prevent lateral movement.

Extra hangers: Provide as necessary to carry additional loads.
Fixing:

- Wire hangers: Tie securely at top with tight bends to loops to prevent vertical movement.
- Angle/ Strap hangers: Do not use rivets for top fixing.

Installing perimeter trims

Jointing: Neat and accurate, without lipping or twisting.

- External and internal corners: Mitre joints.
- Intermediate butt joints: Minimize. Use longest available lengths of trim. Align adjacent lengths.

Fixing: Fix firmly to perimeter wall, edge battens or other building structure.

Exposed grids

Main runners: Install level. Adjust with supporting hangers taut. Do not kink or bend hangers.

- Spliced joints: Stagger.
- Wire hangers passing through main runners: Sharply bend and tightly wrapped loops.
- Angle/ Strap hangers: Do not use rivets for bottom fixing.
- Angular displacement of long axis of one runner in relation to next runner in line with it: Not visually apparent.

Cross members supported by main runners or other cross members: Install perpendicular to intersecting runners.
Cross tees: Flat and coplanar with flanges of main runners after panel insertion:

- Cross tees over 600 mm long, cut and resting on perimeter trim: Provide an additional hanger.

Holding down clips: Locate to manufacturer's recommendations.

- Fire protecting/ resisting ceiling systems: Use clip type featured in the fire test/ assessment.

Concealed grids
Primary support channels: Install level. Do not kink or bend hangers.

- Wire hangers wrapped around primary channels: Twice wrapped. Loops tightly formed.
- Angle/ Strap hangers: Do not use rivets for bottom fixing.

Splines: Locate between infill units to assist levelling of adjacent units and to resist air movement at joints.
Spring-tee grids: Do not omit primary channel.

Installing mineral infill units
General:

- Perimeter infill units: Trimmed, as necessary, to fully fill space between last grid member and perimeter trim. Prevent subsequent movement.
- Deeply textured infill units: Minimize variations in apparent texture and colour. In particular, avoid patchiness.

Concealed grids: Install infill units uniformly, straight and aligned. Avoid dimension creep.

- Infill units around recessed luminaries and similar openings: Prevent movement and displacement.

Installing metal infill units
Sound absorbing pads: Fit to prevent upward air movement through infill units. Cut or fold pads in cut perimeter infill units to full unit size. Reseal cut pads.
Perimeter infill units: Firmly wedge cut units into perimeter trim, or clip down.

Openings in ceiling materials
General: Neat and accurate. To suit sizes and edge details of fittings. Do not distort ceiling system.

Integrated services
General: Position services accurately, support adequately. Align and level in relation to the ceiling and suspension system. Do not diminish performance of ceiling system.
Small fittings: Support with rigid backing boards or other suitable means. Do not damage or distort the ceiling.

- Surface spread of flame rating of additional supporting material: Not less than ceiling material.

Services outlets:

- Supported by ceiling system: Provide additional hangers.
- Independently supported: Provide flanges to support ceiling system.

Ceiling mounted luminaires
Support:

- Independently supported luminaires: Suspension adjusted to line and level of ceiling.
- Ceiling supported luminaires: Do not inhibit designed grid expansion in fire.

Modular fluorescent recessed luminaires: Compatible with ceiling module. Extension boxes must not foul ceiling system.
Recessed rows of luminaires: Provide flanges for support of grid and infill units, unless mounted above grid flanges. Retain in position with lateral restraint.
Fire protecting/ resisting ceiling systems: Luminaires must not diminish protection integrity of ceiling system.
Access: Provide access for maintenance of luminaires.

Mechanical services
Fan coil units:

- Inlet and outlet grilles: Trim ceiling grid and infill units to suit.
- Space beneath: Sufficient for ceiling system components.
- Suspension and connections: Permit accurate setting out and levelling of fan coil units.

Air grilles and diffusers:

- Setting out: Accurate and level.
- Linear air diffusers: Retain in place with lateral restraint. Provide flanges for support of grid and infill units.
- Grille/ Diffuser ceiling joints: Provide smudge rings and edge seals.

Smoke detectors and PA speakers

- Ceiling infill units: Scribe and trim to suit.
- Flexible connections: Required.

Sprinkler heads: Carefully set out and level.

Installing insulation
Fitting: Fit accurately and firmly with butted joints and no gaps.
Insulation within individual infill units: Fit closely. Secure to prevent displacement when infill units are installed or subsequently lifted.

- Dustproof sleeving: Reseal, if cut.

Width: Lay insulation in the widest practical widths to suit grid member spacings.
Services: Do not cover electrical cables that have not been sized accordingly. Cut insulation carefully around electrical fittings, etc. Do not lay insulation over luminaires.
Sloping and vertical areas of ceiling system: Fasten insulation to prevent displacement.

Ceiling systems intended for fire protection

Junctions of ceiling systems with perimeter abutments and service penetrations: Seal gaps with tightly packed mineral wool or intumescent sealant to prevent penetration of smoke and flame.
Ceiling system/ Wall junctions: Maintain protective value of ceiling system.

- Fixings and grounds: Noncombustible.
- Metal trim: Provide for thermal expansion.

Access and access panels: Maintain continuity of fire protection.

Installing cavity fire barriers

Fixing:

- General: Fix barriers securely to channels or angles at abutments to building structure.
- At perimeters and joints: Provide permanent stability and continuity with no gaps to form a complete barrier to smoke and flame.

Joints: Form to preserve integrity in fire.
Service penetrations: Cut barriers neatly to accommodate services. Fit fire resistant sleeves around flexible materials. Fill gaps around services to fire barrier manufacturer's recommendations to maintain barrier integrity. Adequately support services passing through the barrier.
Ceiling systems intended for fire protection: Do not impair fire resisting performance of ceiling system.
Ceiling systems not intended for fire protection: Do not mechanically interlink barriers with ceiling system.

Installing sound barriers

Setting out: Align accurately with partition heads.
Fixing: Fix tightly at perimeters and joints using methods recommended by barrier manufacturer, including steel support sections as appropriate. Provide permanent stability and continuity Completed installation to be stable, secure and continuous, with no gaps.
Gaps at junctions with partition heads, ceiling system, structural soffit, walls, ducts, pipes, etc.: Seal with mineral wool or suitable sealant.

Electrical continuity and earth bonding

Substantial conductive parts of the ceiling system: Electrically continuous and fully earth bonded to carry prospective earth fault currents.

- Standard: To BS 7671.

Sequence: Complete earth bonding as soon as possible after completion of each independent area of suspension system.
Testing: After completion of the ceiling system, associated services and fittings, test conductive parts of suspension system required to carry earth fault current, or used as bonding connections. Give notice before testing.

- Electrical continuity: Measure from various distant conductive points of ceiling system and to earth bar in distribution board serving the area.
- Test current: Sufficient to indicate probable electrical performance under fault conditions.
- Test instrument: Type providing a pulse of about 25 A at safe voltage for safe duration, and indicating resistance in ranges 0-2 ohms and 0-20 ohms.
- Resistance of measuring conductors: Deduce from test instrument readings.
- Test readings: Record and certify. Add results to resistance of other parts of the path forming the earth fault loop

M12 RESIN FLOORING

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

EXECUTION

Testing moisture content of substrates

Drying aids: Remove minimum four days prior to test.
Test: In accordance with BS 8203, Annex A using an accurately calibrated hygrometer

- Location of readings: Corners, along edges, and at various points over the test area.

Acceptability: Do not lay resin flooring until readings show 75% relative humidity or less.

Surface hardness of substrates

General: Substrates must restrain stresses that occur during setting and hardening of resin.
Test for surface hardness: To BS EN 12504-2 using a rebound hammer
Test results: Submit.
Areas of non compliance: Submit remedial proposals.

Preparation

Substrates generally:

- Chases/ Saw cuts: Cut/ break out at skirtings, free edges, movement joints, etc. for termination of resin flooring.
- Blow holes, cavities, cracks, etc: Fill with repair product recommended by resin flooring manufacturer.
- Cleanliness: Remove surface contaminants, debris, dirt and dust.
- Surface texture: Suitable to accept resin flooring and achieve a full bond over the complete area.

Existing cement based substrates:

- Preparation: Remove surface imperfections, ingrained contaminants, coatings and residues.
- Contaminated areas: Submit proposals for removal and repair.

Existing tile/ sheet floor coverings: Remove coverings, residual adhesive, bedding, grouting and pointing.
Metal substrates:

- Cleaning: Shot blast to BS EN ISO 8501-1, grade Sa2½.
- Treated surfaces: Clean. Free from visible oil, grease and dirt, mill scale, rust, paint coatings and foreign matter.

Workmanship

Operatives:

- Trained/ Experienced in the application of resin floorings.
- Evidence of training/ experience: Submit on request.

Fillers and incorporated aggregates: Thoroughly mix in to ensure wetting. Avoid over-vigorous mixing resulting in excessive air entrainment.
Scattered aggregates: Broadcast onto wet surface of resin.

- Appearance: Consistent.

Curing: Allow appropriate periods between coats and before surface treatments and trafficking/ use.

Reinforcement

Laps (minimum): 50 mm.
Bedding: Roll into preliminary thin layer of resin flooring.

Coated resin flooring

Application: Even, of uniform thickness, surface finish and colour.

Flow applied coated resin flooring

Application: Even, of uniform thickness, surface finish and colour.

- Trapped air: Roll to release.

Trowel applied screeded resin flooring

Application: Even and thoroughly compacted of uniform thickness, surface finish and colour.

Surface abrading/ polishing of lamina blinded resin flooring

Surface on completion: Uniform, fine and dust free.
Application of surface sealer: Even to completely wet resin surface.

Surface grinding/ grouting/ abrading/ polishing of decorative aggregate resin flooring

Surface on completion:

- Grinding: Regular appearance to exposed aggregate and dust free.
- Grouting: Surface defects filled.
- Abrading/ Polishing: Uniform, fine and dust free.

Application of surface sealer: Even to completely wet resin surface.

Flatness/ Surface regularity
Sudden irregularities: Not permitted.
Classification of surface regularity in accordance with BS 8204-6.

Slip resistance testing of finished resin flooring
Test to BS 8204-6, Annex B, or to BS 7976-2

Free edges of resin flooring
Transition to abutting floor finishes: Straight and smooth.

Sealant movement joints
Location: Centre over movement joints in substrate.
Preparation and application: As section Z22.

Strip movement joints
Location: Centre over movement joints in substrate.

M50 RUBBER, PLASTICS, CORK, LINO, AND CARPET TILING AND SHEETING

GENERAL

Cross-reference
General: Read with A90 General technical requirements.

PRODUCTS

PVC (vinyl) flooring
PVC (vinyl) homogeneous flooring: To BS EN ISO 10581.
PVC (vinyl) heterogeneous flooring: To BS EN ISO 10582
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 ISO 10874

Rubber flooring
Smooth rubber flooring: To BS EN 1817.
Relief rubber flooring: To BS EN 12199.
Classification: To BS EN ISO 10874

Linoleum flooring
Standard: To BS EN ISO 24011
Classification: To BS EN ISO 10874

Textile floor coverings: Tiles and rolls
Classification: To BS EN 1307.

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 635-2.

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 to 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 floor 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 (pH 6–9) detergent.

- Heavily soiled areas: Lightly scrub.

Rinsing: Clean water, removing surplus to prevent damage to adhesive.

Finishing rubber flooring
Cleaning solution: Recommended by flooring manufacturer.
Residue: Remove.
Rinsing: Clean water, removing surplus to prevent damage to adhesive.

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, removing surplus to prevent damage to adhesive.

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

GENERAL

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 to a firm edge.
Alkali affected coatings: Completely remove.
Contaminated surfaces: 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 firm 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 with 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 coating 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 to 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 DOMESTIC KITCHEN FITTINGS FURNISHINGS AND EQUIPMENT

GENERAL

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 SANITARY APPLIANCES AND FITTINGS

GENERAL

Cross-reference
General: Read with A90 General technical requirements.

PRODUCTS

Baths
To BS EN 14516.

Bidets
To BS EN 14528.

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.

Showers
Trays: To BS EN 14527.
Enclosures: To BS EN 14428.
Hoses: To BS EN 1113

Sinks
Fireclay sinks: To BS 1206.
Kitchen sinks: To BS EN 13310.

Urinals and cisterns
Urinal bowls (for use with auto-flushing cisterns): To BS EN 13407, Class 2, Type III, B
Automatic flushing urinal cisterns: To BS 1876.

Wash basins
To BS EN 14688.

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 33 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 manufacturer.

- Float operated valve: Matched to pressure of water supply.

External overflow pipe: Fix to falls and locate to give visible warning of 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 fit 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 fixing appliances.
Fixing appliances: Do not overstress tiles.

P31 HOLES, CHASES, COVERS AND SUPPORTS FOR SERVICES

GENERAL

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 10 mm diameter and chases: Cast in.
Holes smaller than 10 mm diameter: Drilling is permitted.

Holes in structural steelwork

General: Cutting and drilling are not permitted.

Holes, recesses and chases in masonry

Locations: Select to maintain integrity of strength, stability and sound resistance of construction.
Sizes: Minimum needed to accommodate services.

- Holes: (maximum) 300 mm².

Walls of hollow or cellular block: Do not chase.
Walls of 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.
Cutting: 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:

- Position: Locate at top. Form by sawing down to a drilled hole.
- Depth (maximum): 0.15 x joist depth.
- Distance from supports: Between 0.1 and 0.2 x span.

Holes in joists: Locate on neutral axis.

- Position: Locate on neutral axis.
- Diameter (maximum): 0.25 x joist depth.
- Centres (minimum): 3 x diameter of largest hole.
- Distance from supports: Between 0.25 and 0.4 of span.

Notches in roof rafters, struts and columns: Not permitted.
Holes in struts and columns: Locate on neutral axis.

- Diameter (maximum): 0.25 x minimum width of member.
- Centres (minimum): 3 x diameter of largest hole.
- Distance from ends: Between 0.25 and 0.4 of span.

Floor ducting and trunking

Fixing: Pack ducting and trunking level and true before screeding.

Pipe sleeves

Sleeves: Extend 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: +0 to -6 mm.

COMPLETION

Meter cabinets

Keys: At completion, hand over to Employer.

R11 ABOVE GROUND FOUL DRAINAGE SYSTEMS

GENERAL

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 III ('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 Agrément 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 to 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.
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.
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

GENERAL

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, to BS EN 13598-1 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 Agrément certified

Granular material

Standard: To Water Industry Specification WIS 4-08-02 (as amended 2008)

- 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 Agrément 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 Agrément certified
- Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified
- Plastics: To BS 4660 and Kitemark certified, to BS EN 13598-1 or Agrément certified
- Polypropylene: To BS EN 1852-1.
- Concrete: To BS 5911-6 and Kitemark certified, or Agrément certified
- 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 Agrément certified.
- PVC-U solid wall: To BS EN 1401-1, class SN4 or SN8, with flexible joints.

Plastics access points
Standard: To BS 4660 and Kitemark certified, to BS EN 13598-1, or Agrément certified

- Cover loading grade: To BS EN 124.

Plastics inspection chambers
Standard: To BS EN 13598-1, BS EN 13598-2, or Agrément 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 Agrément certified.
- Plastics: To BS 4660 and Kitemark certified, to BS EN 13598-1 or Agrément certified

Saddle connectors
Standards:

- Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
- Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
- Concrete: To BS 5911-6 and Kitemark certified, or Agrément certified.
- Plastics: To BS 4660 and Kitemark certified, to BS EN 13598-1 or Agrément 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
Setting 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 if in use.

Excavated material
Turf, 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 sizes: To Water Industry Specification WIS 4-08-02 (as amended 2008)
Bedding:

- Material: Granular, compacted 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 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, sizes to Water Industry Specification WIS 4-08-02 – as amended 2008 – 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 O support

Usage: Plastics pipework requiring a full depth granular support (single size material only).
Granular material sizes: To Water Industry Specification WIS 4-08-02 (as amended 2008)
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 sizes: To Water Industry Specification WIS 4-08-02 (as amended 2008)
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 sizes: To Water Industry Specification WIS 4-08-02 (as amended 2008)
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 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 sizes: To Water Industry Specification WIS 4-08-02 (as amended 2008)
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 of 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 carefully to make gastight 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 of pipelines to be tested and pressurise. Air test short lengths to BS EN 1610.

Backfilling to pipelines
Backfilling 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) of material over pipes.

Backfilling under roads and pavings
Backfilling from top of 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 backfilling of 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, lay 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: +0 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: +0 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 main channel at or slightly above invert level, but not higher than half channel 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 soffit.
- 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 main channel at or slightly above invert level, but not higher than half channel level, so that discharge flows smoothly in direction of main flow.
- Connecting angles more than 45° to direction of 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: +0 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

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

Design and detailing by contractor

Standard: To BS EN 806-2 and BS 8558.

PRODUCTS

Equipment

Solar collectors: To BS EN 12975-1 and BS EN ISO 9806.
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 heaters – 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: Soft 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, half hard temper R250
- Finish: Chromium plate, to BS EN ISO 1456, service condition 2.

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.

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
Polybutylene (PB): To BS 7291-1 and BS 7291-2, or Water Regulations Advisory Scheme (WRAS) approved and Agrément certified.
Cross-linked polyethylene (PE-X): To BS 7291-1 and BS 7291-3, or Water Regulations Advisory Scheme (WRAS) approved and Agrément certified.

Polyethylene pipe for use below ground
Tube: Blue polyethylene to 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 handwheels.
For isolation and regulation: With lockshields.
Ball valves: To BS EN 331.
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 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 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 than 30° from the vertical.
Joints:
- Sockets: Uppermost.
- Supports: Fully supported and fixed securely with brackets supplied for the purpose.
- Sealing: Gas-tight, in accordance with manufacturer's instructions.
- Joints within floor void: Not permitted.

Expansion and contraction: Accommodate thermal movement.
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 water 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 safety 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 5955-8, clause 6.11;
- BS EN 806-4; and
- BRE Defect Action Sheets 120 and 121.

Notches and holes in timber to:

- 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 90º elbow fittings. Large radius bends: Support at maximum centres.
90° bends: Fix pipe clips either side of bend.
Small radius bends: Fully support 90° 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: Neat, 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 not damage.
Flux residue: Clean off.

Capillary joints in plastics coated pipes
Plastics coating: Do not damage.
Completed joint: 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 EN 806-4.

Testing and commissioning
Testing and commissioning: To BS EN 806-4

- Notice: 3 days (minimum).

Preparation: Secure and clean pipework and equipment. Fit cistern/ tank covers.
Flushing and filling: To 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 settings 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

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

DESIGN

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.

Oil fired: To BS 799-2 or BS 799-3 and BS EN 15035

Fires

Gas:

- Gas fire: To BS 7977-1.
- Gas fire with back boiler: To BS 7977-2.
- Inset live fuel effect gas fire: To BS EN 509 and BS 7977-1
- Decorative fuel effect gas appliance: To BS EN 509 and BS 7977-1.

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.
- GRP: 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 16297-1, BS EN 16297-2 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 4856-1, -2, -3, -4.

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: Soft coil temper R220.
Wall thickness (nominal):

- 6 and 8 mm nominal O.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/m²K (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, BEAB 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, BEAB 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 restrictor plates in the chimney, or where this is not 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 fire 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 EN 806-4.
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 EN 806-2, clause 5 and
- BRE Defect Action Sheets 120 and 121.

Notches and holes in timber to:

- BS 8558, Figure 14.
- Building Regulations Eng Approved Document A, section 1B6.
- Building Regulations Wales (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 general

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.
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 to full 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, half 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:
- 90° elbow fittings to form bends: Not permitted.
- Large radius bends: Support at maximum centres.
- 90° bends: Fix pipe clips either side of bend.
- Small radius bends: Fully support 90° bends with cold form bend fixtures.

Support centres (maximum):
- Up to 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 90° elbow fittings. Large radius bends: Support at maximum centres.
90° bends: Fix pipe clips either side of bend.
Small radius bends: Fully support 90° 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 after 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 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 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

GENERAL

Cross-reference
General: Read with section A90 General technical requirements.

DESIGN

General electrical installation
Standard: In accordance with BS 7671.

Internal lighting
Standard: In accordance with 'SLL Code for lighting'.

External lighting
Standards: In accordance with BS 5489-1, 'SLL Code for lighting' and CIBSE 'Lighting Guide 6'.

Emergency lighting
Standard: In accordance with BS 5266-1.

Photovoltaic systems
Standards generally: In accordance with DECC Guide to the installation of photovoltaic systems and ENA G83/2.

Small scale wind generating systems
Wind turbines: To BS EN 61400-2.

PRODUCTS

Conduit and trunking
Types and sizes: Suitable for operating conditions.
Rigid conduit and fittings: To BS EN 61386-1 and -21
Cable trunking and cable ducting systems for wall and ceiling mounting: To BS EN 50085-1 and -2-1.
PVC mini trunking: To BS 4678-4.
PVC trunking: To BS 4678-4.

Cable Tray
Standard: To BS EN 61537.
Types and sizes: Suitable for operating conditions.

Cables
Standard: BASEC certified.
Types and sizes: In accordance with BS 7671.

Distribution boards
Distribution boards: To BS EN 61439-1 and BS EN 61439-3 and 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 HD 60269-2 or BS HD 60269-3.
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 lampholders: To BS EN 61184.
Edison screw lampholders: To BS EN 60238.
Compact fluorescent lampholders: To BS EN 60061-2.
Photoelectric control units for control of individual lights or lighting circuits: To BS 5972
Television antennae: In accordance with CAI Aerial benchmarking scheme
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 61215-1 and BS EN 61215-1-1.
Thin film terrestrial photovoltaic (PV) modules: To BS EN 61646.
Junction Boxes and switchgear assemblies: 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.
Orientation: Accurate and square to vertical and horizontal axis. Align adjacent items of switchgear on the same horizontal axis.
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
Earth protection: Ensure that, where utilized, tray jointing pieces are properly fixed and provide satisfactory continuity between the separate sections of containment.

Cable baskets
Access: Provide space encompassing cable trays to permit access for installing and maintaining cables.
Cutting: Minimize. Make good cut edges by treating to same standard as the basket.
Earth protection: Ensure that, where utilized, basket jointing pieces are properly fixed and provide satisfactory continuity between the separate sections of containment.

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. Fix boxes to formwork to prevent displacement.
Concrete cover: As for reinforcement.
Draw wires: Install to all conduit runs and confirm integrity immediately after the concrete pour.

Drainage of conduit
Drainage outlet locations: At lowest points in conduit installed externally and where condensation may occur.

Trunking/ Ducting/ Cable management systems
Positioning: Accurately with respect to equipment served and, where relevant, floor level.
Access: Provide space around cable trunking to permit access for installing and maintaining cables.
Jointing:

- Number of joints: Minimize by using maximum practicable lengths of conduit.
- Steel systems: Use mechanical couplings; do not weld. Fit a copper link at each joint to ensure that satisfactory electrical continuity is maintained between the separate sections of trunking, equipment and accessories.
- Movement joints in structure: Manufactured expansion coupling.

Fixing: Fix securely. Restrain floor mounted systems to prevent 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:

- Internal fire barriers: Provide to maintain integrity of fire compartment.
- Sealing material: Submit proposals.

Cable routes
Cables generally: Conceal wherever possible:

- Concealed cable runs to wall switches and outlets: Align vertically or horizontally 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 thermal insulation: Derate accordingly.

Protective conductors
Type: Cable conductors.

Armoured cables
Temperature: Do not start installation if cable or ambient temperature is below 0°C, or has been below 0°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 shrouds.

PVC sheathed cables
Low temperatures: Do not install if ambient temperature is below 5°C.

MICC cables
Bending: Do not corrugate sheath.
Sealing cable ends: Fit terminations as soon after cable installation as practicable. Temporarily seal open cable ends to prevent the ingress of moisture where terminations are not fitted immediately.
Equipment and boxes: Connect with shrouded glands.
Cable fasteners: Clips and spacings recommended by manufacturer and within 150 mm of bends and connections.
Testing: Test each length immediately after 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: Duct and derate if longer than 10 m. Extend ducts 1 m each side of road or hardstanding.

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.
Heat barriers: Required except where fire resisting barriers are not provided.

Cables in accessible roof spaces
Cables running across ceiling joists: Fix to timber battens which are secured to joists.

Fixing electrical accessories/ equipment
Location: Coordinate with other wall or ceiling mounted equipment.
Positions: Accurate. Square to vertical and horizontal axis.
Alignment: Place adjacent accessories on the same vertical or horizontal axis, as appropriate.

Multigang switches
Connection: Provide a logical relationship with luminaires. Fit blanks to unused switch spaces.
Segregation: Internally segregate each phase with phase barriers and warning plates.

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:

- Electrical equipment: Install labels indicating purpose.
- Voltage warning notices: When the voltage within exceeds 230 V, apply to equipment in a highly visible position, prior to gaining access to live parts.
- Standards: To BS ISO 7010, functional reference number, W012 – include warnings of the voltage present

Distribution boards: Card circuit chart within a reusable clear plastic cover. Fit to the inside of each DB. 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.C. 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 turbines:

- 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 at the wind turbine terminals or frequency range in the case where normal variation is greater than 2%.

Emergency lighting systems
Standards: In accordance with BS 5266-1.

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 turbines
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: In accordance with 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: In accordance with BS 5266-1.
- Test certificates: In accordance with BS 5266-1, Annex I
- System log book: In accordance with BS 5266-1.

External lighting system:

- Standard: In accordance with CIBSE Lighting guide 6.
- Method: Test results based on average illuminance measurement method using a full grid.

Photovoltaic systems:

- Generally: In accordance with DECC Guide to the installation of photovoltaic systems and ENA G83/2.

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.

Z10 PURPOSE MADE JOINERY

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

EXECUTION

Fabrication

Joinery components, timber and workmanship: To BS 1186-2
Sections: Formed out of solid.
Lengths and profiles: Accurate.
Sections after machining: Free from twist and bowing.
Surfaces after machining: Smooth and free from tearing, wooliness, chip bruising and other machining defects.
Joints: Tight, close fitting.
Components: Rigid. Free from distortion.
Screws: Provide pilot holes.
Screws of 8 gauge (4mm diameter) or more and screws into hardwood: Provide clearance holes.
Screw heads: Sunk at least 2 mm below surfaces visible in completed work.
Adhesive: Compatible with wood preservatives applied and end use of timber.

Permitted deviations from timber finished sizes (maximum)

Softwood:

- Sawn sections: To BS EN 1313-1, clause 6.

Hardwood:

- Sawn sections: To BS EN 1313-2, clause 6.
- Further processed sections: To BS EN 1313-2, clause NA3.

Dimensions on drawings: Finished sizes.

Preservative treated wood

Cutting and machining: Completed as far as possible before treatment.
Extensively processed treated timber: Re-treat timber sawn along length, ploughed, thicknessed, planed or otherwise extensively worked.
Surfaces exposed by minor cutting and drilling: Treat with two flood coats of a solution recommended by main treatment solution manufacturer.

Moisture content

Wood and wood based boards: Maintained within specified range during manufacture and storage.

Finishing

Joinery finish: Smooth, flat surfaces suitable to receive finishes.
Arrises: Eased.
End grain of external components: Before assembly, sealed with primer or sealer and allowed to dry.

Z11 PURPOSE MADE METALWORK

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Coatings and coated products

To iron and steel:

- Vitreous enamelled carbon steel and cast iron building components: To BS EN 14431.
- Sherardized coatings on carbon steel and cast iron: To BS 4921.
- Powder organic coatings to galvanized steel for external architectural purposes: To BS 6497 or BS EN 13438.
- Zinc electrodeposited coatings with supplementary treatment on iron or steel: To BS EN 12329.
- Cadmium electrodeposited coatings on iron or steel: To BS EN 12330.
- Nickel, nickel/ chromium, copper/ nickel and copper/ nickel/ chromium electrodeposited coatings: To BS EN 12540 (also applicable to zinc alloys, copper and copper alloys).
- Hot dip galvanized coatings on fabricated iron and steel: To BS EN ISO 1461.

To aluminium and aluminium alloys:

- Anodic oxidation coatings on wrought aluminium for external architectural applications: To BS 3987.
- Liquid organic coatings to aluminium alloy for external architectural purposes: To BS 4842.
- Powder organic coatings to aluminium alloy for external architectural purposes: To BS 6496.
- Welding:

General guidance for arc welding: To BS EN 1011-1.
Arc welding of ferritic steels: To BS EN 1011-2.

Materials generally

Prefinished metal: Do not damage or alter appearance of finish.
Fasteners: To appropriate British Standard and, unless specified otherwise, of same metal as component, with matching coating or finish.

EXECUTION

Fabrication generally

Contact between dissimilar metals in components that are to be fixed where moisture may be present or occur: Avoid.
Finished components: Rigid and free from distortion, cracks, burrs and sharp arrises.

- Moving parts: Free moving without binding.

Corner junctions of identical sections: Mitred unless specified otherwise.

Cold formed work

Profiles: Accurate with straight arrises.

Welding/ Brazing generally

Surfaces to be joined: Thoroughly cleaned.
Tack welds: Use only for temporary attachment.
Joints: Made with parent and filler metal fully bonded throughout with no inclusions, holes, porosity or cracks.
Surfaces of materials that will be self-finished and visible in completed work: Protect from weld spatter.
Traces of flux residue, slag and weld spatter: Removed.

Welding of steel

Preferred method: Metal arc welding.

- Alternative methods: Submit proposals.

Finishing welded/ brazed joints visible in completed work

Butt joints: Smooth and flush with adjacent surfaces.
Fillet joints: Neatly executed and ground smooth where specified.

Preparation for application of coatings

General: Fabrication complete, and fixing holes drilled before applying coatings.
Paint, grease, flux, rust, burrs and sharp arrises: Removed.

Galvanizing

Vent and drain holes: Provide in approved locations and submit proposals for sealing after galvanizing.

Powder coating

Applicator requirements:

- Approved by the powder coating manufacturer.
- Currently certified to BS EN ISO 9901.

Anodizing

Processor requirements:

- Approved by the Aluminium Finishing Association.
- Currently certified to BS EN ISO 9901.

Z12 PRESERVATIVE AND FIRE RETARDANT TREATMENT

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

EXECUTION

Treatment application

Timing: After cutting and machining timber, and before assembling components
Processor: Licensed by manufacturer of specified treatment solution.
Certification: For each batch of timber provide a certificate of assurance that treatment has been carried out as specified.

WPA Commodity Specifications

Standard: Wood Protection Association (WPA) publications 'Industrial flame retardant treatment of wood and wood-based panel products' and 'Manual: Industrial wood preservation. Specification and practice'.
Solution strengths and treatment cycles: Select to achieve specified service life and to suit timber treatability.

Copper-organic preservative treatment

Type: Copper azole (CuAz), alkaline copper quaternary (ACQ) or equivalent.
Application: High pressure impregnation.
Moisture content of wood at time of treatment (maximum): 28%.
Condition of treated timber before use: Dry.

Water-based organic preservative treatment

Application: Vacuum pressure process.
Colour: Colourless.
Usage: Unsuitable for use in ground or seawater contact.
Incorporation of treated timber into the Works: Timber is wet immediately after treatment and must be stored at the treatment plant until in a condition ready for transporting.

Copper chromium arsenic (CCA) preservative treatment

Usage: European legislation restricts new treatment. Submit proposals if use of recycled timber treated with CCA is intended. Copper chromium based preservative treatment (other than CCA).
Type: Chromated copper (CC), copper chromium phosphate (CCP), copper chromium borate (CCB) or equivalent.
Application: High pressure impregnation.
Moisture content of wood at time of treatment (maximum): 28%. After treatment, allow timber to dry before using.
Condition of treated timber before use: Dry and at moisture content specified elsewhere.
Incorporation of treated timber into the Works: Do not use for minimum 14 days after treatment.

Organic solvent preservative treatment

Colour: Colourless.
Usage: Do not use near animals, plants or foodstuffs, or in association with bituminous/ coal tar based materials.
Application: Double vacuum + low pressure impregnation, or immersion.
Moisture content of wood at time of treatment: As specified for the component at time of fixing.
Condition of treated timber before use: Surface dry.

Water based microemulsion preservative treatment

Application: Double vacuum + low pressure impregnation.
Moisture content of wood at time of treatment: As specified for the component at time of fixing.
Condition of treated timber before use: Surface dry.

Boron compound preservative treatment

Usage: Do not use in timber subject to continual wetting.
Application: High pressure impregnation.
Moisture content of wood at time of treatment (maximum): 28%.
Condition of treated timber before use: Dry.

Fire retardant treatment

Application: Vacuum + pressure impregnation.
Moisture content of wood at time of treatment: Not to exceed: 28% for large cross sectional timber, 22% for timber boarding and 15% for board material.
Condition of treated timber before use: Free from mud, dirt, dust, paint, polish and other surface finish; or bark. Material to be free from all signs of active attack by wood-destroying fungi and insects.
Post-treatment: Redried slowly at temperatures not exceeding 60°C to minimize degradation and distortion.

Z20 FIXINGS AND ADHESIVES

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

Definitions

In this section the following definitions are used:

- Fixing: The act of securing an object to another object or background, e.g. Fix A to B with screws at 200 mm centres.
- Fixings: Systems that fix objects together, composite connection items comprising, e.g. nuts, bolts, washers, spacers, cover caps.
- Fasteners: Components that fix objects together, e.g. screws, nails.

PRODUCTS

Fasteners generally

Materials: To have bimetallic corrosion resistance and atmospheric corrosion resistance appropriate to fixing location.
Appearance: Submit samples on request.

Packings

Material: Noncompressible, corrosion resistant, rot proof.
Area of packings: Sufficient to transfer loads.

Masonry fixings

Light duty: Plugs and screws.
Heavy duty: Expansion anchors or chemical anchors.

Pelleted countersunk fixings

Pellets: Cut from matching timber, grain matched.

Plugs

Type: Proprietary types to suit substrate, loads to be supported and conditions expected in use.

Adhesives generally

Standards:

- Hot-setting phenolic and aminoplastic: To BS 1203.
- Thermosetting wood adhesives: To BS EN 12765.
- Polyvinyl acetate thermoplastic adhesive: To BS 4071.

Pelleted countersunk fixings

Pellets: Cut from matching timber, grain matched.

Powder actuated fixing systems

Types of fastener, accessories and consumables: As recommended by tool manufacturer
Tools: To BS 4078-2, Kitemark certified
Operatives: Trained and certified as competent by tool manufacturer.

EXECUTION

Fixing generally

Types, sizes and quantities of fasteners/ packings and spacings of fixings: Selected to retain supported components without distortion and loss of support.
Integrity of supported components: Select types, sizes, quantities and spacings of fixings, fasteners and packings to retain supported components without distortion or loss of support.
Components, substrates, fixings and fasteners of dissimilar metals: Isolate with plastics washers/ sleeves to avoid bimetallic corrosion.
Penetration of fasteners and plugs into substrate: To achieve a secure fixing
Appearance: Fixings to be in straight lines at regular centres.

Fixing packings

Function: To take up tolerances and prevent distortion of materials/ components.
Limits: Do not use packings beyond thicknesses recommended by fixings and fasteners manufacturer.
Locations: Not within zones to be filled with sealant.

Fixing cramps

Cramp positions: 150 mm (maximum) from each end of frame sections and at 600 mm (maximum) centres.
Fasteners: Fix cramps to frames with screws of same material as cramps.
Fixings in masonry work: Fully bedded in mortar.

Pelleted countersunk fixings

Finished level of countersunk screw heads: 6 mm (minimum) below timber surface.
Pellets: Cut from matching timber, match grain and glue in to full depth of hole.
Finished level of pellets: Flush with surface.

Plugged countersunk screw fixing
Finished level of countersunk screw heads: 6 mm (minimum) below timber surface.
Plugs: Glue in to full depth of hole.
Finished level of plugs: Projecting above surface.

Powder actuated fixing systems
Powder actuated fixing tools, method of use: To BS 4078-1.
Operatives: Trained and certified as competent by tool manufacturer.

Applying adhesives
Surfaces: Clean. Adjust regularity and texture to suit bonding and gap filling characteristics of adhesive.
Support and clamping during setting: Provide as necessary. Do not mark surfaces or distort components being fixed.
Finished adhesive joints: Fully bonded. Free of surplus adhesive.

Z21 MORTARS

GENERAL

Cross-reference

General: read with A90 General technical requirements.

PRODUCTS

Admixtures for site made cement gauged and hydraulic lime:sand masonry mortars

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

Cements for mortar

Cement: To BS EN 197-1 and CE marked.

- Type: Portland cement, CEM I. Portland limestone cement, CEM II/A-L or CEM II/A-LL. Portland slag cement, CEM II/B-S, Portland fly ash cement, CEM II/B.
- Strength class: 32.5, 42.5 or 52.5.

White cement: To BS EN 197-1 and CE marked

- Type: Portland cement, CEM I.
- Strength class: 52.5.

Sulfate resisting Portland cement.

- Type: To BS EN 197-1 Sulfate resisting Portland cement, CEM I/SR and CE marked. To BS EN 197-1 fly ash cement, CEM II/B-V and CE marked.
- Strength class: 32.5, 42.5 or 52.5.

Masonry cement: To BS EN 413-1 and CE marked, class MC 12.5.

Lime:sand for cement gauged masonry mortars

Ready mixed:

- Standard: To BS EN 998-2.
- Lime: Nonhydraulic to BS EN 459-1, type CL 90S.
- Pigments for coloured mortar: To BS EN 12878.

Site made:

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

Retarded ready to use cement gauged masonry mortars

Standard: To BS EN 998-2.
Lime for cement:lime:sand mortars: Nonhydraulic to BS EN 459-1.

- Type: CL 90S.

Pigments for coloured mortars: To BS EN 12878.
Time and temperature limitations: Use within limits prescribed by mortar manufacturer.

- Retempering: Restore workability with water only within prescribed time limits.

Sand for lime:sand masonry mortars

Type: Sharp, well graded.

- Quality, sampling and testing: To BS EN 13139

Sand for site made cement gauged masonry mortars

Standard: To BS EN 13139.

- Grading: 0/2 (FP or MP). Fines content where the proportion of sand in a mortar mix is specified as a range (e.g. 1:1: 5 – 6): Lower proportion of sand, use category 3 fines. Higher proportion of sand, use category 2 fines.

Sand for facework mortar: Maintain consistent colour and texture. Obtain from one source.

EXECUTION

Making cement gauged mortars

Batching: By volume. Use clean and accurate gauge boxes or buckets.

- Mix proportions: Based on dry sand. Allow for bulking of damp sand.

Mixing: Mix materials thoroughly to uniform consistency, free from lumps.

- Mortars containing air entraining admixtures: Mix mechanically. Do not overmix.

Working time (maximum): Two hours at normal temperatures.
Contamination: Prevent intermixing with other materials.

Ready prepared lime putty

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 putty: 1.3–1.4 kg/L.

Maturation period before use (minimum): 30 days after slaking.

Making lime:sand mortars

Batching: By volume. Use clean and accurate gauge boxes or buckets.

Mixing: Mix materials thoroughly to uniform consistency, free from lumps.

- Site prepared nonhydraulic lime:sand mortars: Use roller pan mixer. Mix materials thoroughly by compressing, beating and chopping. Do not add water. Maturation period before use (maximum) 7 days.
- Site prepared hydrated hydraulic lime:sand: Follow the lime manufacturer's recommendations for each stage of the mix. Water quantity, only sufficient to produce a workable mix. Working time, within limits recommended by the hydraulic lime manufacturer.

Contamination: Prevent intermixing with other materials, including cement.

Ready to use nonhydraulic lime:sand mortars

Type: Select from:

- Lime putty slaked directly from quicklime to BS EN 459-1 and mixed thoroughly with sand.
- Quicklime to BS EN 459-1 slaked directly with sand.

Maturation period before use (maximum): 7 days.

Z22 SEALANTS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Joints

Design: To BS 6093.

Sealants

Classification and requirements: To BS EN ISO 11600

Non-cellular gaskets

Standard: To BS 4255-1.

Components

Backing strips, bond breakers, primers: Types recommended by sealant manufacturer.

EXECUTION

Suitability of joints

Presealing checks:

- Joint dimensions: Within limits specified for the sealant.
- Substrate quality: Surfaces regular, undamaged and stable.

Joints not fit to receive sealant: Submit proposals for rectification.

Preparing joints

Surfaces to which sealant must adhere:

- Remove temporary coatings, tapes, loosely adhering material, dust, oil, grease, surface water and contaminants that may affect bond.
- Clean using materials and methods recommended by sealant manufacturer.

Vulnerable surfaces adjacent to joints: Mask to prevent staining or smearing with primer or sealant.
Primer, backing strip, bond breaker: Types recommended by sealant manufacturer

- Backing strip and/ or bond breaker installation: Insert into joint to correct depth, without stretching or twisting, leaving no gaps.

Protection: Keep joints clean and protect from damage until sealant is applied.

Applying sealants

Substrate: Dry (unless recommended otherwise) and unaffected by frost, ice or snow.
Environmental conditions: Mix and apply primers and sealants within temperature and humidity ranges recommended by manufacturers. Do not dry or raise temperature of joints by heating.
Sealant application: Unless specified otherwise, fill joints completely and neatly, ensuring firm adhesion to substrates.
Sealant profiles:

- Butt and lap joints: Slightly concave.
- Fillet joints: Flat or slightly convex.

Protection: Protect finished joints from contamination or damage until sealant has cured.