Project:	Erection of store (ancillary to the Town Park) and associated landscaping works to include 'the Thread' a new public garden inspired by the Trowbridge textile industry
Address:	Trowbridge Town Park, Silver Street, Trowbridge, Wiltshire
Client:	Trowbridge Town Council
Date:	November 2019
Status:	ISSUED FOR TENDER

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Table of Contents

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.

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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.

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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.

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B15 PREFABRICATED FRAMED STRUCTURES

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

Pre-completion testing

Air permeability: See Preliminaries A33/570.
Continuity of thermal insulation: See Preliminaries A33/580.
Resistance to passage of sound: See Preliminaries A33/590.

PRODUCTS

Timber frame design

Standard: In accordance with BS EN 1995-1-1 and -1-2 (Eurocode 5).

EXECUTION

Information from manufacturer

Prior to fabrication of frame, manufacturer to provide:

- Drawings showing all construction details, including connections and manufactured tolerances.
- Risk assessments for the installation and construction process.
- Installation instructions including training requirements for installers.
- Requirements for storage of materials.

Transportation

General: Handling, lifting and transportation must not cause damage, or impair the intended performance of elements or components when subsequently erected.

Delivery

Inspection: Upon delivery inspect all materials to ensure they are free from damage and that the required accuracy of erection can be achieved.

Storage

Support: So as not induce excessive stress into the components.
Protection: Prevent the ingress of water.

Supporting structure

Survey: Before commencing installation, carry out survey sufficient to verify that required accuracy of erection can be achieved.

Erection

Lifting, positioning, fixing:

- Do not drag units.
- Lift units from manufacturer's designated points only.
- Provide temporarily support, as required.

Assembly

Framing components: Cut squarely or as required for an angular fit against abutting members.
Fixings: Size and pattern as determined by structural calculation.
Splices: Not permitted except where specifically designed.
Anchor bolts and straps: Correctly positioned at all locations shown on the drawings.
Insulation: Ensure continuity.

Accuracy of erection

Finished appearance: Frames must be square, regular, true to line, level and plane.

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 L153 'Managing health and safety in construction. Construction (Design and Management) Regulations 2015. Guidance on regulations 2015' 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 publication L143 'Managing and working with 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.

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C45 DAMP PROOF COURSE RENEWAL OR INSERTION

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

Survey report

Content:

- Building defects causing damp or rising damp.
- Extent of rising damp. Determine using methods recommended in the Property Care Association (PCA) 'Code of Practice for the installation of remedial damp proof courses in masonry walls', clause 6.
- Suitability of walls for treatment by proposed dpc system.
- Features which would prevent the installation of an effective dpc.

EXECUTION

Exposed masonry

Heavily salt contaminated bricks or blocks: Give notice if revealed in the substrate.

Fungal and beetle attack to timber sections

Report occurrences.

Sources of damp

Give notice if built-in timbers, structural deficiencies or additional sources of damp are revealed.

Preparatory work

Positions of dpcs not shown on drawings: Submit proposals.

Chemical dpc system

Installation: To BS 6576 by a firm approved by dpc system manufacturer.

Mortar mix to exposed injection holes

Approval of appearance: Obtain for first few holes before completing the remainder.

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.

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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.

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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.

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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.

D50 UNDERPINNING

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Concrete

Standard: To BS 8500-2.

EXECUTION

Notification

Site investigation: Confirm as adequate or propose further investigation as considered necessary.

Mass concrete underpinning

Standard: To BS 8004.

Construction of mass concrete underpinning

Formation:

- Preparation: Remove or compact loose material.
- Protection: Cover with 50 mm thickness of concrete if there will be a delay of more than four hours between completion of excavation and casting of concrete underpinning.

Front shutter: Provide where required.
Casting underpinning: In one lift, leaving a gap for packing up beneath existing foundation.
Packing: On completion of concrete curing period, hard pack gap between underpinning block and existing foundation. Allow packing to cure before commencing excavation for the next sequence of underpinning.
Split sleeves: Provide around drain/ service passing through underpinning. Closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin. Clearance around drain/ service, minimum 50 mm, but obtain confirmation in each case.
Continuous underpinning:

- Block and working space: Excavate together.

Intermittent underpinning:

- Block and working space: Excavate together. Excavated length not to exceed design length by more than 75 mm, but obtain confirmation in each case.

Health and safety file – mass concrete underpinning

Requirement: Collate and submit duplicate copies of a full set of records for inclusion in the health and safety file.
Content to be recorded for each underpinning block:

- Date of casting.
- Depth of base below datum.
- Length.
- Width either side of wall.
- Details of drains and services built into block and diameter of sleeving.

Latest date for submission: Within 14 days of completion.

E10 IN SITU CONCRETE

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Concrete

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

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

Aggregates

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

- Limitations on contaminants: Free from absorbent particles which may cause 'popouts', and other particles such as coal and iron sulfide which may be unsightly or cause unacceptable staining.
- Colour: Consistent.
- Supply: From a single source and maintained throughout the contract.
- Samples: Submit on request.

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

Underlay

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

EXECUTION

Ready mixed concrete

Production plant: Currently certified by a body accredited by UKAS to BS EN ISO/ IEC 17065 for product conformity certification of ready-mixed concrete.
Source: Obtain from one source if possible, otherwise submit proposals.
Delivery notes: Retain for inspection.
Declarations of nonconformity from concrete producer: Notify immediately.
Substitution of standardized prescribed concrete for designated concrete:

- Generally: Conform to BS 8500-2, clause 8.
- Substitution: In accordance with BS 8500-1, table A.13. Submit proposals for each substitution, stating reasons.

Site mixed concrete

Application: Use where neither strength nor appearance is critical.
Water: Use mains water. Protect from contamination.
Batching by mass: Allow for water content of aggregates.
Site made standardized prescribed concrete mixes: Conform to BS 8000-2.1, sub sections 2, 3 and 4.
Admixtures:

- Calcium chloride and admixtures containing calcium chloride: Not permitted.

Construction (daywork) joints

Locations: Where not shown on drawings, submit proposals.
Preparation: While concrete is still green, remove surface laitance and expose aggregate finish.

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

Premature water loss

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

Placing

Cleanliness of surfaces immediately before placing concrete: Clean with no debris, tying wire clippings, fastenings or free water.
Pours: Maintain records for time, date and location.
Timing: Place as soon as practicable after mixing and while sufficiently plastic for full compaction.
Temperature limitations for concrete: 5–30°C.
Continuity of pours: Place in final position in one continuous operation up to construction joints.
Placing of concrete must not:

- cause uneven dispersal, segregation or loss of ingredients;

- adversely affect the formwork or formed finishes;
- be carried out against frozen or frost covered surfaces; or
- form cold joints.

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

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Compacting
General: Fully compact concrete to full depth. Continue until air bubbles cease to appear on the top surface.
Consecutive batches of concrete: Amalgamate without damaging adjacent partly hardened concrete.
Methods of compaction: To suit consistence class and use of concrete.

Surface regularity
Sudden irregularities: Not permitted.
Measurement: Use slip gauges to BS 8204-1 or -2.

Curing
Requirement: Keep surface layers of concrete moist throughout curing period, including perimeters and abutments, by either restricting evaporation or continuously wetting surfaces of concrete.
Surfaces covered by formwork: Retain formwork in position and, where necessary to satisfy curing period, cover surfaces immediately after striking.
Top surfaces: Cover immediately after placing and compacting.

- Removal of covering for finishing operations: Replace immediately thereafter.

Surface temperature: Maintain above 5°C for four days.
Records: Maintain details of location and timing of casting of individual batches, removal of formwork and removal of coverings. Keep on site, available for inspection.
Coverings for curing: Suitable impervious sheet materials.

- Curing compounds: Do not use without consent.

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

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

Protection
Prevent damage to concrete, including:

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

E20 FORMWORK FOR IN SITU CONCRETE

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

Loadings

Contractor designed formwork: Designed and constructed to withstand the worst combination of:

- Total weight of formwork, reinforcement and concrete.
- Construction loads including dynamic effects of placing, compacting and construction traffic.
- Wind and snow loads.

Design standards

- Standards – either BS 5975 or BS EN 12812.

PRODUCTS

Underslab sheet insulation

Expanded polystyrene (EPS) products: To BS EN 13163 and BS EN 14933.
Extruded polystyrene foam (XPS) products: To BS EN 13164.

Concrete for blinding

Standards: To BS EN 206-1, BS 8500-1 and -2.

EXECUTION

Work below ground

Casting vertical faces of footings, bases and slabs against faces of excavation:

- Obtain consent.
- If permitted increase minimum cover to reinforcement to 75 mm by increasing overall width of concrete to provide increased cover. Prevent contamination of concrete by loose soil.

Casting walls against faces of excavation: Use formwork on both sides.

Collapsible board substructure formwork (cardboard cellular core)

Installation generally: Keep dry. Lay tightly butted, fully supported and level on polyethylene sheet, on sand blinding. Overlay with polyethylene sheet to lap with bottom sheet. Joints lapped and sealed with tape.

- Pipes for introduction of water: Type and spacing as recommended by board manufacturer. Vertical and secure. Do not puncture bottom face of board.
- Cutting: Neat and accurate. Reseal polyethylene bags.

Compressible board substructure formwork (plastics cellular core)

Installation generally: Lay tightly butted and fully supported on firm, even substrate. Restrain against movement during concrete placement.

- Joints: Seal to prevent penetration of concrete.
- Cutting: Neat and accurate.

Compressible board substructure formwork (low density expanded polystyrene (EPS))

Installation generally: Lay tightly butted and fully supported on firm, even substrate. Restrain against movement during concrete placement.

- Cutting: Neat and accurate.

Ventilated substructure formwork

Installation generally: Lay tightly butted and fully supported on firm, even substrate.

Underslab insulation

Installation generally: Lay tightly butted and fully supported on firm, even substrate.

Accuracy

General requirement for formwork: Accurately and robustly constructed to produce finished concrete in the required positions and to the required dimensions.
Formed surfaces: Free from twist and bow (other than required cambers).
Intersections, lines and angles: Square, plumb and true.

Joints in forms

Requirements including joints in form linings and between forms and completed work:

- Prevent loss of grout, using seals where necessary.

- Prevent formation of steps. Secure formwork tight against adjacent concrete.

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Inserts, holes and chases

Positions and details:

- As drawings: Give notice of any conflicts well in advance of placing concrete.
- Undefined positions and details: Submit proposals.
- Method of forming: Fix inserts or box out as required. Do not cut hardened concrete without approval.

Striking formwork

Timing: Prevent any disturbance, damage or overloading of the permanent structure.

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E30 REINFORCEMENT FOR IN SITU CONCRETE

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Reinforcement

Ribbed weldable steel reinforcement: To BS 4449.
Plain, indented and ribbed steel wire reinforcement: To BS 4482.
Stainless steel bar reinforcement: To BS 6744.
Fabric reinforcement: To BS 4483.

EXECUTION

Cutting, bending and labelling

Standard: To BS 8666.
Site bending/ reshaping: Not permitted for Grade 500 bars. Obtain instructions for other grades.

Cleanliness

General: Clean and free of substances which may adversely affect the reinforcement, concrete or bond between the two.

Laps and splices

For details not shown on drawings:

- Laps in bar reinforcement (minimum): Tension lap length to BS 8110-1, table 3.27, appropriate to the concrete strength, and to BS EN 1992-1-1, section 8.7.3.
- Laps in fabric reinforcement (minimum): Tension lap length to BS 8110-1, table 3.27, for the same grade bar reinforcement and appropriate to the concrete strength, and to BS EN 1992-1-1, section 8.7.5. Avoid four layer build-up at corners.

Fixing

Sequence: Before placing concrete, fix reinforcement in position.
General: Provide adequate support, tie securely and maintain the cover. Prevent contact between ordinary carbon steel and stainless or galvanized reinforcement
Spacers: To BS 7973-1 and -2.
Tying: Tie with 16 gauge black annealed tying wire. Do not intrude tying wire into the concrete cover. Remove loose ends.

- Stainless steel reinforcement: Tie with 16 gauge annealed stainless steel wire.

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E60 PRECAST CONCRETE FLOORS AND ROOF DECKS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Precast concrete beams for beam and block floors/ decks

Standard: Designed to BS EN 1992-1-1 or to BS EN 15037-1, or Agrément certified.

Infill units for precast concrete floors/ roof decks

Generic standard concrete infill blocks: Solid rectangular concrete to BS EN 771-3 and BS EN 15037-2.

- Size 440 x 215 x 100 mm.
- Compressive strength: 3.5 N/mm² (minimum).
- Transverse load capacity measured on a 420 mm span: 3.5 kN (minimum).

Generic autoclaved aerated concrete infill blocks: Solid rectangular autoclaved aerated concrete to BS EN 771-4.

- Size 440 x 215 x 100 mm.
- Compressive strength: 3.5 N/mm² (minimum).
- Transverse load capacity measured on a 420 mm span: 3.5 kN (minimum).

Proprietary concrete infill units:

- Standard: To BS EN 771-3, or to BS EN 771-4, or to BS EN 15037-2 or Agrément certified.
- Compressive strength: 3.5 N/mm² (minimum).
- Transverse load capacity: 3.5 kN (minimum) measured on a 420 mm span.

Proprietary insulating infill units:

- Expanded polystyrene (EPS): To BS EN 13163.

Precast concrete slabs for floors/ roof decks

Standard: To BS EN 1992-1-1.

In situ concrete for infill and toppings

Standard: To BS 8500-2.

Lateral restraint straps

Size:

- Section: 30 x 5 mm (minimum) cross section.
- Length: To extend 800 mm (minimum) from inside face of wall.

Form: Both ends cranked 100 mm.

Reinforcement

Carbon steel bar: To BS 4449.
Steel fabric: To BS 4483.

EXECUTION

General requirements

Lifting: At designed lifting points, using special lifting devices and cradles as necessary.
Bearings: Set on level bearings ensuring not less than the minimum seating recommended by precast unit manufacturer.
Site formed openings and sinkings: As precast unit manufacturer's recommendations.
Cutting/ Drilling: Do not cut or drill units except as recommended or agreed by manufacturer.

Perimeter split infill blocks

Installation: Infill gaps in walling below built in standard flooring blocks.

Concrete infill

Preparation: Thoroughly clean and wet surfaces of precast units.
Placing: Avoid segregation and compact thoroughly to eliminate voids.

- Extent: Fill troughs and other holes.
- Finish: Flush with top of precast units.

Protection: Ensure that units do not move. Prevent movement of units until concrete has gained sufficient strength.

Grouting to blocks

Extent: Fill joints and surface irregularities.

Lateral restraint straps

To external cavity walls: One cranked end in tight contact with cavity face of wall inner leaf, the other cranked end grouted into floor/ roof deck joint.

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F10 BRICK AND BLOCK WALLING

GENERAL

Cross-reference

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

PRODUCTS

New masonry units

Aggregate concrete bricks and blocks: To BS EN 771-3.
Autoclaved aerated concrete (AAC) blocks: To BS EN 771-4.
Calcium silicate bricks: To BS EN 771-2.
Clay blocks: To BS EN 771-1.

- Type: LD.

Clay bricks: To BS EN 771-1.
Gypsum blocks: To BS EN 12859.
Manufactured stone blocks: To BS EN 771-5.
Standard special shape bricks: To BS 4729.

Second hand masonry units

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

EXECUTION

Workmanship generally

Standard: To BS 5628-3 (withdrawn but citied in Building Regulations).

Conditioning clay and calcium silicate bricks

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

Conditioning concrete bricks/ blocks

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

- Use of water retaining mortar admixture: Submit details.

Laying generally

Mortar joints generally: Fill vertical joints. Lay bricks, solid and cellular blocks on a full bed.
Autoclaved aerated concrete (AAC) blocks laid with thin mortar adhesive joints: Fill vertical joints. Lay blocks on a full bed.
Clay blocks with interlocking vertical joints: Dry vertical joints. Lay blocks on a full bed of thin layer mortar.
Bond where not specified: Half lap stretcher.
Vertical joints in facework: Even widths. Plumb at every fifth cross joint along course.

Height of lifts

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

- Lift height: 1.2 m (maximum) above any other part of work at any time.
- Daily lift height: 1.5 m (maximum) for any one leaf.

Walling using thin joint mortar glue:

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

Levelling of separate leaves using cement gauged or hydraulic lime mortar

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

- Every course containing vertical twist type ties or other rigid ties.
- Every third tie course for double triangle/ butterfly ties.
- Courses in which lintels are to be bedded.

Coursing brickwork

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

Laying frogged bricks

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

Laying gypsum blocks with tongues and grooves
Orientation: Tongued length uppermost.

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

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Block bonding new walls to existing

Pocket requirements: Formed as follows:

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

Vertical spacing of pockets:

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

Pocket joints: Fully filled with mortar.

Jointing

Profile: Consistent in appearance.
Accessible joints not exposed to view: Struck flush as work proceeds.

Pointing

Joint preparation: Remove debris. Dampen surface.

Fire stopping

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

Adverse weather

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

- In cement gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising.
- In hydraulic lime:sand mortars when at or below 5°C and falling or below 3°C and rising.
- In thin joint/ layer mortar glue when outside the limits set by the mortar manufacturer.

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

- Rain and snow.
- Drying out too rapidly in hot conditions and in drying winds.

Facework

Colour consistency of masonry units:

- Methods to ensure that delivered units are consistent and of an even colour range within deliveries: Submit proposals.
- Conformity: Check each delivery for consistency of appearance with previous deliveries and with approved reference panels; do not use if variation is excessive.
- Finished work: Free from patches, horizontal stripes and racking back marks.

Appearance:

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

Ground level: Commencement of facework: Not less than 150 mm below finished level of adjoining ground or external works level.
Putlog scaffolding: Not permitted in facework.
Toothed bond: New and existing facework in the same plane: Bond together at every course to achieve continuity of bond and coursing.
Cleanliness:

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

F30 ACCESSORIES AND SUNDRY ITEMS FOR BRICK BLOCK AND STONE WALLING

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Air bricks in external walling

Standard: To BS 493, Class 1.

Cavity insulation

Glass or rock wool batts: To BS EN 13162 or Agrément certified.
Expanded polystyrene (EPS) boards: To BS EN 13163 or Agrément certified.
Extruded polystyrene (XPS) boards: To BS EN 13164 or Agrément certified.
Polyisocyanurate (PIR) foam boards: To BS EN 13165 or Agrément certified.
Polyurethane (PUR) foam boards: To BS EN 13165 or Agrément certified.
Phenolic foam boards: To BS EN 13166 or Agrément certified.

Concrete fill to base of cavity wall

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

Coping units

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

Fireplace components

Standard: To BS 1251.

Flexible damp proof courses and cavity trays

Bitumen based: To BS 6398.
Polyethylene: To BS 6515.
Pitch polymer, bitumen polymer, polypropylene, and ethylene polypropylene based: Agrément certified.

Flue blocks

Clay/ Ceramic: To BS EN 1806.

Flue linings

Clay/ Ceramic: To BS EN 1457-1 and -2.
Concrete: To BS EN 1857.

Gratings/ Ventilators in internal walling

Standard: To BS 493, Class 2.

Lintels

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

Meshwork joint reinforcement

Standard: To BS EN 845-3.

Plain clay tiles

Standard: To BS EN 1304.

Sills

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

Wall ties

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

EXECUTION

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

Placement: Built in with no gaps at joints.

Cavities in masonry walling

Concrete fill to base of cavity wall:

- Extent: Maintain 75 mm between top of fill and external ground level and 225 mm (minimum) between top of fill and ground level dpc.
- Placement: Compact to eliminate voids.

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

Cavity trays
Formed in-situ:
- Joint treatment: Use unjointed wherever possible, otherwise lap 100 mm (minimum) and seal to produce a free draining and watertight installation.
- Horizontal cavity trays: Support using cavity closer.
- Sloping cavity trays: Prevent sagging.
- Cleanliness: Free from debris and mortar droppings.

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

Over openings and other cavity bridgings:
- Length: To extend 150 mm (minimum) beyond ends of lintels/ bridgings.

Cavity trays – gas resistant
Formed in-situ:
- Joint treatment: Use unjointed wherever possible, otherwise lap 150 mm (minimum) and seal to form a gas and watertight installation.
- Joint with damp proof membrane: Overlap dpc/ cavity tray 150 mm (minimum).

Cavity wall insulation
Full fill type:
- Placement: Continuous and free of mortar and debris.

Partial fill type:
- Placement: Secure against face of inner leaf.
- Residual cavity: Clear and unobstructed.
- Joints between boards, at closures and penetrations: No gaps and free from mortar and debris.

Dpcs – horizontal
Placement: In continuous lengths on full even bed of fresh mortar, with 100 mm laps at joints and full laps at angles.
Width: At least full width of leaf unless otherwise specified. Edges of dpc not covered with mortar or projecting into cavity.
Overlying construction: Immediately cover with full even bed of mortar to receive next masonry course.
Overall finished joint thickness: As close to normal as practicable.
Ground level dpcs:
- Joint with damp proof membrane: Continuous and effectively sealed.

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

Sill dpcs: In one piece and turned up at back when sill is in contact with inner leaf.
Coping/ Capping dpcs:
- Bed in one operation to ensure maximum bond between masonry units, mortar and dpc.
- Dpcs crossing cavity: Provide rigid support to prevent sagging.

Dpcs – vertical
Form: In one piece wherever possible.
Joints: Upper part overlapping lower 100 mm (minimum).
Jamb dpcs at openings:
- Joint with cavity tray/ lintel at head: Full underlap.
- Joint with sill/ horizontal dpc at base: Full overlap.
- Projection into cavity: 25 mm (minimum).
- Relationship with frame: In full contact.

Jamb dpcs to built in timber frames:
- Fixing: Securely fastened to back of frame.
- Fasteners: Galvanized clout nails or staples.

Flues – block system
Block placement: Finish joints flush to ensure a smooth, unrestricted flueway.
- Starter, offset and transfer blocks: Use.
- Coursing: As adjacent masonry.
- Non-bonded blocks: Support.

- Joints between blocks: Seal.

Testing flue system:

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

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Flues – clay/ ceramic lining system
Linings placement: Fully bed with socket or rebate uppermost using correct starters, adaptors, bends etc.
- Joints: Flush to provide an unrestricted flueway with smooth interior surfaces.

Testing flue system:
- Core ball test and smoke test to BS EN 15287-1, NA 8: On completion, carry out each test. If obstructions or leaks are revealed, submit proposals for making good.

Frames
Built in frames: Remove horns and provide support.
- Fixing cramps: Fully bed in mortar.

Frames in prepared openings:
- Formation of opening: Use accurate, rigid templates to required size.

Lintels
Placement: Bed on mortar used for adjacent work.
- Bearing: 100 mm (minimum).

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

Meshwork joint reinforcement
Placement: Lay on an even bed of mortar in a continuous strip.
Laps:
- Joints: 225 mm (minimum).
- Angles: Full.

Keep edges back from face of work:
- External: 20 mm.
- Internal: 12 mm.

Joint finish: Normal thickness.

Movement joints with sealant
Joint preparation and sealant application: As section Z22.
Filler:
- Thickness: To match design width of joint.
- Placement: Build in as work proceeds with no projections into cavities and to correct depth to receive sealant system.

Movement joints without sealant
Filler to standard joints:
- Thickness: To match design width of joint.
- Placement: Build in as work proceeds filling the joint but without projecting into cavities.

Filler to fire resistant joints:
- Placement: Compress and insert into place in open joint.
- Adhesives and accessories: Types recommended by filler manufacturer.

Pinning up to soffits
Top joint of loadbearing walls: Fill and consolidate with mortar.

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

Precast concrete, clayware, slate and natural stone coping units
Joints: Full and finished flush.
Placement: Lay on a full bed of mortar to line and level.

Precast concrete, clayware, slate and natural stone sills
Joints: Flush.
Bedding one piece sills: Leave bed joints open except under end bearings and masonry mullions.
Pointing on completion: To match adjacent work.

Preformed dpc/ cavity tray junction cloaks/ stop ends
Placement: To provide a free draining and watertight installation.

Site formed dpc/ cavity tray junctions/ stop ends
- Three dimensional changes in shape: Form to provide a free draining and watertight installation. Seal laps.
- Alternative use of preformed junction cloaks/ stop ends: Submit proposals.

Ties in masonry cavity walls
Embedment in mortar beds: 50 mm (minimum).
Placement: Sloping slightly downwards towards outer leaf, without bending.

- Drip: Centred in the cavity and pointing downwards.

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

Ties in masonry cladding to timber frames
Embedment in mortar beds: 50 mm (minimum).
Placement: Slope downwards away from timber frame, without bending.
Additional ties at openings and movement joints: 300 mm (maximum) centres vertically within 225 mm of vertical movement joints and reveals of unbonded openings.

Tile creasing
Placement: Two courses, broken jointed.

- Mortar: As adjacent work, full bed.

Joints: Full and finished flush.

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

Tops of restrained nonloadbearing walls
Restraints: Secure to soffit.
Filler placement: Full, no gaps.

Ventilation ducts in external walling
Placement: Across cavity, sloping away from inner leaf.

- Cavity seal: Full mortar joints.

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

Wall plates
Placement: On full bed of mortar to correct horizontal level.

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

- Position: 75 mm above top of cavity fill at base of cavity.

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

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G10 STRUCTURAL STEEL FRAMING

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

DESIGN

Completion of design

Design standards:

- Design of steel structures. General rules and rules for buildings: To BS EN 1993-1-1 Eurocode 3 (together with United Kingdom National Application Document).

Loading

Dead and imposed loads: To BS EN 1991-1-1.
Wind loads: To BS EN 1991-1-4.

PRODUCTS

Steel Sections

Hot rolled sections:

- Material: To BS EN 10025-1, -2, -3, -4, -5 and -6.

Hot finished structural hollow sections: To BS EN 10210-1 and -2.
Cold formed structural hollow sections: To BS EN 10219-1 and -2.
Galvanized structural steel strip and sheet: To BS EN 10346.
Galvanized structural steel strip and sheet for cold forming: To BS EN 10346.

Fasteners

Hexagon head carbon steel bolts (partially threaded): To BS EN ISO 4014 and 4016.
Hexagon head screws – Product grades A and B: To BS EN ISO 4017 and 4018.
Nuts for hexagon head carbon steel bolts: To BS EN ISO 4032 and 4034.
High-strength structural bolting assemblies for preloading. General requirements: To BS EN 14399-1.
High-strength structural bolting assemblies for preloading. Plain chamfered washers: To BS EN 14399-6.
High-strength structural bolting assemblies for preloading. Plain washers: To BS EN 14399-5.
High strength structural bolting assemblies for preloading – System HR, hexagon bolts and nuts: To BS EN 14399-3.
High strength structural bolting assemblies for preloading – System HV, hexagon bolts and nuts: To BS EN 14399-4.
High strength structural bolting assemblies for preloading – System HR countersunk hexagon bolts and nuts: To BS EN 14399-7.
Direct tension indicators:

- High strength structural bolting assemblies for preloading –System HR or HV direct tension indicators for bolts and nuts: To BS EN 14399-9.

Coatings on metal fasteners:

- Hot dip galvanized: To BS 7371-6.
- Sherardized: To BS 7371-8.

Coatings

Cleaning and preparation of metal surfaces: To BS ISO 27831-1 and -2.
Hot dip galvanized coatings on fabricated iron and steel: To BS EN ISO 1461.
Corrosion protection of steel structures by protective paint systems: To BS EN ISO 12944-1 to -8.

Fire resistance testing

General requirements: To BS EN 1363-1.
Loadbearing elements:

- Floors and roofs: To BS EN 1365-2.
- Beams: To BS EN 1365-3.
- Columns: To BS EN 1365-4.

Filling/ bedding of column bases

Portland cement: To BS EN 197-1.
Sand: To BS EN 12620, grade 0/4 or 0/2 (MP).

EXECUTION

Notification of commencement

Give notice: Before fabrication is due to start.

- Minimum period of notice: Five working days.

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Faying surfaces of pre-loaded joints

Steel 25 mm thick or more: Check faying surfaces for deformities that may reduce slip factor to below design limit.
Remedial measures: Submit proposals.
Protection: Immediately after blast cleaning and before coating surrounding areas, mask faying surfaces to protect from contamination and deterioration.
Applying coatings: Step each coat 30 mm back from edge of preceding coat and away from masked areas.
Removal of protection: Immediately before bolting, remove masking. Check faying surfaces are free from adhesive. Clean with solvent if necessary.

Preparation for galvanizing

Cutting, welding and drilling: Complete before galvanizing.
Vent and drain holes: Provide as necessary. Seal after galvanizing.

- Locations: Submit proposals.
- Method of sealing: Submit proposals.

Offsite preparation and painting

Working area: Covered and properly lit, heated and ventilated.
Sequence of working: Select from the following and submit proposals:

- Fabricate, blast clean, prime.
- Blast clean, fabricate, remove flash rust with a light overall sweep blast, prime.
- Blast clean, apply weldable prefabrication primer, fabricate, prime.

Prefabrication primer: Type recommended by manufacturer of post fabrication primer.

- Thickness of post fabrication primer coat: May be reduced if and as recommended by manufacturer.

Surfaces inaccessible after assembly: Apply full treatment and coating system including, if necessary, local application of site coatings.

Manual cleaning of new steelwork

Preparation: Remove fins, burrs, sharp edges, weld spatter, loose rust and loose scale.
Surface finish: Clean but unpolished to BS EN ISO 8501-1, grade St 2.
Finishing: Thoroughly degrease and clean down. Remove any consequent rusting back to grade St 2. Prime without delay.

Site welding

Use: Permitted only where indicated on drawings.
Working conditions: Suitable and safe. Do not weld when surfaces are wet or when ambient temperature is below 0°C.
Finished welds: Carefully dressed to remove slag without deforming surface of weld.

Sealed hollow sections

Bolt holes: Sealed to prevent access of moisture.

Pre-erection checks

Scope: At least 7 days before proposed erection start date, check the following:

- Foundations and other structures to which steelwork will be attached: Accuracy of setting out.
- Holding down bolts: Position, protruding length, slackness and condition.

Inaccuracies and defects: Report without delay.
Permission to commence erection: Obtain.

Modifications

Steelwork: Do not modify without approval.

Direct tension indicators

Grade: Appropriate for grade of bolt and nut assembly.
Post installation and inspection treatment: Where no further protective coating is specified, apply a butyl rubber sealing compound to seal measuring gap around indicators.

Column bases

Levels: Adjust with steel shims or folding wedges no larger than necessary.
Location of shims/ wedges: Symmetrically around perimeter of base plate. Do not use a single central pack.
Give notice: If space beneath any column base is less than, or over 25 mm greater than, the specified dimension.
Accuracy of erection: Check, and correct errors before filling and bedding beneath bases and carrying out other adjacent work.

Mortar filling/ bedding of column bases

Bolt pockets: Completely filled with neat cement slurry.
Spaces beneath base plates: Completely filled:

- Spaces 25–50 mm deep: 1:1 cement:fine aggregate mortar, just fluid enough to pour, well tamped as filling proceeds.
- Spaces 50–80 mm deep: 1:2 cement:fine aggregate mortar, just damp, well tamped against properly fixed supports as filling proceeds.

Bonded anchors
Holes: Clean and free from dust at time of installing anchor.
Permeable sleeves: Use in conditions where otherwise the loss of bonding agent would be unacceptably high.

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Fixing profiled sheet for floor slabs
Standard: To BS EN 1090-2.

Preparation of fasteners for site painting
Uncoated fasteners: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Without delay, coat to match adjacent shop painted areas.
Galvanized fasteners: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Etch prime.

Site painting
Environmental conditions prior to starting coating work:

- Surfaces: Unaffected by moisture or frost.
- Steel temperature: At least 3°C above dew point, with conditions stable or improving, and not high enough to cause blistering or wrinkling of the coating.
- Relative humidity: Below 85%.

Coatings:

- Surfaces to be coated: Clean, dust free and suitably dry. Previous coats to be adequately cured.
- Multiple coats of same material: Use different tints to assist checking of complete coverage.
- Penultimate coat: Colour recommended by paint manufacturer to suit top coat colour.
- Finish required: Smooth and even, of uniform thickness and colour, free from defects.

External angles, nuts, bolt heads, rough weld seams, and areas difficult to coat: Apply an additional stripe coat.
Exposed steelwork partially embedded or encased in concrete: Apply two coats of bituminous coating locally to the steel/ concrete junction.

G12 ISOLATED STRUCTURAL METAL MEMBERS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Steel sections

Hot rolled structural sections:

- Section properties: To BS 4-1.
- Steel: To BS EN 10025-2, grade S275JR.

Structural steel equal and unequal angles:

- Section properties: To BS EN 10056-1 and -2.
- Steel: To BS EN 10025-2, grade S275JR.

Hot finished structural hollow sections:

- Section properties: To BS EN 10210-2.
- Steel: To BS EN 10210-1, grade S275J2H.

Surface condition: Free from heavy pitting and rust, burrs, sharp edges and flame cutting dross.

Bolt assemblies

Hexagon head bolts: To BS EN ISO 4014 or BS EN ISO 4016.

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

EXECUTION

Fabrication of steel members

Cuts and holes: Accurate and neat.
Welding: Metal arc method to BS EN 1011-1 and BS EN 1011-2.

- Welded joints: Fully fused, with mechanical properties not less than those of the parent metal.
- Site welding: Obtain approval before planning work.

Shop priming

Preparation: To BS EN ISO 12944-4. Remove fins, burrs, sharp edges and weld spatter and clean out crevices.
Primer application: To BS EN ISO 12944-7.

Installation

Accuracy: Members positioned true to line and level using, if necessary steel packs of sufficient area to allow full transfer of loads to bearing surfaces.
Fixing: Use washers under bolt heads and nuts.

- Tapered washers: Provide under bolt heads and nuts bearing on sloping surfaces. Match taper to slope angle and align correctly.

H43 METAL COMPOSITE PANEL CLADDING AND COVERINGS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Profiled metal facing sheets to composite panels

Steel: To BS EN 508-1.
Aluminium: To BS EN 508-2.
Stainless steel: To BS EN 508-3.

Factory assembled insulating rooflights (FAIRS)

Glass fibre reinforced polyester resin (GRP): To BS EN 1013.
Polyvinyl chloride (PVC-U): To BS EN 1013.
Polycarbonate (PC): To BS EN 1013.

Roof sheeting generally

Fragility testing: To Advisory Committee for Roofsafety (ACR) publication, ACR[M]001, 'Test for fragility of roofing assemblies'.

Factory made insulation products

Mineral wool (MW): To BS EN 13162.
Expanded polystyrene (EPS): To BS EN 13163.
Extruded polystyrene foam (XPS): To BS EN 13164.
Polyurethane foam (PUR) and polyisocyanurate (PIR): To BS EN 13165.

Warning signs

Warning sign: To BS EN ISO 7010, reference number W001 with supplementary text sign, lettering 'DANGER Fragile roof'.
Mandatory action sign: To BS EN ISO 7010, reference number M001 with supplementary text sign, lettering 'Use crawling boards'.

EXECUTION

Completion of design

Cladding/ covering system: Complete detailed design to the extent specified and submit proposals before commencement of fabrication.

- Standard: To BS 5427-1.
- Related works: Coordinate in detailed design.

Painting structure

Sequence: Paint outer surface of supporting structure before fixing cladding/ covering.

Prevention of electrolytic action

Isolating tape: Type recommended by cladding/ covering manufacturer.

- Location: To contact surfaces of supports and sheets of dissimilar metals.

Continuity thermal insulation

Installation: Secure to prevent future movement or dislodgement and continuous with cladding/ covering insulation.
Fixing: Not compressed between outer and lining sheets.

Profile fillers

Requirement: To close cavities/ regulate air paths within the external envelope. Tight fit with no unintended gaps.

Fixing panels generally

Cut edges: Clean true lines.
Penetrations: Openings to minimum size necessary.

- Edges: Reinforce.

Orientation: Exposed joints of side laps away from prevailing wind.
Panel ends, laps and raking cut edges: Fully supported and with fixings at top of lap.
Fasteners: At regular intervals in straight lines, centred on support bearings.

- Position of fastener in oversized drilled holes: Central.
- Fasteners torque: Sufficient to correctly compress washers.

Debris: Remove dust and other foreign matter before finally fixing panels.
Completion: Check fixings to ensure weathertightness and that panels are secure with no buckling or distortion.

Fixing plastics rooflights

Fastener holes: Sized in accordance with panel manufacturer's recommendations.
End laps: Use minimum two strips of sealant tape, one along each edge of lap.

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Flashings/ trims generally

Lap joint treatment:

- Vertical and sloping flashings/ trims: End laps to be same as adjacent panels.
- Horizontal flashings/ trims: End laps to be 150 mm, sealed and where possible arranged with laps away from prevailing wind.

Method of fixing: To structure in conjunction with adjacent panels. Otherwise to panels.

Sealing external laps

Position of tape: Below fixing positions in straight, unbroken lines, parallel to and slightly back from edge of panel.
Seal quality: Effective, continuous and not overcompressed.
End laps: Sealant tape positions:

- Single line tape: Immediately below line of fasteners.
- Second line tape (where specified): Slightly set back from edge of external sheet.

Side laps: Sealant tape positions:

- Single line tape: Outside line of fasteners.
- Second line tape (where specified): On other side of fasteners.

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H71B LEAD SHEET FLASHINGS AND WEATHERINGS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Lead sheet

Rolled: To BS EN 12588.
Machine cast: Agrément certified.

- Tolerance (by weight): ±5%.

Marking: Colour marked for thickness.

Underlay

Geotextile: Needle punched nonwoven polyester.

Timber for use with leadwork

Softwood battens, fillets etc:

- Quality: Planed, free from wane, pitch pockets, decay and insect attack (ambrosia beetle excepted).
- Moisture content: 22% (maximum) at time of fixing and covering. Give notice if greater than 16%.
- Preservative treatment: Organic solvent as section Z12 and Wood Protection Association Commodity Specification C8.

Fasteners to timber substrates

Nails: Copper clout nails to BS 1202-2, table 2 or stainless steel (austenitic) clout nails.

- Shank: Annular ringed, helical threaded or serrated.
- Shank diameter: 2.65 mm (minimum) for light duty or 3.35 mm (minimum) for heavy duty.
- Length: 20 mm (minimum) or equal to substrate thickness.

Fasteners to concrete or masonry substrates

Screws: Brass or stainless steel to BS 1210, table 3 or 4.

- Diameter: 3.35 mm (minimum).
- Length: 19 mm (minimum).
- Washers and plastic plugs: Compatible with screws.

Clips

Material:

- Lead: Cut from sheets of same code as sheet being secured.
- Copper: To BS EN 1172, temper designation R220 in welts, seams and rolls, R240 elsewhere; dipped in solder if exposed to view.
- Stainless steel: To BS EN 10088, grade 1.4301(304), terne coated if exposed to view.

Dimensions:

- Width: 50 mm where not continuous.
- Length: To suit detail.

Continuous clips

Sheltered/ moderate conditions:

- Lead: Cut from sheet of same thickness/ code as sheet being secured.
- Copper: Cut from sheet to BS EN 1172, temper designation R240, 0.6 mm (minimum) thick.
- Stainless steel: Cut from sheet to BS EN 10088, grade 1.4301(304), 0.38 mm (minimum) thick.

Severe/ very severe conditions:

- Lead: Cut from sheet two thicknesses/ codes more than sheet being secured.
- Copper: Cut from sheet to BS EN 1172, temper designation R240, 0.7 mm (minimum) thick.
- Stainless steel: Cut from sheet to BS EN 10088, grade 1.4301(304), 0.46 mm (minimum) thick.

EXECUTION

General

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

- Protection: Prevent staining, discolouration and damage by subsequent works.

Preparation of existing timber/ plywood substrates

Defective boards: Give notice.
Condition after preparation: Boards fixed securely. Protruding fastenings punched in. Surface finished evenly. Acceptably levelled. Gross irregularities removed or filled.

Underlay

Handling: Prevent tears and punctures.
Laying: Butt or overlap jointed onto a dry substrate.

- Fixing edges: With copper or stainless steel staples or clout nails.
- Do not lay over roof edges but do turn up at abutments.

Protection: Keep dry and cover with lead at the earliest opportunity.

Valley gutter lining (slate or tile roofs)

Laying: Over, and beyond, tilting fillets.
Fixing: Welted edges. Nailed top edge to each sheet. Bottom end dressed neatly into eaves gutter.

Ridge/ hip rolls (slate roofs)

Clips: At capping laps and 500 mm (maximum) centres (code 4 or 5 lead).

- Fixing: Nailed to top of ridge/ hip board before fixing core. Nail each side 50 mm (maximum) from capping edge. Slates drilled as necessary.

Core: Rounded timber.

- Shape: Tapered to a flat base 30 mm wide.
- Fixing: To ridge/ hip board with brass or stainless steel countersunk screws at 600 mm (maximum) centres, with base 5 mm (minimum) above slates.

Lead capping:

- Hip capping: Nail head of each length around core.
- Laps: 150 mm (minimum) for ridges, 100 mm (minimum) for hips.
- Cover: Wings of capping to extend 150 mm (minimum) on to roof.

Apron flashings

Lengths: 1500 mm (maximum).
End to end joints: Laps 100 mm (minimum).
Overlap to upstand: 75 mm (minimum).
Fixing: Lead wedges into bed joint, clips to lead upstand at laps and 500 mm centres.

Cover flashings (upstands of bitumen sheet or asphalt flat roofs)

End to end joints: Laps 100 mm (minimum).
Overlap to upstand: 75 mm (minimum).
Fixing: Lead wedges into bed joint, clips to lead upstand at laps and 500 mm centres.

Soakers and step flashings (slate or tile roofs)

Lead soakers:

- Length: Slate/ tile gauge + lap + 25 mm.
- Upstand: 75 mm (minimum).
- Underlap: 100 mm (minimum).

Lead step flashings:

- Lengths: 1500 mm (maximum).
- End to end joint: Laps 100 mm (minimum).

- Cover: Overlap to soaker upstands 65 mm (minimum).
- Fixing: Lead wedges at every course.

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Step and cover flashings (single lap tile roofs) in sheltered/ moderate exposure locations

Lengths: 1500 mm (maximum).
End to end joints: Laps 100 mm (minimum).
Upstand: 85 mm (minimum).
Fixing: Lead wedges at every course. Clipped at 500 mm (maximum) centres along free edge.

Single step and cover flashings (single lap tile roofs) in exposed locations

Lead single step flashings:

- End to end joints: Laps 50 mm (minimum).
- Cover: Overlap to cover flashing upstands 65 mm (minimum).
- Fixing: Lead wedges at every step.

Lead cover flashings:

- Lengths: 1500 mm (maximum).
- End to end joints: Laps 100 mm (minimum).
- Upstand: 85 mm (minimum).
- Cover to roof : 150 mm (minimum) and over first full tile corrugation.
- Fixing: Turned over head of tiles. Clipped at 500 mm (maximum) centres along free edge. Upstand plugged and screwed to abutment in top third of each length only.

Step flashings with secret gutter

Lead step flashings:

- Lengths: 1500 mm (maximum).
- End to end joints: Laps 100 mm (minimum).
- Cover: Overlap to gutter lining upstand 65 mm (minimum).
- Fixing: Lead wedges at every course.

Lead secret gutter lining:

- Lengths: 1500 mm (maximum).
- Upstand: 65 mm (minimum) above tiles.
- Fixing: Dressed into secret gutter. Welted edge at side to be tiled. Nailed top edge to each sheet. Bottom end dressed neatly into eaves gutter.

Step and cover flashing with secret gutter

Lead step and cover flashings:

- Lengths: 1500 mm (maximum).
- End to end joints: Laps 100 mm (minimum).
- Upstand: 85 mm (minimum) with overlap to gutter lining upstand of 65 mm (minimum).
- Cover to roof: 150 mm (minimum).
- Fixing: Lead wedges at every course. Clipped at 500 mm (maximum) centres along free edge.

Lead secret gutter linings:

- Lengths: 1500 mm (maximum).
- Upstand: 65 mm (minimum) above tiles.
- Fixing: Dressed into secret gutter. Welted edge at side to be tiled. Nailed top edge to each sheet. Bottom end dressed neatly into eaves gutter.

Chimney flashings (slate or plain tile roofs)

Lead front apron:

- Length: Width of chimney plus 150 mm (minimum) underlap to each side flashing.
- Upstand: 75 mm (minimum).
- Fixing: Lead wedges into bed joint.

Lead soakers:

- Thickness: 1.25 or 1.32 mm (code 3).
- Length: Slate/ tile gauge + lap + 25 mm.
- Upstand: 75 mm (minimum).
- Underlap: 100 mm (minimum).

Lead step flashings:

- Lengths: 1500 mm (maximum).
- End to end joints: Laps of 100 mm (minimum).
- Front end: Turn 75 mm around chimney over apron.
- Cover: Overlap to soaker upstands of 65 mm (minimum).
- Fixing: Lead wedges at every course.

Lead back gutter:

- Length: Width of chimney plus 100 mm (minimum) overlap to each side flashing.
- Upstand: 100 mm (minimum).
- Gutter sole: 150 mm (minimum).
- Cover up roof: 225 mm (minimum).

Back gutter cover flashing:

- Length: Width of chimney plus 100 mm (minimum) overlap to each side flashing.
- Cover: Overlap to back gutter upstand 75 mm (minimum).
- Fixing: Lead wedges into bed joint.

Chimney flashings (single lap tile roofs)

Lead front apron:

- Length: Width of chimney plus 150 mm (minimum) underlap to each side flashing.
- Upstand: 75 mm (minimum).
- Fixing: Lead wedges into bed joint.

Side step and cover flashings:

- Lengths: 1500 mm (maximum).
- End to end joints: Laps 100 mm (minimum).
- Upstand: 65 mm (minimum).
- Cover to roof: 150 mm (minimum).
- Fixing: Lead wedges at every course. Clipped at 500 mm (maximum) centres along free edge.

Lead back gutter:

- Length: Width of chimney plus 100 mm (minimum) overlap to each side flashing.
- Upstand: 100 mm (minimum).
- Gutter sole: 150 mm (minimum).
- Cover up roof: 225 mm (minimum).

Back gutter cover flashing:

- Length: Width of chimney plus 100 mm (minimum) overlap to each side flashing.
- Cover: Overlap to back gutter upstand 75 mm (minimum).
- Fixing: Lead wedges into bed joint.

Chimney damp proof course above pitched roofs

Protection: Fully coated with high build bitumen based paint on surfaces to be embedded.

Dimensions:

- Plan area of chimney plus laps on perimeters: turned up 50 mm against stack in roof void, turned down 50mm over stack externally, through flue lining and turned up 25 mm all round internally.

Laying: On a thin even bed of wet mortar.

- Next layer of overlying construction: Bed on mortar without delay and finish joint neatly.

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Vertical tiling/ slating flashings
General:
- Length: 1500 mm (maximum).
- End to end joint laps: 100 mm (minimum).

Width:
- Bottom edge flashings: Adequate for underlap to underlay, dressing over tilting fillet, and welted drip or straight cut bottom edge.
- Top edge flashings: Adequate for underlap to abutment and dressing down over tiles/ slates 150 mm (minimum).
- Side abutment step flashings: Adequate for 75 mm (minimum) underlap with welted edge to tiles/ slates and 50 mm (minimum) cover to abutment.

Vertical tiling/ slating angle soakers
Lead: 1.25 or 1.32 mm (code 3).
Dimensions:
- Length: Tile/ slate gauge + lap + 25 mm.
- Underlaps: 150 mm (minimum).

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

Clips
Fixing clips: Secure each to substrate with two fixings 50 mm (maximum) from edge of lead sheet.
Fixing lead sheet: Welt clips around edges and turn over 25 mm.

Continuous clips
Fixing clips:
- Lead clips: Secure at 75 mm centres.
- Copper and stainless steel clips: Secure at 200 mm (maximum) centres.

Fixing lead sheet: Welt edge around continuous clip and dress down.

Wedge fixing into joints/ chases
Joint/ Chase: Rake out to a depth of 25 mm (minimum).
Lead: Dress into joint/ chase.
- Fixing: Lead wedges at 450 mm (maximum) centres, at every change of direction and with at least two for each piece of lead.

Wedge fixing into damp proof course joints
Joint: Rake/ cut out under damp proof course to a depth of 25 mm (minimum).
Lead: Dress lead into joint.
- Fixing: Lead wedges at 450 mm (maximum) centres, at every change of direction and with at least two for each piece of lead.

Screw fixing into joints/ chases
Joint/ chase: Rake out to a depth of 25 mm (minimum).
Lead: Dress into joint/ chase and up back face.
- Fixing: Into back face with stainless steel screws and washers and plastics plugs at 450 mm (maximum) centres, at every change of direction, and with at least two fixings for each piece of lead.

Forming details
Method: Bossing or leadwelding except where bossing is specifically required.
Leadwelded seams: Neatly and consistently formed.
- Seams: Do not undercut or reduce sheet thickness.
- Filler strips: Of the same composition as the sheets being joined.
- Butt joints: Formed to a thickness one third more than the sheets being joined.
- Lap joints: Formed with 25 mm laps and two loadings to the edge of the overlap.

Bossing: Carried out without thinning, cutting or otherwise splitting the lead sheet.

Drips with splash laps (gutter linings at pitches above 3°)
Underlap: Dress up full height of drip upstand.
- Fixing: Two rows of nails to lower level substrate, 25 mm and 50 mm from face of drip. At 75 mm centres in each row, evenly spaced and staggered. Seal over nails with a soldered or leadwelded dot.

Overlap: Dress over drip and form 75 mm splashlap.

- Fixing: Lead clips, leadwelded to underlap, with one per bay (minimum).

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Drips without splash laps (gutter linings at pitches up to 3°)
Underlap: Dress into rebate along top edge of drip.

- Fixing: One row of nails at 50 mm centres on centre line of rebate.

Overlap: Dress over drip to just short of lower level.

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J40 FLEXIBLE SHEET WATERPROOFING AND DAMP PROOFING

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Concrete

Standard: To BS 8500-2.

Bitumen damp proof sheets

Standard: To BS 743.

Reinforced bitumen damp proof membranes

Standard: To BS 8747 and BS EN 13707.

Polyethylene membranes

Standard: To harmonized standard BS EN 13967, and Agrément certified.

Oxidized bitumen bonding compound

Standard: To BS EN 13304.

EXECUTION

General

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

- Clean and even textured free from voids and sharp protrusions.
- Moisture content: Compatible with damp proofing/ tanking.
- Air and surface temperature: Do not apply sheets if below minimum recommended by membrane manufacturer.

Condition of membrane at completion:

- Neat, smooth and fully supported, dressed well into abutments and around intrusions.
- Completely impervious and continuous.
- Undamaged. Prevent puncturing during following work.

Permanent overlying construction: Cover membrane as soon as possible.

Hardcore/ Venting hardcore beds

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

Primers

Curing: Allow to dry thoroughly before covering.

Hot applied bonding compounds

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

Loose laid membranes

Surfaces to be jointed: Clean and dry beyond full width of joint.
Covering to oversite damp proofing: Place immediately after laying membrane.

Self-adhesive membranes

Bonding: Full. Smooth out to exclude air.

Multilayer membranes

Subsequent layers: Apply as soon as possible.

Angles in bonded sheeting

Preformed rot proof fillet to internal angles:

- Size (minimum): 50 x 50 mm, splay faced.
- Bedding: Bitumen mastic or bonding compound.

Reinforcing strip to all angles:

- Material: As damp proofing/ tanking.
- Width (minimum): 300 mm.
- Timing: Apply before main sheeting.

Proprietary reinforcing strip to all angles:

- Timing: Apply before main sheeting.

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

Junctions with projecting dpcs/ cavity trays

Adjoining surfaces: Clean and dry.
Dpcs/ Cavity trays: Lap and fully bond/ seal with sheeting.

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

Junctions with flush dpcs/ cavity trays

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

- Expose edge where concealed.
- Lap and fully bond/ seal sheeting to wall.
- Dressing of sheeting beyond dpc/ cavity tray (minimum): 50 mm.
- Bonding/ Sealing: Method compatible with component materials.

Preformed collars for pipes, ducts, cables, etc

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

Protection boards for damp proofing/ tanking

Application

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

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

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K10 PLASTERBOARD DRY LININGS FOR WALLS, PARTITIONS AND CEILINGS

GENERAL REQUIREMENTS

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Insulation

Mineral wool: To BS EN 13162.

Gypsum plasterboards to BS EN 520

Type A:

- Face suitable for gypsum plasters or decoration to be applied.

Type H (plasterboard with reduced water absorption):

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

Type E (gypsum sheathing board):

- Manufactured to be used as sheathing board in external walls.
- Not intended to receive decoration.
- Not designed to be permanently exposed to external weather conditions.
- Has reduced water absorption rates.

Type F (gypsum plasterboard with improved core adhesion at high temperatures):

- Face suitable for gypsum plasters or decoration to be applied.

Type P (gypsum baseboard):

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

Type D (gypsum plasterboard with controlled density):

- Face suitable for gypsum plasters or decoration to be applied.

Type R (gypsum plasterboard with enhanced strength):

- For applications where higher strength is required.
- Increased longitudinal and transverse breaking loads.
- Face suitable for gypsum plasters or decoration to be applied.

Type I (gypsum plasterboard with enhanced surface hardness):

- Face suitable for gypsum plasters or decoration to be applied.
- Designated Type I3.3 for edge and end profiles.

Edges:

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

Designation of plasterboards:

- _Gypsum plasterboard/ type letter/ BS EN 520 – width/ length/ thickness/ edge profile_.
- E.g. _Gypsum plasterboard/ Type A/ BS EN 520 – 1200/ 2400/ 12.5/ tapered edge_

Rigid beads/ stops

Standard: Galvanized steel: To BS EN ISO 1461.

EXECUTION

New wet laid bases

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

Metal framing for partitions/ wall linings

Setting out: Accurately aligned and plumb.

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

Fixing centres at perimeters (maximum): 600 mm.

Openings: Form accurately:

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

- Services penetrations: Allow for associated fire stopping.

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

- Partition heads: Running parallel with, but offset from main structural supports.
- Fixtures, fittings and service outlets. Mark framing positions clearly and accurately on linings.
- Board edges and lining perimeters: As recommended by board manufacturer to suit type and performance of lining.

Metal furrings for wall linings
Setting out:

- Vertical furring positions: Equal vertical centres to suit specified linings, maintaining sequence across openings. Position adjacent to angles and openings.
- Additional vertical furrings: To support vertical edges of boards and at junctions with partitions.
- Horizontal furring positions: To provide continuous support to edges of boards.

Adhesive bedding to furrings:

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

Suspended ceiling grids
Grid members and hangers: Centres to suit specified linings and imposed loads.
Additional grid members: To provide bracing and stiffening as necessary at upstands, partition heads, access hatches, etc.

Dry lining generally
General: Use fixing, jointing, sealing and finishing materials, components and installation methods recommended by board manufacturer.
Cutting plasterboard: Neatly and accurately without damaging core or tearing paper facing.

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

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

Dry lining ceilings
Sequence: Fix boards to ceilings before dry lining walls and partitions.
Orientation of boards: Fix with bound edges at right angles to supports and with ends staggered in adjacent rows.
Two layer boarding: Stagger joints between layers.

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

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

Sealing gaps and air paths
Location of sealant: To perimeter abutments and around openings.

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

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

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

Cavity fire barriers
Installation: Form accurately and fix securely with no gaps to provide a complete barrier to smoke and flame.
Within suspended ceilings: Fixing at perimeters and joints: Secure, stable and continuous with no gaps, to provide a complete barrier to smoke and flame.
Service penetrations: Cut and pack to maintain barrier integrity. Sleeve flexible materials. Adequately support services passing through barriers.
Ceiling systems for fire protection: Do not impair fire resisting performance of ceiling system.

Fire stopping at perimeters of dry lining systems
Material: Tightly packed mineral wool or intumescent mastic/ sealant.
Application: Provide a complete barrier to smoke and flame.

Joints between boards
Tapered edged plasterboard:

- Bound edges: Lightly butted.
- Cut/ unbound edges: 3 mm gap.

Square edged plasterboard: 3 mm gap.
Square edged fibre reinforced gypsum board: 5 mm gap.

Vertical joints
Joints: Centre on studs/ framing.
Partitions: Stagger joints on opposite sides of studs.
Two layer boarding: Stagger joints between layers.

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Horizontal joints
Surfaces exposed to view: Horizontal joints not permitted. Seek instructions where height of partition/ lining exceeds maximum available length of board.
Two layer boarding: Stagger joints between layers by at least 600 mm.
Edges of boards: Support using additional framing.

- Two layer boarding: Support edges of outer layer.

Insulation backed plasterboard
General: Do not damage or cut away insulation to accommodate services.
Installation at corners: Carefully cut back insulation or plasterboard as appropriate along edges of boards to give a continuous plasterboard face, with no gaps in insulation.

Fixing plasterboard to metal framing:
Screw fixing to framing/ furrings:

- Position of screws from edges of boards (minimum): 10 mm.
- Screw heads: Set in a depression. Do not break paper or gypsum core.
- Fixing insulation backed plasterboard to metal furrings: In addition to screw fixings, apply continuous beads of adhesive sealant to furrings.

Fixing plasterboard to timber framing:
Position of nails/ screws from edges of boards (minimum):

- Bound edges: 10 mm.
- Cut/ unbound edges: 13 mm.

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

Fixing plasterboard with adhesive dabs
Setting out boards: Accurately aligned and plumb.
Fixing to background: Securely using adhesive dabs.
Dab spacing to each board horizontally: One row along top edge and one continuous dab along bottom edge.
Dab spacing to each board vertically: One row along each edge and at intermediate spacings to suit size of board:

- Boards 9.5 x 1200 mm: 400 mm centres.
- Boards 9.5/ 12.5 x 900 mm: 450 mm centres.
- Boards 12.5 x 1200 mm: 600 mm centres.

Adhesive dab dimensions (width x length): At least 50–75 mm x 250 mm.

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

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

Fixing insulation backed plasterboard with adhesive spots
Setting out boards: Accurately aligned and plumb.
Fixing to background: Securely using adhesive spots and mechanical fastenings.
Adhesive spot spacings to each board: Four vertical rows, at 400 mm centres in each row.
Adhesive spot diameters: 25 mm (minimum).
Mechanical fasteners: Nailable plugs in locations recommended by board manufacturer.

Level of dry lining across joints
Sudden irregularities: Not permitted.
Joint deviations: Measure from faces of adjacent boards using methods and straightedges (450 mm long with feet/ pads) to BS 8212, clause 3.3.5.

- Tapered edge joints: Permissible deviation (maximum) across joints when measured with feet resting on boards: 3 mm.
- External angles: Permissible deviation for both faces, 4 mm (maximum).
- Internal angles: Permissible deviation for both faces, 5 mm (maximum).

Seamless jointing to plasterboard
Cut edges of boards: Remove paper burrs.
Filling and taping: Fill joints, gaps and internal angles with jointing compound and cover with continuous lengths of paper tape, fully bedded.
Protection of edges/ corners: Reinforce external angles, stop ends, etc. with specified edge/ angle bead.
Finishing: Apply jointing compound. Feather out each application beyond previous application to give a flush, smooth, seamless surface.
Nail/ screw depressions: Fill with jointing compound to give a flush surface.
Minor imperfections: Remove by light sanding.

Installing beads/ stops
Cutting: Neatly using mitres at return angles.

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

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Repairs to existing plasterboard

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

- Finish: Flush, smooth surface suitable for redecoration.

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

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

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L10 WINDOWS ROOFLIGHTS SCREENS AND LOUVRES

GENERAL

Cross-reference

General: Read with A90 General technical requirements.
Sealants: Read with section Z22 Sealants.
Joinery workmanship: Read with section Z10 Purpose made joinery.

PRODUCTS

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

External joinery: 12–19%.
For unheated buildings: 12–16%.
For buildings with heating providing room temperatures in the range 12–21°C: 9–13%.
For buildings with heating providing room temperatures in excess of 21°C: 6–10%.

Windows

Aluminium:

- Standard: To BS 4873.
- Factory applied powder coatings: To BS 6496.

PVC-U windows (white and surface covered):

- Standard: Manufactured to BS 7412 from extruded profiles.
- Manufacturer: Registered under a quality assurance scheme operated by a certification and inspection body accredited by the United Kingdom Accreditation Service (UKAS).
- Operation and strength characteristics: To BS 6375-2.

Steel:

- Standard: To BS 6510.
- Operation and strength characteristics: To BS 6375-2.
- Factory applied powder coatings: To BS EN 13438.

Wood:

- Standard: To BS 644.
- Manufacturer: Registered under a third party quality assurance scheme.
- Operation and strength characteristics: To BS 6375-2.
- Certification: All wood being traded in the EU should be 'legal' under the European Timber Regulation (EUTR). For public procurement projects the UK Timber Procurement Policy may be applicable, and evidence should be submitted as appropriate (contact CPET for advice).

Glazing

Safety glazing:

- Standard: In accordance with BS 6262-4 as appropriate for installation.

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

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

- For opaque finish: Glazing beads, drip mouldings and the like, class J10; all other members, J40 or better.
- For clear finish: Glazing beads, drip mouldings and the like, Class J2; other members, as specified.

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

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

EXECUTION

Protection of components

General: Do not deliver to site components that cannot be installed immediately or placed in clean, dry floored and covered storage.
Stored components: Stack vertical or near vertical on level bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.

Priming/ sealing

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

Corrosion protection

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

- Timing of application: Before fixing components.

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Building in
General: Not permitted unless specified.
- Brace and protect components to prevent distortion and damage during construction of adjacent structure.

PVC-U windows
Installation standard: To BS 8213-4.

Replacement windows installation
Standard: To BS 8213-4.

Window installation
General: Install into prepared openings, without twist or diagonal racking.
Gap between frame edge and surrounding construction (maximum):
- Steel windows: 3 mm.
- Timber and PVC-U windows: 10 mm.

Fixing of wood frames
Positions of fasteners unless predrilled:
- Distance from ends of each jamb: 150 mm (maximum).
- Adjacent to each hanging point of opening lights.
- Centres: 450 mm (maximum).

Fixing of steel frames
Positions of fasteners unless predrilled:
- Distance from ends of each jamb: 50–190 mm.
- Adjacent to each hanging point of opening lights.
- Centres: 900 mm (maximum).

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

Fixing of aluminium frames
Positions of fasteners unless predrilled:
- Distance from ends of each jamb: 250 mm (maximum).
- Adjacent to each hanging point of opening lights.
- Centres: 600 mm (maximum).

Fixing of PVC-U frames
Positions of fasteners unless predrilled:
- Distance from ends of each jamb: 150–250 mm (maximum).
- Fasteners at critical points: Adjacent to each hanging point of opening lights, but no closer than 150 mm to a transom or mullion centre line.
- Centres: 600 mm (maximum).

Fixing of composite frames
Positions of fasteners unless predrilled:
- Distance from ends of each jamb: 150 mm (maximum).
- Adjacent to each hanging point of opening lights.
- Centres: 600 mm (maximum).

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

L20 DOORS/ SHUTTERS/ HATCHES

GENERAL

Cross-reference

General: Read with A90 General technical requirements.
Purpose made joinery: Read with Z10.
Preservative/ fire retardant treatment: Read with Z12.
Fixings/ adhesives: Read with Z20.
Sealants: Read with Z22.

PRODUCTS

Door facings: laminate

Standard: To BS EN 438-1 and -7.
Grade: Horizontal:

- Standard general purpose: HGS.
- Flame retardent general purpose: HGF.
- Post forming general purpose: HGP.

Door facings: plywood

Bonding quality: To BS EN 314.
Surface appearance:

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

Conditions of use: To BS EN 636.

External wood matchboarded doors

Standard: Generally to BS 459.

Fire performance

CE marked fire resisting doorsets:

- To BS EN 16034 and in conjunction with BS EN 13241 and BS EN 14351-1 (and eventually prEN 14351-2).

Fire resistant doorsets and shutter assemblies:

- Type testing: To BS 476-22 or BS EN 1634-1.

Smoke control doorsets and shutter assemblies:

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

Intumescent seals:

- Type testing: To BS 476-23.

Testing authority: UKAS accredited.

Metal door frames

Steel frames: Generally to BS 1245.

Metric internal and external wood doorsets, door leaves and frames

Coordinated sizes: To BS 4787.

Non fire resisting doors/ door assemblies/ doorsets

Standard: To BS EN 14351-1.

Safety glazing to door leaves and sidelights

Standard: To BS 6206 for safety plastics and BS EN 12600 for safety glass.
Location: To BS 6262-4.

Single leaf external doorsets to dwellings

Security: To BS 8220-1.

- Enhanced security requirements: To BSI publication, PAS 24.

Wood framed panel doors

Timber quality: To BS EN 942.

Wood preservative treatment

Service life: Not less than 30 years.
External softwood doors and frames: Wood Protection Association (WPA) commodity specification C5.
External hardwood doors and frames: WPA commodity specification C10.

Adhesives for wood doors and frames

- Polyvinyl acetate (PVAC) to BS EN 204.

- Thermosetting resin to BS EN 12765, class C4.

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EXECUTION

Protection of components

General: Do not deliver to site components that cannot be installed immediately or placed in clean, dry, floored and covered storage.
Stored components: Stacked on level bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.

Protection of timber surfaces inaccessible after installation

Protective coating: Primed or sealed before fixing components.

Protection of metallic surfaces inaccessible after installation

Relevant conditions: External or damp (high humidity) internal.
Copper alloys: Avoid direct contact with aluminium, iron, steel or zinc (including galvanizing).
Aluminium alloys: Avoid direct contact with:

- Timber treated with copper, zinc or mercury based preservatives.
- Unseasoned oak, sweet chestnut, Douglas fir, western red cedar.
- Iron and steel unless galvanized.
- Copper, copper alloys and rainwater run off from these materials.
- Concrete, mortars, plasters or soil, especially when embedded.
- Paints containing copper or mercury based fungicides, graphite or lead.

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

- Timing: Before fixing components.
- Constraint: Only to surfaces not exposed on completion.

Building in

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

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

Fixing of wood frames

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

Fire resisting and/ or smoke control doors/ doorsets

Installation: In accordance with instructions supplied with the product conformity certificate, test report or engineering assessment.
Gaps between frames and supporting construction: Filled as necessary in accordance with requirements for certification and/ or door/ doorset manufacturer's instructions.

L40 GENERAL GLAZING

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Glass

Standards: To BS 952-1 and -2 and relevant parts of:

- BS EN 572 for basic soda lime silicate glass.
- BS EN 1096 for coated glass.
- BS EN 1748-1 for borosilicate glass.
- BS EN 1748-2 for ceramic glass.
- BS EN 1863 for heat strengthened soda lime silicate glass.
- BS EN 12150 for thermally toughened soda lime silicate safety glass.
- BS EN 12337 for chemically strengthened soda lime silicate glass.
- BS EN 13024 for thermally toughened borosilicate safety glass.
- BS EN ISO 12543 for laminated glass and laminated safety glass.

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

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

Heat soaking of thermally toughened glass

Heat soaking regime: Glass specified as 'heat soaked' to BS EN 14179-1 and -2 must be subjected to a heat soaking regime designed to reduce the incidence of failure due to nickel sulfide inclusions.

- Heat soaking period (minimum): Submit proposals.
- Mean glass temperature: 290°C ±10°C.

Certified evidence of treatment: Submit.

Impact resistance

Plastics: To BS 6206.
Glass: To BS EN 12600.

Fire resistance

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

Mirrors

General: Silvered to give maximum reflection, free from distortion, tarnishing, discoloration, scratches and other defects visible in the designed viewing conditions.
Standard: To BS EN 1036-2.
Fixing: To BS 6262-6, clause 8.3 for glass mirrors and clause 8.4 for plastic mirrors.

Glazing sealants

Type G to BS EN 11600.

Insulating glass units

CE marked to BS EN 1279-5.

EXECUTION

Workmanship

Glazing generally: To BS 6262-1, -2, -3, -4, -6 and -7.
Integrity: Glazing must be wind and watertight under all conditions with full allowance made for deflections and other movements.
Dimensional tolerances: Panes/ sheets to be within ±2 mm of specified dimensions.
Materials:

- Compatibility: Glass/ plastics, surround materials, sealers primers and paints/ clear finishes to be used together to be compatible. Avoid contact between glazing panes/ units and alkaline materials such as cement and lime.
- Protection: Keep materials dry until fixed. Protect insulating glass units and plastics glazing sheets from the sun and other heat sources.

Preparation:

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

Removal of glazing for reuse

Existing glass/ plastics and glazing compound, beads, etc: Remove carefully, avoiding damage to frame, to leave clean, smooth rebates free from obstructions and debris.
Deterioration of frame/ surround: Submit report on defects revealed by removal of glazing.

- Affected areas: Do not reglaze until instructed.

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

Bead fixing

With pins:

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

With screws:

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

Single glazing putty fronted

Glazing installation:

- Glass: Located centrally in surround using setting and location blocks, and secured with glazing sprigs/ cleats/ clips at 300 mm centres.
- Finished thickness of back bedding after inserting glazing (minimum): 1.5 mm.
- Front putty: Finished to a smooth, neat triangular profile stopping 2 mm short of sight line. Surface lightly brushed to seal putty to glass and left smooth with no brush marks.

Sealing putty: Seal as soon as sufficiently hard but not within 7 days of glazing. Within 28 days apply either the full final finish, suitably protected until completion and cleaned down and made good as necessary, or two coats of primer/ sealer applied locally to the compound, to be followed nearer completion with the full specified finish.
Opening lights: Keep in closed position until putty has set sufficiently to prevent displacement of glazing when opened.

Single glazing bead fixed with glazing compound

Glazing installation:

- Glass: Located centrally in surround using setting and location blocks and distance pieces.
- Finished thickness of back bedding after inserting glazing (minimum): 3 mm.
- Front bedding: Applied to fill voids.
- Beads: Bedded in glazing compound and fixed securely.
- Visible edge of glazing compound: Finished internally and externally with a smooth chamfer.

Single glazing bead fixed with tapes and capping sealant

Glazing installation:

- Glass: Located centrally in surround using setting and location blocks.
- Glazing tape: Top edge approximately 6 mm short of sight line on external side of glazing, to allow for capping sealant. Corners butt jointed with no gaps.
- Thickness of glazing tape bed (minimum): 3 mm on both sides of glazing after compression.
- Beads: Bedded in sealant, pressed firmly into position to compress tape, and fixed securely.
- Excess tape on internal side: Carefully trimmed to a smooth chamfer.
- Capping sealant: Applied to fill void between bead and glazing and finished to a smooth chamfer.

Single glazing bead fixed with extruded gaskets

Glazing installation:

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

Insulating glass units bead fixed with extruded gaskets

Glazing installation:

- Insulating unit: Located centrally in surround using setting and location blocks.
- Gaskets and beads: Installed as recommended by frame manufacturer.
- Gasket fit at corners: Tight, without gaps.
- Drainage and ventilation holes: Unobstructed.

Insulating glass units bead fixed with cellular adhesive sections

Glazing installation:

- Insulating unit: Located centrally in surround using setting and location blocks.
- Glazing sections/ strips/ tapes: Applied to rebate upstands and beads in positions recommended by manufacturer.
- Beads: Installed using sufficient pressure to compress inner and outer sections/ strips/ tapes and fixed securely.
- Drainage and ventilation holes: Unobstructed.

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Insulating glass units bead fixed with loadbearing tapes and sealant capping

Glazing installation:

- Insulating unit: Located centrally in surround using setting and location blocks.
- Glazing sections/ strips/ tapes: Applied to rebate upstands and beads finishing approximately 5 mm short of sight line to allow for capping sealant.
- Beads: Installed using sufficient pressure to compress inner and outer sections/ strips/ tapes and fixed securely.
- Capping sealant: Applied to both sides of glass unit and finish to a smooth chamfer.
- Drainage and ventilation holes: Unobstructed.

Insulating glass units bead fixed with solid bedding

Glazing installation:

- Insulating unit: Located centrally in surround using setting and location blocks and distance pieces.
- Inner sealant: Applied to full height of rebate.
- Outer sealant: Applied to fill edge clearance void and space between unit and beads up to sight line.
- Finished thickness of back and front bedding after inserting glazing (minimum): 3 mm.
- Beads: Bedded on outer sealant and fixed securely.
- Excess sealant: Trimmed to a smooth chamfer.

Single glazing into grooves with sealant capping

Glazing installation:

- Glass: Located centrally in grooves using setting blocks and distance pieces of appropriate thickness.
- Backing strip: Expanded polyethylene, inserted at head and jambs, ensuring a tight fit and allowing a minimum distance of 6 mm between strip and sight line.
- Sill beads: Fixed securely with backing strip between bead and glazing.
- Capping sealant: Applied to fill recesses on both sides of glass and finished to a smooth chamfer.

Internal tape glazing

Glazing installation: Beads bedded dry to rebate and glazing tape/ section and fixed securely. Tape trimmed flush with sight line on both sides.

Mirrors

Installation: Fixed accurately and securely without overtightening fasteners, to provide a flat surface giving a distortion free reflection.

Window film

Application: Carried out by a firm approved by the film manufacturer in accordance with manufacturer's recommendations.

- Evidence of applicator's competence and experience: Submit on request.
- Sample area: Complete as part of the finished work, in an approved location and obtain approval of appearance before proceeding.
- Ambient air temperature at time of application: Above 5°C.

Installed film: Fully adhered to the glass with no peeling, and free from bubbles, wrinkles, cracks or tears.

- Further contact with applied films: Avoid until bonding adhesive has cured.
- Cleaning and maintenance instructions: Submit copies.

Manifestation

Factory application: Acid etching or engraving to be carried out by the glass manufacturer or by a firm approved in accordance with manufacturer's recommendations.
Site application: Adhesive film or transfers to be applied by a firm approved by film manufacturer and in accordance with manufacturer's recommendations.

- Sample area: Complete as part of the finished work, in an approved location, and obtain approval of appearance before proceeding.
- Ambient air temperature at time of film/ transfer application: Above 5°C.

Installed film: Fully adhered to the glass with no peeling, and free from bubbles, wrinkles, cracks or tears.

- Further contact with applied films: Avoid until bonding adhesive has cured.
- Cleaning and maintenance instructions: Submit.

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.

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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.

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N10 GENERAL FIXTURES FURNISHINGS AND EQUIPMENT

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Purpose made furniture

Adhesives – non loadbearing: To BS EN 204.
Adhesives – loadbearing: To BS EN 301.
Medium density fibreboard (MDF): To BS EN 622-5.
Particleboard: To BS EN 312.
Plywood: Manufactured to a national standard and equal to or exceeding the requirements of the relevant British Standard.

- Bonding quality: To BS EN 314-2.
- Appearance class: To BS EN 635-1, -2, -3 and -5.

Timber: To BS EN 942.

Educational furniture

Functional dimensions: To BS EN 1729-1.
Safety requirements: To BS EN 1729-2.

Laboratory work benches

Dimensions and safety requirements: To BS EN 13150.

Freestanding office screens

Dimensions: To BS EN 1023-1.
Performance: To BS EN 1023-2.

Office storage furniture

Safety requirements: To BS EN 14073-2.

Office tables and desks

Dimensions: To BS EN 527-1.
Performance: To BS EN 527-2.

Non domestic seating

Strength, durability and safety: To BS EN 16139.

Whiteboards

Surface: To BS EN 438-1.

Lockers

Standard: To BS 4680.

Curtains

General requirements: To BS 5867-1.
Flammability requirements: To BS 5867-2.

Open fireplace components

Standard: To BS 1251.

EXECUTION

Moisture content of wood and wood based boards

Temperature and humidity: Maintain conditions to suit specified moisture content of wood components during delivery, storage, fixing and to handover.
Testing: When instructed, test components with approved moisture meter to manufacturer's recommendations.

Installation generally

Fixings and fasteners: As reference specification section Z20.

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.

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.

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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.

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N15 SIGNS AND NOTICES

GENERAL

Cross-reference

General: Read with A90 General technical requirements.
Fasteners/ Adhesives: As section Z20.

PRODUCTS

Safety signs

Safety signs generally: To BS ISO 3864-1.
Photoluminescent safety signs: To Photoluminescent Safety Products Association Standard 002 Part 1.

Public information signs

Graphic symbols: To BS 8501.

Tactile signs for the visually impaired

Corners of rectangular rigid signs: Radiused.
Surface: Nonreflective with maximum gloss factor of 15% when tested to BS 2782-5 or BS EN ISO 2813.
Characters: Embossed between 1 and 1.5 mm with a stroke width that allows both sides of the character to be felt with the fingers at a single pass.
Braille: English Standard located 6 mm below bottom of text with braille locator at left edge of sign.

Metal posts for signs

Hot rolled steel: To BS EN 10210-2.

EXECUTION

Fixing signs generally

Fixing signs: Secure, plumb and level, using fixing methods recommended by manufacturer.
Strength of fasteners: Sufficient to support all live and dead loads.
Fasteners for external signs: Corrosion resistant material or with a corrosion resistant finish. Isolate dissimilar metals to avoid electrolytic corrosion.
Fixings showing on surface of sign: Must not detract from the message being displayed.

Concrete foundations for sign posts

Mix: To BS EN 206-1 and BS 8500-2, Designated concrete not weaker than GEN 1 or Standardized prescribed concrete not less than ST2.
Alternative mix for small quantities: 50 kg Portland cement, class 42.5, to 100 kg fine aggregate to 180 kg 20 mm nominal maximum size coarse aggregate, medium workability.
Admixtures: Submit proposals.

- Prohibited content: Calcium chloride.

Blinding to post holes: 50 mm concrete.
Installation of posts: Plumb and central in holes.
Concrete fill: Fully compacted with concrete to not less than 150 mm below ground level.
Duration of support to posts after placing concrete: Not less than three days.
Backfilling: Not less than 48 hours after placing concrete.

N25 PERMANENT ACCESS AND SAFETY EQUIPMENT

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Fasteners, inserts and bolts for building in

Supplier: Equipment manufacturer/ supplier.

Mechanical fixings

Materials: Unless otherwise recommended by equipment manufacturer:

- Connecting bolts and other fixings fully accessible for inspection: Carbon steel hot dip galvanized to BS 7371-6.
- Nuts: Tapped after galvanizing.
- Cast-in anchors and other fixings not accessible for routine inspection: Austenitic stainless steel, grade 1.4401 (316) to BS EN 10088-1.

Single point anchorage devices

Standard: To BS EN 795.

EXECUTION

Single point anchorage device

Installation: To BS 7883.
Provide with each anchor:

- A backing disc giving the manufacturer's name and telephone number and the date of installation.
- A certificate of compliance with testing and examination requirements of BS EN 365.

Safety

General: The equipment as installed must have no irregularities/ projections capable of inflicting personal injury.
Finished surfaces and edges of all accessible parts: Regular and smooth.

Maintenance programme

Schedule for maintenance and for replacement of components: Submit.

Fabrication and assembly generally

Machine cutting, drilling and assembly: Carry out as much as possible in the workshop. Obtain approval for any reassembly on site.
Dissimilar metal surfaces of assembly components/ supports/ fixings: Isolate to prevent electrolytic corrosion.

Protection

General: Do not deliver to site any components or assemblies that cannot be installed immediately or unloaded into a suitable well protected storage area.

Execution generally

Structural members: Do not modify, cut notch or make holes in structural members without permission.
Frameworks: Assemble and brace, including temporary members required for installation.

- Temporary support: Do not use access systems as temporary support or strutting for other work.

Bolted joints:

- Contact between dissimilar metals: Avoid.
- Bolts and washers: Select types, sizes and quantities of fasteners or packings and spacings to retain supported components without distortion or loss of support.

Welded joints: Comply with latest edition of National Structural Steelwork Specification (NSSS), Section 5.
Finished components: Smooth, free from distortion, cracks, burrs and sharp arrises.

Fixings for securing equipment

Adjustment capability: Adequate three dimensional adjustment to accommodate building structure/ fabric irregularities.

Fixing anchor installation

Site drilling or cutting into structure/ fabric: Permitted only in approved locations.
Distance between all fixing devices and edges of supporting material: Not less than recommended by fixing manufacturer.

Marking of anchor devices

Provision: Provide on or near each anchor device a label or other clear marking giving:

- Manufacturer's name and telephone number.
- Serial number and year of manufacture of device.

- Maximum number of personnel that may be attached to the device at any one time.
- Requirements for energy absorbers, ground clearance, etc.

Anchor devices intended solely for use with personal protective equipment: Indicate restriction of use by pictogram or other suitable marking on or near the device.

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Operating instructions

Equipment and accessories: Where appropriate, mark in such a way that it is possible to identify the correct mode of operation for their safe use.

Operating and maintenance manual

General: Provide, for inclusion in the Building Manual, printed instructions and recommended procedures to be established by the Employer for operating and routinely maintaining the equipment. Provide diagrams where appropriate.
Content:

- Instructions for assembling/ erecting equipment for use.
- Comprehensive operating instructions, including safety and emergency procedures.
- Servicing and planned maintenance procedures.
- List of replacement parts, with references.
- Recommended procedures for testing equipment.

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N91 EXTERNAL SIGNAGE AND INTERPRETATION

GENERAL

Cross-reference

General: Read with A90 General technical requirements.
Fasteners/ Adhesives: As section Z20.
Internal signage: As section N15.

PRODUCTS

Signs generally

Standard: To BS 559.
Geometric shapes, colours and layout: In accordance with BS 8501 and ISO 7001.
Wind loads: To BS EN 1991-1-4.

Road traffic signs

Standard: To BS EN 12899-1.
Geometric shapes, colours and layout: In accordance with DFT 'Traffic Signs Manual'.
Wind loads: To BS EN 1991-1-4 or BS EN 12899-1, Table NA.2.

Graphic symbols

Public information signage systems: To BS 8501.
Safety signage systems: To BS EN ISO 7010 and BS ISO 20712-1.

Inclusive signage systems

Corners of rectangular rigid signs: Radiused.
Surface: Nonreflective with maximum gloss factor of 15% when tested to BS 2782-5 or BS EN ISO 2813.
Characters: Embossed 1–1.5 mm with a stroke width that allows both sides of the character to be felt with the fingers at a single pass.
Braille: English Standard, located 6 mm below bottom of text with Braille locator at left edge of sign.

Metal posts for signs

Hot rolled steel: To BS EN 10210-2, grade S275J0.

Fasteners for external signs

Material: Corrosion resistant material or with a corrosion resistant finish. Isolate dissimilar materials to avoid electrolytic corrosion.
Strength of fasteners: Sufficient to support all live and dead loads.
Safety of users:

- Sharp edges or protrusions that would cause injury to users: Not permitted.
- Fasteners for tactile/ Braille signs: Avoid protruding caps/ heads that would cause confusion to users.

Concrete to post holes

Standard: To BS 8500-2.
Concrete: Designated, not less than GEN1 or standardized prescribed concrete not less than ST2.

- Alternative mix for small quantities: 50 kg Portland cement, class 42.5 to 150 kg fine aggregate to 250 kg 20 mm nominal maximum size coarse aggregate, medium workability.
- Admixtures: Not permitted.

EXECUTION

Fixing signs generally

Fixing signs: Secure, plumb and level, using fixing methods recommended by manufacturer.
Strength of fasteners: Sufficient to support all live and dead loads.
Fasteners for external signs: Corrosion resistant material or with a corrosion resistant finish. Isolate dissimilar metals to avoid electrolytic corrosion.
Fixings showing on surface of sign: Must not detract from the message being displayed.

Fixing road traffic signs

Evaluation of conformity: To BS EN 12899-1, section 10.
Protrusion of post top above sign: Not permitted unless supporting a luminaire.
Plastics sheeting: Apply clear lacquer recommended by plastics sheet manufacturer to edges of holes to prevent ingress of moisture damaging the lamination.
Erection: In accordance with the DFT 'Traffic signs manual,' Chapter 1.
Fixing: Austenitic stainless steel fasteners recommended for the purpose by the sign manufacturer.
Graphic symbols: To BS 8501 and BS EN ISO 7010.

Concrete foundations for posts

Blinding to post holes: 50 mm concrete.
Installation of posts: Plumb and central in holes.
Concrete fill: Fully compacted with concrete to not less than 150 mm below ground level.
Duration of support to posts after placing concrete: Not less than three days.
Backfilling: Not less than 48 hours after placing concrete.

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P10 SUNDRY INSULATION AND PROOFING WORK

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Insulation

Blown mineral fibre loft insulation: To BS 5803-2.
Blown cellulose fibre loft insulation: To BS 5803-3.
Blown loose-fill mineral wool: To BS EN 14064-1.
Sprayed rigid polyurethane (PUR) and polyisocyanurate (PIR) foam products: To BS EN 14315-1.
Mineral wool insulation boards, batts, rolls and slabs (MW): To BS EN 13162.
Expanded polystyrene insulation boards (EPS): To BS EN 13163.
Extruded polystyrene insulation boards (XPS): To BS EN 13164.
Polyurethane insulation boards (PUR): To BS EN 13165.
Cellulose fibre insulation blown between studs: To BS EN 13171.
Flexible sheets for waterproofing (breather membrane/ VPU): BS EN 13859-1 (roofs); BS EN 13859-2 (walls).

EXECUTION

Eaves roof ventilators for existing roofs

Eaves free air space: Not less than required by Building Regulations guidance for ventilation of roof space.

Insulation batts or quilt laid between ceiling ties/ joists

Installation requirements:

- Joints: Butted, no gaps.
- Extent of insulation: Over wall plates.
- Service holes: Sealed, and debris removed before laying insulation.
- Eaves ventilation: Unobstructed.
- Electric cables overlaid by insulation: Sized accordingly.
- Water cistern platforms on ceiling joists: Insulation below omitted.

Mineral wool installation: To BS 5803-5.

Insulation batts or quilt laid across ceiling ties/ joists

Installation requirements:

- Insulation widths: Widest practical.
- Laid direction: At right angles to ties/ joists.
- Joints: Butted, no gaps.
- Insulation: Fitted around rafter ends and extended over wall plates.
- Service holes: Sealed, and debris removed before laying insulation.
- Eaves ventilation: Unobstructed.
- Electric cables overlaid by insulation: Sized accordingly.
- Water cistern platforms on ceiling joists: Insulation below omitted.

Mineral wool installation: To BS 5803-5.

Insulation boards or batts fitted between rafters

Installation requirements:

- Joints: Butted, no gaps.
- Fasteners: Used where necessary to retain insulation and/ or prevent slumping.
- Eaves ventilation where required: Unobstructed.
- Air space above insulation where required: Unrestricted.

Faced mineral wool insulation fitted between rafters

Installation requirements:

- Fixing: Secure, with facing on warm side, staple flanges at 300 mm centres to underside of rafters.
- Joints: Closely butted, no gaps. Seal at ends of lengths with adhesive tape.
- Eaves ventilation where required: Unobstructed.
- Air space above insulation where required: Unrestricted.

Polyurethane foam sprayed between rafters
Installation: In accordance with Agrément Certificate.

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Blown loft insulation
Testing of installed product: In accordance with BS 5803-2.
- Installer: Trained by the insulation manufacturer, British Board of Agrément (BBA) approved installer or National Insulation Association (NIA) registered installer.

Installation requirements:
- Service holes: Sealed, and debris removed before laying insulation.
- Eaves ventilation: Unobstructed.
- Electric cables overlaid by insulation: Sized accordingly.
- Water cistern platforms on ceiling joists: Insulation below omitted.

Loose laid loft insulation
Installation requirements:
- Insulation: Level, covering all parts of the ceiling.
- Service holes: Sealed, and debris removed before laying insulation.
- Eaves ventilation: Unobstructed.
- Electric cables overlaid by insulation: Sized accordingly.
- Water cistern platforms on ceiling joists: Insulation below omitted.

Insulation to loft access hatch
Installation: Cut to fit with no gaps and securely fixed.
Edges of hatch: Sealed with an approved compressible draught excluder.

Insulation to existing water cistern
Mineral wool products: Installation in accordance with BS 5803-5.
Cistern position: At ceiling level directly over joists:
- Sides and top of cistern: Covered with insulation.
- Continuity: Continuous with loft insulation, no gaps.

Cistern position: At high level:
- Sides, top and bottom of cistern: Covered with insulation.
- Continuity: No gaps.

Fixing: Securely to prevent slumping/ displacement but without undue compression.
Insulation to lid: Extended over side insulation and removable with lid.

Cellulose fibre insulation blown between wall studs
Installation requirements:
- Openings for hose: Submit proposals of locations.
- Service holes: Sealed, and debris removed before commencing insulation.
- Electric cables overlaid by insulation: Sized accordingly.

Insulation sprayed between wall studs
Application: In accordance with Agrément Certificate.
Installation requirements:
- Service holes: Sealed, and debris removed before commencing insulation.
- Electric cables overlaid by insulation: Sized accordingly.
- Residual material: Removed before fixing wall lining.

Insulation boards or batts fitted between studs
Installation requirements:
- Fixing: Secure, friction fitted between studs.
- Joints: Closely butted, no gaps.
- Fasteners: Used to prevent slumping/ displacement.

Faced mineral wool insulation fitted between studs
Installation requirements:
- Fixing: Secure, with facing on warm side, flanges stapled at 300 mm centres to face of studs.
- Joints: Closely butted, no gaps. Ends of lengths sealed with adhesive tape.

Mineral wool insulation fixed to backing wall
Installation requirements:
- Joints: Closely butted, no gaps.

- Cladding supports: Fitted tightly between and around.

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Unfaced mineral wool insulation suspended vertically in timber frame separating wall
Installation requirements:
- Joints: Closely butted, no gaps.
- Head fixing: Staples or large head nails.

Unfaced mineral wool insulation fitted between studs in timber frame separating wall
Installation requirements:
- Fixing: Fit tightly with joints closely butted, no gaps.
- Fasteners: Used to prevent slumping/ displacement.

Mineral wool insulation laid between floor joists
Installation requirements:
- Joints: Closely butted, no gaps.
- Service holes: Sealed, and debris removed before laying insulation.
- Electric cables overlaid by insulation: Sized accordingly.

Mineral wool insulation supported between suspended ground floor joists
Installation requirements:
- Support: 20–25 mm square mesh polyethylene net draped over joists and stapled to sides of joists.
- Insulation: Laid on net between joists, no space between top surface and underside of flooring.

Air and vapour control layer
Fixing to timber studs, joists or framing:
- Moisture content of timber: 20% (maximum).
- Method of fixing: Staples at maximum 250 mm centres along all supports. No sagging.

Fixing to metal framing: Double sided sealant tape. Prime substrate as necessary.
Fixing to concrete/ masonry: Prime and apply adhesive recommended by membrane manufacturer.
Installation requirements:
- Setting out: Continuous, minimum joints, no sagging.
- Lapped joints: 150 mm (minimum), at supports only.
- Openings: Lap over and fix to reveals.
- Joints and edges: Sealed using double sided tape with vapour resistivity not less than the vapour control layer.
- Penetrations: Sealed.

Breather membrane
Installation requirements:
- Setting out: Continuous. Form a barrier preventing water, snow and wind blown dust reaching the substrate.
- Lapped joints: As manufacturer's instructions for application and location.
- Taping: As manufacturer's instructions for application and location.
- Openings: Lap over and fix to reveals.
- Bottom edges: Lapped over flashings, sills, etc. to allow free drainage to the exterior.
- Penetrations: Sealed.

Flexible cavity barrier
Installation requirements:
- Spacing: Subdivide void into areas to comply with Building Regulation guidance requirements.
- Fixing: Secure, with no gaps, to provide a complete barrier to smoke and flame.
- Wired cavity barriers: Butted and stapled at 150 mm (maximum) centres, fold if necessary to ensure a tight fit.

Sleeved Mineral wool small cavity barrier
Installation requirements:
- Fasteners: Staples at 150 mm (maximum) centres.
- Intumescent facing: Positioned facing cavity, maximum 50 mm from rear of cladding.
- Vertical barriers: Fixed by both flanges.
- Horizontal barriers: Fixed by upper flange only.
- Joints and intersections: closely butted, with barriers compressed along full length to give complete seal.

Mineral wool slab cavity barrier

Installation requirements: Continuous, with minimum joints.

Ventilated cavity barrier

Installation requirements: Continuous, with minimum joints.

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P12 FIRE STOPPING SYSTEMS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Insulation board

Mineral wool rigid batts: To BS EN 13162.

Silicone Sealants

Fire Resisting Silicone Sealants: To BS 476-20 and BS 476-22.
Sealing around service installations (linear joints): To BS EN 1366-4.

EXECUTION

Workmanship generally

Gaps: Seal gaps between building elements and services, to provide fire resistance and resist the passage of smoke.
Adjacent surfaces: Prevent overrun of sealant or mortar onto finished surfaces.

Intumescent foam

New joints: Remove builder's debris, mortar droppings, grease, and the like.
Old joints: Clean and remove existing sealant from the joint.
Priming: Lightly moisten substrate with water.
Application: Fill joint to approximately half its depth, allowing foam to expand to face of joint.
Trimming: Do not trim or cut the face of the cured foam.

Intumescent mortar

Sequence: Install mortar after services are permanently installed.
Loose dust and combustible materials: Remove from the opening.
Shuttering: Install suitable shuttering panels to the faces of the opening.
Temperature: Do not apply mortar when it could be damaged by frost.
Mortar cure: Do not disturb mortar before final set has taken place.
Shuttering: Remove after mortar has cured.

Batts

Installing batts: Fit tight into void between the floor or wall and the penetrating services.
Face of batts: Flush with the surface of wall, floor or soffit.
Gaps between services and batts: Seal with fire resisting sealant.

Pipe collars

Integrity: Fit tightly and accurately to structure and pipe. Fill gaps between collar and structure and/or pipe with intumescent material.
Fixings: Plastics free.
Clearance around service pipe: Minimum possible, pipe in contact with sleeve.
Installation: Bed solid.
Exposed to view: Finish bedding and sealing neatly.

COMPLETION

Cleaning

Masking tapes: Remove.
Cleaning: Clean off splashes and droppings. Wipe down finishes.

P20 UNFRAMED ISOLATED TRIMS SKIRTINGS AND SUNDRY ITEMS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Wood architraves, skirtings, window boards and trims

Quality of wood and fixing: To BS 1186-3.
Moisture content at time of fixing: To BS EN 942.

- Exterior trim: 12–19%.
- Interior trim to continuously heated rooms, temperatures of 12–19ºC: 9–13%.
- Interior trim to continuously heated rooms, temperatures of 20–24ºC: 6–10%.

Sheet materials

Fibreboards:

- Hardboard: To BS EN 622-2.
- Medium board: To BS EN 622-3.
- Dry processed boards (Medium density fibre board): To BS EN 622-5.

Particleboards: To BS EN 312.
Plywood:

- Appearance class, hardwood: To BS EN 635-2.
- Appearance class, softwood: To BS EN 635-3.
- Bond quality: To BS EN 314-2.

Plastics veneered board: To BS 4965.

- Durability class: D2.
- Laminate grade: VG.

EXECUTION

Installation

Straight runs: Form in single lengths wherever possible.
Location and method of forming running joints: Submit proposals.
Joints at angles: Mitre, unless shown otherwise.
Position and level of trims: Submit proposals.

P21 DOOR AND WINDOW IRONMONGERY

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Third party certification

Submission: Submit evidence of successful testing by third party certification body accredited by UKAS or equivalent.

Ironmongery selected by contractor

Source: Single co-ordinated range. Submit details of selected range, manufacturer and/ or supplier, relevant third party certification, and CE Declarations of performance (DoP) for CE marked products.

Samples

Timing: Before placing orders with suppliers obtain list of required samples from Contract Administrator.
Submission: Submit labelled examples of required samples with technical data including third party certification and CE mark DoPs where relevant.
Conformity: Retain samples on site for the duration of the contract. Ensure conformity of ironmongery as delivered with labelled samples and any DoP.

Ironmongery for fire doors

Relevant products: Ironmongery fixed to, or morticed into, the component parts of a fire resisting door assembly.
Compliance: Ironmongery included in successful tests to BS 476-22 or BS EN 1634-1 on door assemblies similar to those proposed, third party certified.
Melting point of components (except decorative non functional parts): 800°C (minimum).

Door bolts

Standard: To BS EN 12051.

Door closing devices (controlled)

Overhead closers and floor springs: To BS EN 1154.

Door coordinators

Standard: To BS EN 1158.

Door hinges

Single axis door hinges: To BS EN 1935.

Door latches

General: To BS EN 12209.

Door lever handles and knobsets

Standard: To BS EN 1906.

Door locks – Mechanically operated

General: To BS EN 12209.

- Single point locking:
- Thief resistant keyed egress: To BS 3621, third party certified, or, for retrofit, three star rated to DHF Technical specification TS 007, third party certified.
- Thief resistant keyless egress: To BS 8621, third party certified.
- Thief resistant dual mode egress: To BS 10621, third party certified.

Multipoint locking:

- Keyed egress: To PAS 3621, third party certified.
- Keyless egress: To PAS 8621, third party certified.
- Dual mode egress: To PAS 10621, third party certified.

Door locks – Electromagnetic

Thief resistant: In accordance with DHF Technical specification TS 621.

Door track and running gear

Standard: To BS EN 1527.

Electromagnetic hold open devices

Standard: To BS 5839 or to BS EN 1155.

Electromagnetic hold open/ swing-free devices

Standard: To BS EN 1155.

Emergency/ Panic exit devices
Emergency exit devices: To BS EN 179.
Panic exit devices: To BS EN 1125.

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Letter plates
Standard: To BS EN 13724, and in accordance with DHF Technical specification TS 008.

Padlocks
Standard: To BS EN 12320.

Pull handles
Standard: To BS 8424.

Window hinges
Single axis hinges to access windows (window doors): To BS EN 1935.

EXECUTION

Overhead door closers
Operational adjustment:

- Variable power: Matched to size, weight and location of doors.
- Latched doors: Override latches and/ or door seals when fitted.
- Unlatched doors: Hold shut under normal working conditions.
- Closing against smoke seals of fire doors: Positive. No gaps.

Floor springs
Operational adjustment:

- Variable power: Matched to size, weight and location of doors.
- Latched doors: Override latches and/ or door seals when fitted.
- Unlatched doors: Hold shut under normal working conditions.
- Closing against smoke seals of fire doors: Positive. No gaps.

Electromagnetic hold open/ swing-free devices
Means of release: Alarm system and/ or failure of power supply.
Test switch: Located in a convenient position adjacent to door.
Operational adjustment for devices with integral closer:

- Variable power: Matched to size, weight and location of doors.
- Latched doors: Override latches and/ or door seals when fitted.
- Unlatched doors: Hold shut under normal working conditions.

Door coordinators
Application: To all single swing double doors with rebated meeting stiles and fitted with self closers.

Uncontrolled door closers
Operation:

- Power: To suit the size and weight of doors to which they are fitted.
- Unlatched doors: Hold closed under normal conditions.

P30 TRENCHES, PIPEWAYS AND PITS FOR BURIED ENGINEERING SERVICES

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Access covers and frames

Standard: To BS EN 124.

Proprietary access and inspection chambers

Standard: To BS EN 13598-1.

Perforated gas collection pipework

Vitrified clay: To BS EN 295-5, Kitemark certified, perforated, strength FN22, with flexible mechanical joints.

Pipeducts

Material:

- Vitrified clay: To BS 65.
- PVC-U: To BS EN 1401-1, class SN4, Kitemark certified.
- Twin wall HDPE: To BS EN 61386-24 or Agrément certified.

Small surface access boxes

Standard: To BS 5834-2.

- Pipeguard: Cut from 110 mm outside diameter PVC-U pipe to BS EN 1401-1, class SN4.

Large surface access boxes

Standard: To BS 750 (2006), BS 5834-2, or BS EN 124, subject to requirements of service undertaker, highway authority or fire brigade as appropriate.

Granular material for bedding or surrounds

Standard: To BS EN 12620.

- Size: 4/10.

Drawlines

Material: To the requirements of service undertakers.

Warning marker tapes

Standard: To BS EN 12613.
Type: Continuous colour coded, heavy gauge polyethylene identification tapes.

EXECUTION

Routes of services below ground

Locations of new service runs and pipeducts:

- Temporary marking: Indicate new service runs and pipeducts with 75 x 75 mm softwood posts painted white and projecting not less than 600 mm above ground level, or with clearly visible waterproof markings on hard surfaces.

Excavation for services in public roads and pavings

Excavation and backfilling:

- England, Wales and Scotland: To Department for Transport (DfT) New roads and street works act 1991: Specification for the reinstatement of openings in highways: code of practice'.
- Northern Ireland: To Northern Ireland Road Authority and Utilities Committee (NIRAUC) 'Specification for the reinstatement of openings in roads'.

Service trenches

Trench width: As small as practicable.
Trench bottoms: Remove mud, rock projections, boulders and hard spots. Trim level.
Give notice: To inspect trench for each section of the work.

Tree roots in service trenches

Protected area: The larger of the branch spread of the tree or an area with a radius of half the tree's height, measured from the trunk.
Roots in protected area: Do not cut.
Roots exceeding 25 mm diameter (all areas): Give notice and do not cut without permission.
Cutting:

- Use a hand saw to make clean smooth cuts.
- Minimise wound area and ragged edges.
- Pare cut surfaces smooth with a sharp knife.

Unintentionally severed roots: Give notice and form a new clean cut slightly nearer the trunk.
Backfilling to trenches containing intact or cut tree roots: Topsoil, well watered.

Laying pipeducts

General: Lay straight to line, true to gradient or level on an even continuous bed.
Clearance between pipeducts where they cross: 50 mm (minimum).
Drawlines: Thread through pipeducts. Leave in place for future pulling through of services.
Seal: Ends of pipeducts terminating inside buildings.

- Material: Mortar.

Protection: Protect from ingress of debris. During construction, temporarily seal all exposed ends.

Pipeduct bedding and surround – selected as-dug material

Location: General use.
As-dug bed: Trimmed by hand, level or to accurate gradient. Replace overdig with compacted spoil.
Bedding: Selected as-dug material thoroughly compacted by hand in 150 mm (maximum) layers.

- Thickness: 150 mm (minimum).

Surround: Selected as-dug material. Lay and compact to 150 mm (minimum) above pipeduct crown.

Pipeduct bedding and surround – granular material

Location: Where specified.
Bedding: Granular material thoroughly compacted by hand in 150 mm (maximum) layers.

- Thickness: 100 mm (minimum).

Surround: Granular material. Lay and compact to 150 mm (minimum) above pipeduct crown.

Pipeduct structural/ protective surround – concrete

Location: Close to buildings (where structural stability may be affected by the trench, or where a pipeduct needs protection).
Concrete blinding: 25 mm thick over full width of trench. Allow to set.
Pipeducts:

- Temporary support: Folding wedges of compressible board. Prevent flotation.
- Height above blinding: 100 mm (minimum).

Surround, to full width of trench:

- Depth: To 150 mm above crown of pipeduct or as shown on drawings.
- Vertical construction joints: At face of flexible pipeduct joints using 18 mm thick compressible board pre-cut to pipeduct profile.

Concrete surround for shallow pipeducts under buildings

Locations: Where pipeduct crowns are less than 300 mm below underside of slab.
Timing: Excavate trench after hardcore has been laid and compacted.
Concrete blinding: 25 mm thick over full width of trench. Allow to set.
Pipeducts:

- Temporary support: Folding wedges of compressible board. Prevent flotation.
- Height above blinding: 100 mm (minimum).

Surround: Cast integral with slab. Extend surround to within 150 mm of nearest flexible joint.

Installing proprietary access and inspection chambers and surface boxes

Setting out relative to adjacent construction features: Square and tightly jointed.
Permissible deviation in level of external covers and gratings: +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 traffic.

Bedding of frames for access covers and surface boxes

Bedding: Solidly in mortar, centrally over opening and level with surrounding finishes.

- In road or pavement finishes: Flush, and square with block or slab joints.
- In grassed areas: Set 30 mm below soil surface. Haunch back edge of bedding so that it is not visible.

Backfilling generally
Backfill from top of pipeduct surround: Material excavated from the trench.
Backfilling: Lay and compact in 300 mm (maximum) layers. Do not use heavy compactors before backfill is 600 mm deep.

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Backfilling under new roads and pavings
Backfill from top of pipeduct surround: Granular sub-base material to Highways Agency Specification for highway works, clause 803 (Type 1).
Backfilling: Lay and compact in 150 mm (maximum) layers.

Warning marker boards, tapes and tiles
Installation: During backfilling.
Depth: Continuously, 200–300 mm above service pipe or cable or to requirements of service undertaker if different.

- Pipelines deeper than 2 m: Lay additional marker 600 mm above the top of the pipeline or to requirements of service undertaker if different.

Additional requirements for water and gas mains
Anchor blocks: Provide at all bends, tapers, cap ends and junctions.

Service testing
Timing: Where services require testing undertake tests before backfilling.

Documentation
Record drawings: Submit.

Perforated or slotted gas collection piping
Position: Lay just below floor slab in venting hardcore layer.

Brick radon sumps
Construction: Rectangular chamber. Lay perforated bricks on edge in honeycomb bond with mortar in bed joints only. Cap with paving slab. Enclose and seal end of vent pipe within sump.
Position: Centrally below ground floor slab, 15 m maximum from farthest point of area served.

- Area served (maximum): 250 m².

Plastics radon sumps
Position: Centrally below ground floor slab, 15 m maximum from farthest point of area served.

- Area served (maximum): 250 m².

P31 HOLES, CHASES, 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.

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COMPLETION

Meter cabinets

Keys: At completion, hand over to Employer.

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Q10 KERBS, EDGINGS, CHANNELS AND PAVING ACCESSORIES

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Precast concrete kerbs, edgings and channels

Standard: To BS EN 1340.

Drainage channel systems with gratings

Loading grade standard: To BS EN 124.

Concrete for foundations and haunching

Standard: To BS 8500-2.

Steel bar dowels for haunching

Standard: To BS 4482.

Mortar for bedding and jointing

Portland cement: To BS EN 197-1 CEM I 42.5 N.
Sand: To BS EN 12620, Grade 0/4 or 0/2 (MP).

EXECUTION

Laying kerbs, edgings and channels

Cutting: Neat, accurate and without spalling. Form neat junctions.

- Long units (450 mm and over) minimum length after cutting: 300 mm.
- Short units minimum length after cutting: The lower of one third of their original length or 50 mm.

Bedding: Position true to line and level along top and front faces, in a mortar bed on accurately cast foundations.
Securing: After bedding has set, secure with a continuous haunching of concrete.

Haunching dowels

Size: 12 mm diameter, 150 mm long.
Installation: While concrete is plastic, insert dowels vertically into foundation.

- Centres: 450 mm.
- Distance from back face of kerb: 50 mm.
- Projection: 75 mm.

Haunching: Rectangular cross section, cast against formwork, fully enclosing and protecting dowels.

Channels

Installation: Lay to an even gradient. Avoid ponding and backfall.
Lowest points of channels: 6 mm above drainage outlets.

Drainage channel systems

Installation:

- Constant depth channels: Lay to an even gradient. Avoid ponding and backfall. Commence laying from outlets.
- Channel systems with a built in fall: Lay with top of channels level, installed in correct sequence to form an even gradient without ponding or backfall. Commence laying from outlets.

Silt and debris: Immediately before handover, remove from entire system.
Washing and detritus: Safely dispose without discharging into sewers or watercourses.

Accuracy

Deviations (maximum):

- Level: ± 6 mm.
- Horizontal and vertical alignment: 3 mm in 3 m.

Mortar joints

Jointing: As laying proceeds, butter ends of units with bedding mortar. Completely fill joints.

- Narrow mortar joints: Tightly butt. Clean off surplus mortar immediately.
- Tooled mortar joints: Tool to a neat flush profile.

Road marking

Standard: To Road Safety Markings Association (RSMA) StanSpec 2003: Standard specification document for road marking and road studs incorporating European standards BS EN 1436, BS EN 1824 and BS EN 1871.

Q20 GRANULAR SUB-BASES TO PAVINGS

GENERAL

Cross-reference

General: Read with A90 General Technical requirements.

PRODUCTS

Granular material

Quality: Free from excessive dust, well graded, all pieces less than 75 mm in any direction, minimum 10% fines value of 50 kN when tested in a soaked condition to BS 812-111.
In any one layer only one of the following groups:

- Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.
- Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
- Crushed non-expansive slag.
- Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.
- Well-burned non-plastic colliery shale.
- Natural gravel.
- Natural sand.

Highways Agency material

Standard: Highways Agency 'Specification for highway works'.

- Type 1 material: To HA specification clause 803.5.
- Type 2 material: To HA specification clause 804.6.

Non frost susceptible material

Definition (non frost susceptible material): To Highways Agency 'Specification for highway works' clause 705.5.

EXECUTION

Excavation of subgrades

Final excavation to formation/ sub-formation level: Carry out immediately before compaction of subgrade.
Soft spots and voids: Give notice.
Wet conditions: Do not excavate or compact when the subgrade may be damaged or destabilised.

Installation of sub-base filter sheets

Protect from:

- Exposure to light, except during laying (maximum five hours).
- Contaminants.
- Materials listed as potentially deleterious by membrane manufacturer.
- Damage, until fully covered by fill.
- Wind uplift, by laying not more than 15 m before covering with fill.

Preparation: Remove humps and sharp projections and fill hollows before laying.

Preparation/ compaction of subgrades

Timing: Immediately before placing sub-base.
Soft or damaged areas: Excavate and replace with sub-base material, compacted in layers 300 mm (maximum) thick.
Compaction: Thoroughly, by roller or other suitable means, adequate to resist subsidence or deformation of the subgrade during construction and of the completed pavings when in use. Take particular care to compact fully at intrusions, perimeters and where local excavation and backfilling has taken place.

Compaction of sub-base

Proposals: Well in advance of starting work submit details of:

- Maximum depth of each compacted layer.
- Type of plant.
- Minimum number of passes per layer.

Preparation: Remove loose soil, rubbish and standing water.
Structures, membranes and buried services: Ensure stability and avoid damage.
Laying: Spread and level in layers. As soon as possible thereafter thoroughly compact each layer.
At drainage fittings, inspection cover bases and at perimeters: Take particular care to compact fully.

After compaction and immediately before overlaying: The sub-base surface must be uniformly well closed and free from loose material, cracks, ruts or hollows.

Blinding

Finish: Vibrate to provide a close, smooth surface.

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Cold weather working

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

Protection

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

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Q23 GRAVEL, HOGGIN AND WOODCHIP DRIVES AND PAVINGS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Bonded Chippings

Standard: To BS EN 13043.
Compatibility: Chippings suitable for use with respective binders/ emulsions.

Hoggin

Material: Naturally occurring material consisting of sand and gravel, with minimum clay content required to bind the material together, with no large lumps of clay.
Grading for use in surface course: 85% (minimum) by weight passing a 10 mm BS sieve.

Woodchips

Quality: Free from pests, disease, weeds and any additives.

Bitumen emulsions for bonded chippings

Standard: To BS 434-1, class A1 60.

EXECUTION

Blinding to sub-bases

Laying: Compact. Seal interstices. Provide free drainage.

Herbicide to paving

Type: Suitable for the application, location and conditions of use.
Weeds and moss: Grub up.

Laying generally

Channels, gullies, etc: Keep clear.
Completion: Compact to produce a firm, regular surface, stable in use.
Finished surfaces:

- Lines and levels: To prevent ponding.
- Overall texture: Even.
- State at completion: Clean.

Cold weather working

Frozen materials: Do not use.
Freezing conditions: Do not lay pavings.
Cold bituminous surface dressings: Do not apply when ambient temperature is below 10°C.

Drainage falls

Sealed surfaces.

- Falls and cross falls: 1:40 (minimum).
- Camber: 1:50 (minimum).

Unsealed surfaces: 1:30 (minimum).

Granular surfaces in vehicular areas

Permissible deviation from required levels, falls and cambers: ±20mm (maximum).
General: Spread and level in 150 mm (maximum) layers. As soon as possible compact each layer.
Dry weather: Lightly water layers during compaction.

Granular surfaces in pedestrian areas and cycle tracks

Permissible deviation from required levels, falls and cambers: ±12 mm (maximum).
General: Spread and level in 100 mm (maximum) layers. As soon as possible compact each layer.
Dry weather: Lightly water layers during compaction.

Gravel

General: Loose laid and raked to uniform thickness.

Laying bonded chippings

Base course:

- Vehicular use: Cover with clean chippings at specified rate and compact.
- Pedestrian and cycle use: Cover with stone dust or sand. Brush into interstices.

Consolidation: Before application of surface course, allow surface to dry and consolidate.
Surface course: Uniformly spray binder at specified rate. Cover with clean chippings. Provide 100–105% shoulder to shoulder coverage to BS 598-1 and compact.
Compaction to all layers: By heavy roller or other appropriate means, adequate to resist subsidence or deformation of the completed roads/ pavings when in use. Do not crush chippings.
Completion: Before trafficking, remove excess chippings.

Protection from traffic and plant

Paved areas: Restrict access to prevent damage.

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Q24 INTERLOCKING BRICK OR BLOCK ROADS OR PAVINGS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Concrete blocks

Standard: To BS EN 1338.

Clay pavers

Standard: To BS EN 1344.

Bedding sand

Standard: Naturally occurring clean sharp sand in accordance with BS 7533-3, clause 4.3.1 and 4.3.2.
Grading category: To BS 7533-3, Annex D.

- Category lB: Industrial pavements and loading bays.
- Category II: Roads, pedestrian areas/ footpaths receiving regular heavy traffic, car parks receiving some heavy traffic.
- Category III: Pedestrian areas receiving occasional heavy traffic, car parks with no heavy vehicles.
- Category IV: Private drives, dedicated pedestrian areas, footpaths subject only to occasional vehicle overriding.

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

Jointing sand

Standard: Clean free flowing dried silica sand in accordance with BS 7533-3.
Purity: Free from deleterious salts, contaminants and cement.

Concrete for in situ surrounds

Standard: In accordance with BS 7533-3, clause 5.4.3.2, C35 air entrained concrete, maximum aggregate size 10 mm.

Mortar for in situ infill, bedding and haunching

Cement: To BS EN 197-1, Portland CEM 1.
Sand: To BS EN 13139, 0/4, (grading MP) with fines category 1.

EXECUTION

Colour variation of paving units

Method for avoiding banding and patches in laid paving: Submit proposal.

Samples

General: Before ordering, submit samples of all paving units that are representative of colour and appearance.

Levels of paving

Permissible deviation from specified levels:

- Generally: ±6 mm.

Height of finished paving above features:

- At drainage channels and kerbs: +3 to +6 mm.

Condition of sub-bases and bases before laying sand bedding course

Granular surfaces:

- Sound, clean, smooth and close-textured enough to prevent migration of sand bedding into the sub base/ overlay during compaction and use.
- Free from movement under compaction plant and free from compaction ridges, cracks and loose material.

Prepared existing and new bound bases (roadbases): Sound, clean, free from rutting or major cracking and cleared of sharp stones, projections or debris.
Bound base (roadbase) surface tolerance: +0 -12 mm.
Levels and falls: Accurate and within specified tolerances.
Drainage outlets: Within +0 to -10 mm of required finished level.
Edge restraints, manhole covers, drainage outlets and the like: Complete, to required levels, and adequately bedded and haunched in mortar that has reached sufficient strength.
Haunching to gullies, manhole covers and inside face of edge restraints: Vertical, so that paving does not 'ride up' when compacted.

Mortar bedded units

General: Fully bedded and secured with continuous mortar haunching.
Joints: Completely filled with bedding mortar. Movement joints at 4.5–6 m centres to clay paver edgings and features and

to mortar jointed concrete edging units.

Geotextile sheet

Laying: Fitted neatly at edge restraints and other features that interrupt the sand bedding course, e.g. drainage fittings, channels, manholes and kerbs.
Edge detail: Sheet turned up to form an upstand against features, height not less than thickness of sand bedding.

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Laying bedding generally

Depth of loose bedding material needed to ensure specified bedding course thickness after final compaction of paving: Determined by trials.
Bedding materials: Do not deliver to working area over uncompacted paving.
Bedding course prepared area: 1 m (minimum) to 3 m (maximum) in advance of laying face, and 1m (maximum) at end of working period.
Saturated bedding: Not allowed. Remove and replace or allow to dry before laying paving.
Protection of prepared bedding course: Do not allow traffic or leave exposed. Fill, re-screed and recompact areas disturbed by removal of screed rails or trafficking. Lay blocks/ pavers/ setts immediately.

Compaction and jointing of paving units

Compaction:

- Standard: To BS 7533-3.
- Method: Submit proposal for achieving even compaction overall and without damaging kerbs and adjacent work.
- Neoprene sole plate: Use if recommended by paving unit manufacturer.

Areas not to be compacted: Within 1 m of working face and within 1 m of unrestrained edges.
Jointing material: Brush into joints, revibrate surface and repeat as necessary to completely fill joints.

Completed paving

General: Thoroughly compacted and interlocked, of even overall appearance with regular joints of even width, and accurate to line, level and profile.
Colour variation: Evenly spread without banding or patches.
Infill at edge restraints: Completed as work proceeds.

- Cut units: Accurately sized and shaped, not less than 1/3 of full size block.
- Cut edges: Turned inwards; away from edge restraints or other features.

Kerbs and adjacent work: Securely bedded and undamaged.
Paving units adjacent to obstructions: Trimmed neatly and accurately around drainage fittings and other obstructions. Do not reduce thickness of paving units.

Completion of paving with sand filled joints

Vacuum cleaning machines: Not allowed.

Removal and reinstatement of block paving

Methods: As recommended in BS 7533-3, annex A.
Removing units: Minimize breakage.
Replaced units: Matched in with existing and slightly proud to allow for bedding in.

Q25 SLAB, BRICK, SETT, OR COBBLE PAVINGS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.
Mortar: Read with Z21 Mortar.
Movement joint sealant: Read with Z22 Sealants.

Completion of design by contractor

Concrete flag paving system: In accordance with BS 7533-4.
Concrete sett paving system: In accordance with manufacturer's instructions.
Natural stone cobble paving system: In accordance with BS 7533-7.
Natural stone sett paving system: In accordance with BS 7533-7.
Natural stone slab paving system: In accordance with BS 7533-4.
Precast concrete and grass paving system: In accordance with manufacturer's instructions.
Rigid brick paving system: In accordance with Brick Development Association Design Note 8.

Design proposals

Proposals: Submit drawings, technical information, calculations and manufacturers' literature.

PRODUCTS

Standards:

Natural stone slabs: To BS EN 1341.
Concrete setts: To BS EN 1338.
Concrete flags: To BS EN 1339.
Tactile flags and slabs: To DD CEN/TS 15209.
Natural stone setts: To BS EN 1342.

- Freeze/ thaw resistance: Class 1 (F1).

Laying course sand for sand bedded concrete flags: To BS 7533-4, maintained at even moisture content that will give maximum compaction.
Sand for mortar to fully bedded slab/ flag paving: To BS EN 12620, grading 0/4 or 0/2 (MP) or 0/2 or 0/1 (FP).
Bedding sand for precast concrete and grass paving: To BS EN 12620, grading 0/4 or 0/2 (MP).
Nonhydraulic lime for mortar bedding and pointing: To BS EN 459-1, -2 and -3.
Ready-mixed lime:sand for mortar bedding and pointing: To BS EN 998-2.

Natural stone cobbles

Selection: Hard smooth, egg-shaped beach or river stones.

EXECUTION

Material samples

Samples representative of colour and appearance of any designated materials specified for the project: Submit before placing orders.
Designated materials:

- Natural stone slab paving; reference sample to BS EN 1341.
- Concrete slab paving.
- Brick paving.
- Natural stone sett paving; reference sample to BS EN 1342.
- Concrete sett paving.
- Natural stone cobble paving.

Adverse weather

General:

- Temperature: Do not lay or joint paving if the temperature is below 3°C on a falling thermometer or below 1°C on a rising thermometer.
- Frozen materials: Do not use. Do not lay bedding on frozen or frost covered bases.

Paving with mortar joints and/ or bedding: Protect from frost damage, rapid drying out and saturation until mortar has hardened.
Paving laid and jointed in sand:

- Stockpiled bedding sand: Protect from saturation.
- Exposed areas of sand bedding and uncompacted areas of sand bedded paving: Protect from heavy rainfall.
- Saturated sand bedding: Remove and replace, or allow to dry before proceeding.

- Laying dry-sand jointed paving in damp conditions: Brush in as much jointing sand as possible. Minimize site traffic over paving. As soon as paving is dry, top up joints and complete compaction.

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Laying pavings – general
Appearance: Smooth and even with regular joints and accurate to line, level and profile.
Falls: To prevent ponding.
Bedding of paving units: Firm so that rocking or subsidence does not occur or develop.

- Bedding/ Laying course: Consistently and accurately graded, spread and compacted to produce uniform thickness and support for paving units.

Slopes: Lay paving units upwards from the bottom of slopes.
Paving units: Free of mortar and sand stains.
Cutting: Cut units cleanly and accurately, without spalling, to give neat junctions with edgings and adjoining finishes.

Levels of paving
Permissible deviation from specified levels (generally): ± 6 mm.
Height of finished paving above features:

- At gullies: +6 to +10 mm.
- At drainage channels and kerbs: +3 to +6 mm.

Regularity
Maximum variation in gap under a 3 m straight edge placed anywhere on the surface (where appropriate in relation to the geometry of the surface): 10 mm.
Sudden irregularities: Not permitted.
Difference in level between adjacent blocks/ pavers/ setts (maximum): 2 mm.

Colour banding
General: Unless premixed by manufacturer, select from at least 3 separate packs in rotation to avoid colour banding.

Protection
Cleanliness: Keep paving clean and free from mortar droppings, oil and other materials likely to cause staining.
Materials storage: Do not overload pavings with stacks of materials.
Handling: Do not damage paving unit corners, arrises, or previously laid paving.
Mortar bedded pavings (ordinary site mixed mortar without additives): Keep free from traffic after laying:

- Pedestrian traffic (minimum): 4 days.
- Vehicular traffic (minimum): 10 days.

Access: Restrict access to paved areas to prevent damage from site traffic and plant.

Cementitious bases and sub-bases
General: Protect from moisture loss, if not covered by another pavement course within 2 hours of completion.

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

Drainage holes in existing bases
Location: Impervious layers of existing road/ paving where new paving is to be overlayed on sand laying course.
Drainage: Form regular grid of holes, through base and any additional build up, down to sub-base:

- Spacing in both directions: 1000 mm.
- Clear opening (minimum): 30 mm. Do not weaken or excessively disturb road/ paving.

Completion: Remove jagged or protruding edges. Fill voids with pea gravel. Ram down to form flush smooth surface.
Laying geotextile sheet patches over drainage holes: Lay geotextile patches on the base, centred over each hole.

Planing and repairs to existing bases
Existing macadam/ asphalt surfaces: Plane to required levels.
Repairs: Cut out depressions. Cut out cracks over 25 mm wide. Fill to match existing surface and compact.
Building up existing surfaces to required levels: Regulate using coated macadam to BS EN 13108-1 or rolled asphalt to BS EN 13108-4.

Laying geotextile sheet edging strips

Location: Immediately below sand laying course, abutting features which interrupt the laying course, including:

- Perimeters/ Edge restraints/ Kerbs.
- Other types of paving.
- Drainage fittings, e.g. channels and manholes.

Edge detail: Turn sheet up to a height not less than thickness of sand bedding to form an upstand fitted neatly against features.

- Width (minimum): 1000 mm.

Laying geotextile sheet overlays

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

- Width (minimum): 1000 mm.

Site mixed fine concrete laying courses

Standard: In accordance with BS 7533-7.

Laying flag and slab paving – sand laying course and jointing

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

Laying rigid brick paving

Standard generally: In accordance with Brick Development Association Design Note 8.
Bedding and jointing method: Simultaneous bedding and jointing with stiff plastic mortar.
Cement slurry: Apply thin slurry (1–3 mm) of neat cement or 1:1 cement:soft sand over the freshly laid mortar bed immediately prior to laying bricks.
Laying: Wet bricks as necessary (but do not soak), butter joint faces and press down firmly to give a level surface with 10 mm regular joints.

Laying natural stone sett paving

Standard generally: In accordance with BS 7533-7.
Laying type: Rigid.

Laying concrete sett paving – mortar bedded

Laying: Spread and level a bed of mortar. Individually lay and hammer down the setts so that tops are level, leaving joints open.
Jointing: Fill joints and finish neatly. Clean mortar from face of setts before it sets.

Laying natural stone cobble paving

Bedding, laying, jointing and completion: In accordance with BS 7533-7 and -10.

Laying precast concrete and grass paving

Laying: Tamp down into lightly compacted laying course.
Filling: Allow to settle and refill level with surface.

Sealant movement joints in mortar bedded units

Joint filler: Build in as work proceeds.
Barrier (joint breaker): Position filler and barrier accurately to fully support sealant at recommended distance from exposed faces of units.

Completion of paving with dry sand or fine aggregate filled joints

Sand dressing: Leave a thin layer of dry jointing sand over the paving, sweep clean before practical completion.
Final compaction of the surface course: In accordance with BS 7533-3.
Vacuum cleaning machines: Not allowed.

Completion of grassed pavings

Protection: Protect from traffic for 6–8 weeks or until grass can tolerate traffic.

Q28 TOPSOILING

GENERAL

Cross-reference

General: Read with A90 general technical requirements.

PRODUCTS

Imported topsoil

Classification: To BS 3882.

Compost

Standard: To PAS 100.

EXECUTION

Grading subsoil

General: Grade to smooth flowing contours to achieve specified finished levels of topsoil.
Areas of thicker topsoil: Excavate locally.

Loosening soil

Light and noncohesive soils: Use a three tine ripper, drawn 300 mm deep at 600 mm centres in two directions obliquely, when ground conditions are reasonably dry.
Stiff clay and cohesive subsoils: Use a single tine ripper, driven 450 mm deep at 1 m centres in two directions obliquely, when ground conditions are reasonably dry.
Rock and chalk subgrades: Lightly scarify to promote free drainage.

Preparation of undisturbed topsoil

General: Prepare areas to receive soft landscaping as necessary to ensure that the topsoil is in a suitable state for cultivation operations.
Hard ground: Break up with a ripper operated in transverse directions. Remove roots and boulders.
Areas covered with turf or thick sward: Plough or dig over to full depth of topsoil.

Surplus topsoil to be retained

General: Spread and level on site:

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

Contamination

General: Do not use topsoil contaminated with subsoil, rubbish or other materials that are:

- Corrosive, explosive or flammable.
- Hazardous to human or animal life.
- Detrimental to healthy plant growth.

Subsoil: In areas to receive topsoil, do not use subsoil contaminated with the above materials.
Give notice: If any evidence or symptoms of soil contamination are discovered on the site, or in topsoil to be imported.

Handling topsoil

Aggressive weeds: Give notice and obtain instructions before moving topsoil.
Plant: Select and use plant to minimize disturbance, trafficking and compaction.
Contamination: Do not mix topsoil with:

- Subsoil, stone, hardcore, rubbish or material from demolition work.
- 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 it is wetter than the plastic limit.

Spreading topsoil

Temporary roads/surfacing: Remove before spreading topsoil.
Crumb structure: Do not compact topsoil. Preserve a friable texture of separate visible crumbs wherever possible.

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Q30 SEEDING AND TURFING

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Seed

Freshness: Seed produced for the current growing season.
Certification: Blue label certified varieties to EC purity and germinating regulations.

- Evidence of certification: Submit.

Samples: Submit on request.

Turf

Supplier: A member of the Turfgrass Growers Association (TGA).
Standard: Free from undesirable grasses and weeds.

Compost as soil ameliorant or turf dressing

Standard: To PAS 100.
Horticultural parameters:

- pH (1:5 water extract): 7.0–8.7.
- Electrical conductivity (maximum, 1:5 water extract): 200 mS/m.
- Moisture content (m/m of fresh weight): 35–55%.
- Organic matter content (minimum): 25%
- Grading (air dried samples) for soil ameliorant: 99% passing 25 mm screen, and 90% passing 10 mm screen mesh aperture.
- Grading (air dried samples) for turf dressing: 100% passing 5 mm screen mesh aperture.
- Carbon:Nitrogen ratio (maximum): 20:1.

Texture: Friable.
Objectionable odour: None.

EXECUTION

Generally

Application of seeding and turfing: While soil and weather conditions are suitable. Not during periods of frost, strong winds, heavy rain or drought.
Handling/ storage and transport:

- Handling: Protected from frost, mechanical damage and shock. Stored, only when necessary, and for the minimum period in a cool, dry and dark location.
- Stacking turfs: Not higher than 1 m.

Preparation

Cultivation:

- Ground conditions: Suitably dry.
- Compacted soil: Loosened, aerated and broken up for full depth of topsoil to particles of 2-8 mm.
- Undesirable material: Weeds, roots, stones and clods larger than 50 mm in any dimension (25 mm for fine lawns), tufts of grass and foreign matter.
- Within root spread of existing trees: Do not cultivate.

Grading:

- Topsoil condition before grading: Reasonably dry and workable.
- Contours after grading: Smooth and flowing, with falls for adequate drainage. Minor hollows and ridges removed.
- Finished levels after settlement: 25 mm above adjoining paving and features.
- Blade grading: May be used to adjust topsoil levels, provided topsoil depth is nowhere less than specified.
- Submit: If required levels and topsoil depth cannot be achieved by movement of existing soil, submit proposals.

Fertilizing: Before final cultivation and 3–5 days before seeding/ turfing.
Final cultivation: Reduce to fine, firm tilth with good crumb structure.

- Depth: 25 mm.
- Surface preparation: Rake to a true, even surface, friable and lightly firmed but not over compacted.

- Remove surface stones/ earth clods exceeding: 20 mm (10 mm for fine lawns).

Watering: Soak the full depth of topsoil. Water evenly not to displace soil.

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Installation

Seed:

- Adjusted levels: True, even surface, friable and lightly firmed but not over compacted.
- Adjacent levels: Cultivation extended into existing adjacent grassed areas sufficient to ensure full marrying in of levels.
- Sowing: Good seed contact with the soil. Method of sowing to suit soil type and weather conditions.
- Watering: Full depth of topsoil. Water evenly not to displace seed or soil.

Turf:

- Timing: Laid with minimum possible delay after lifting. Spring and summer, lay within 18 hours of delivery; Autumn and winter, lay within 24 hours of delivery.
- Dried out or deteriorated turf: Do not use.
- Access: Not permitted on prepared beds or recently laid turf.
- Adjusted levels of beds: High spots raked out and hollows infilled with fine soil.
- Jointing of turfs: Broken joints, well butted up. Do not stretch turf.
- Edges of laid areas: Whole turfs trimmed to a true line.
- Consolidation: Lightly and evenly as work proceeds to ensure full contact with substrate. Do not use rollers.
- Dressing: Brushed well in. All joints filled.
- Watering: Full depth of turf and topsoil thoroughly watered immediately after laying.
- Turf on slopes exceeding 30°: Diagonal or horizontal configuration.

– Fixing: Galvanized wire pins or softwood pegs.

Maintenance

Generally:

- Trimming: All grass edges, around trees, manholes, etc. remove arisings. Avoid damage to planting.
- Weed control: Keep sward free of broad leaved weeds.
- Pathogens: Keep sward free of pests and diseases.
- Cleanliness: Remove soil and arisings from paved surfaces.
- Failures: Make good by re-cultivation and reseeding/ returfing.
- Bulb planting areas: Do not cut until bulb foliage has died down.
- Stones brought to the surface: Remove regularly.
- Areas of settlement: Make good.

Wildflower cutting (timing):

- Annual wildflowers, as soon as flowers start to loose colour and look untidy. Remove arisings.
- Perennial wildflowers, every 6 to 8 weeks through the summer of the first year after planting.

Instructions:

- Submit written instructions for one full year's maintenance.

Q31 EXTERNAL PLANTING

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Supply of plants

Predelivery inspection: Arrange for inspection of plants at the supplier's premises when requested.

Labelling

Information: Provide each plant, or group of plants of a single species, with supplier's labelling for delivery to site, showing:

- Full botanical name.
- Supplier's name.
- Project reference.
- Sizing in accordance with the National Plant Specification categories.
- Total number, number of bundles and part bundles.

Trees and shrubs

Standard: To BS 3936-1 or the National Plant Specification.
Condition: Materially undamaged, sturdy, healthy and vigorous. Of good shape and without elongated shoots. Free from pests, diseases, discolouration, weeds and physiological disorders.
Root system: Well balanced with crown size.
Species: True to genus and species as scheduled.

Bulbs, corms and tubers

Standard: To BS 3936-9 or the National Plant Specification.
Condition: Firm, entire, not dried out or shrivelled.
Health: Free from pests, diseases and fungus.
Handling: Remove from packaging immediately.
Storage: Permitted only where necessary.

- Location: Well ventilated, dark, covered, rodent proof container, away from exhausts and fruit.
- Duration: Minimum period.
- Temperature: 18–21°C

Container grown plants

Growing medium: With adequate nutrients for plants to thrive until permanently planted. Plants centred in containers, firmed and well watered.
Containers: With adequate holes for drainage.
Root growth: Substantially filling containers but not root bound, and in condition conducive to successful transplanting.
Hardiness: Grown in the open for at least two months prior to shipping.

Bitumen coatings

Standard: To BS 6949.

EXECUTION

Programme

Climatic conditions: Carry out work while soil and weather conditions are suitable. Do not plant during periods of frost, strong winds or heavy rain.

Site clearance generally

General: Remove rubbish, concrete, metal, glass, decayed vegetation and contaminated topsoil.

- Contamination: Remove material containing toxins, pathogens or other extraneous substances harmful to plant, animal or human life.

Planting seasons

Aquatic plants: May/ June or September/ October.
Colchicum (crocus): July/ August.
Conifers and evergreens: September/ October or April/ May.
Container grown plants: At any time of the year if ground and weather conditions are appropriate.
Deciduous trees and shrubs: Late October to late March.
Dried bulbs, corms and tubers: September/ October.
Green bulbs: After flowering in spring.
Herbaceous plants (including marginals): September/ October or March/ April.

Wildflower plugs: Late August to mid November or March/ April.

Watering

General: Soak the full depth of topsoil. Water evenly not to displace plants, mulch or soil. Apply water as frequently as required to ensure establishment and continued flourishing of the plants.

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Notice
Timing: Give notice 7 days before:

- Setting out.
- Applying fertilizer.
- Applying herbicide.
- Delivery/ installation of plants.
- Visiting site during maintenance period.

Handling/ storage and transport
Standard: To Horticultural Trades Association (HTA) 'National plant specification. Handling and establishing landscape plants' Part 1, Part 2 and Part 3.
Handling: Protect from frost, mechanical damage and shock. Handle with care, do not drop from a vehicle.

Protection of existing areas
General: Use boards/ tarpaulins to protect areas of existing lawn or paving adjacent to the planting works.

Preparation
Cultivation:

- Compacted soil: When ground conditions are suitably dry, loosen, aerate and break up full depth of soil to particles of 2–8 mm.
- Undesirable material: Remove weeds, roots, stones, clods larger than 50 mm in any dimension, tufts of grass and foreign matter.
- Within root spread of existing trees: Do not cultivate.

Planting generally
Standard: To HTA 'National plant specification. Handling and establishing landscape plants', Part 3.
Appearance: Plant upright or well balanced with best side to the front.

Planting conditions
Trees:

- Depth: Horizontal bases and vertical sides with no less than the minimum depth throughout. Install so crown of rootball is at ground level after settling.
- Pit bottoms and sides: Break up to a depth of 150 mm and form a slightly raised centre. Scarify pit sides.

Shrubs:

- Depth: Horizontal bases and vertical sides with no less than the minimum depth throughout. Install so crown of rootball is at ground level after settling.
- Pruning: Trim by one-third to leave a well balanced branching head and to encourage dense growth.

Bulbs, corms and tubers:

- Depth: Top of bulb/ corm/ tuber at a depth of approximately twice its height, base in contact with the bottom of the hole.

Climbing plants:

- Position: 150 mm clear of supporting structure (e.g. wall/ fence) with roots spread outward. Lightly secure branches to supports. Retain canes of plants which are too small to reach supports.

Staking
Short single staking:

- Position: Install stake close to the tree position, drive vertically at least 300 mm into the base of the pit before planting. Consolidate backfilling material around the stake as filling proceeds.
- Height: Cut to approximately 600 mm above ground level.
- Tying: Secure tree firmly but not rigidly to stake within 25 mm of top of stake.

Short double staking:

- Position: Install stakes on either side of the tree position, drive vertically at least 300 mm into the base of the pit before planting. Consolidate backfilling material around stakes as filling proceeds.
- Height: Cut to approximately 600 mm above ground level.
- Cross bar: Firmly fix on windward side of tree as close as possible to the stem, without touching.
- Tying: Secure tree firmly but not rigidly to cross bar.

Maintenance

Generally:

- Weed control: Maintain a weed free area around each plant of the larger of 1 m diameter or the original pit size. Keep beds free of weeds.
- Pathogens: Keep plants free of pests and diseases by the application of appropriate biological or chemical treatment as required.
- Cultivation: Fork over beds as necessary to keep soil loose, with gentle cambers and no hollows, taking care not to reduce depth or effect of mulch.
- Prevention of damage: Ensure that plants are not damaged by the use of mowers, rotary filament cutters or other similar powered tools.
- Staking: Check condition of stakes, ties, guys and guards. Replace broken or missing items. Adjust if necessary to allow for growth and prevent rubbing of bark. Cut back any damaged bark.
- Refirming: Plants that have become loosened in their planting pits shall be set upright and refirmed.
- Climbing plants: Train to climb and cover adjacent vertical surfaces using appropriate fixing methods.
- Hedges: Keep base clear of invasive ruderal species and weed growth.
- Bulbs, corms and tubers: Dead heads removed after flowering, remove leaves only after discolouration is evident.

Fertilizing:

- Timing: March or April.
- Application: Evenly spread, carefully incorporating below mulch materials.

Watering:

- Frequency: As required to ensure full depth of topsoil is saturated and to provide healthy growth.

Pruning:

- Generally: Trim with a clean smooth cut to a main stem or a sound and healthy outward growing lateral.
- Timing: Prune at appropriate times, to remove dead, dying and diseased wood, straggling stems, over vigorous shoots and suckers, to promote healthy growth and natural shape.
- Trees: Prune to favour a single central leader.
- Shrubs: Trim to maintain natural form and encourage dense growth.
- Ground covers: Trim to prevent encroachment onto adjacent surfaces.
- Hedges: Trim laterals and top growth in July to encourage dense growth and to retain shape of hedge as originally specified.

Instructions:

- Before the end of the maintenance period, provide written instructions recommending procedures to be established by the employer for one full year's planting maintenance.

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Q40 FENCING

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

PRODUCTS

Fencing types

Chain link fencing:

- Standard: To BS 1722-1.

Cleft chestnut pale fencing:

- Standard: To BS 1722-4.

Close boarded wood fencing:

- Standard: To BS 1722-5.

Wood palisade fencing:

- Standard: To BS 1722-5.

Wood post and rail fencing:

- Standard: To BS 1722-7.

Carbon steel vertical bar fencing:

- Standard: To BS 1722-9.

Anti intruder fencing:

- Standard: To BS 1722-10.

Prefabricated wood panel fencing:

- Standard: To BS 1722-11.

Steel palisade fencing:

- Standard: To BS 1722-12.

Open mesh steel panel fencing:

- Standard: To BS 1722-14.

Gates/ gate posts

Wood gates, stiles and gate posts to footpaths and bridleways:

- Standard: To BS 5709.

Steel gates and gate posts:

- Steel: As section Z11.
- Jointing: Welded.

Domestic steel gates:

- Standard: To BS 4092-1.

Concrete to post holes and sills

Standard: To BS 8500-2.

Concrete: Designated, not less than GEN1 or standard prescribed concrete not less than ST2.

- Alternative mix for small quantities: 50 kg Portland cement, class 42.5 to 150 kg fine aggregate to 250 kg 20 mm nominal maximum size coarse aggregate, medium workability.
- Admixtures: Not permitted.

Hot-dip galvanizing

- Standard: To BS EN ISO 1461.

Plastics powder coating

- Standard: To BS 1722-16.

EXECUTION

General

Installation:

- Alignment: Straight lines or smoothly flowing curves.
- Tops of posts: Following profile of the ground.
- Setting posts: Rigid, plumb and to specified depth, or greater where necessary to ensure adequate support.
- Fixings: All components securely fixed.

Competence

- Operatives: Contractors must employ competent operatives.
- Qualifications: Submit certification of training and experience of Sector Scheme 2A for the design, supply, installation and repair of fences.

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Setting out

Wood post and rail fencing:

- Morticed fences: Posts maximum 2850 mm centres.
- Nailed fences: Posts maximum 1800 mm centres.

Close boarded wood fencing:

- With gravel board: Posts maximum 3000 mm centres.
- Without gravel board: Posts maximum 2400 mm centres.

Wood palisade fencing: Posts maximum 3000 mm centres. Mild steel vertical bar fencing: Posts maximum 2750 mm centres.
Open mesh steel panel fencing: Posts maximum 3000 mm centres.

Chain link mesh

Joining: Interweave a spiral and restore knuckle or barb to top and bottom.

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Size of fencing post holes for concrete foundation/ surround (normal ground conditions)

Chain link fencing (general purpose):

- Straining posts:

Up to 1400 mm high fencing: 450 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.
1400–2150 mm high fencing: 450 mm square or 450 mm diameter (augered) post hole, minimum 750 mm depth in ground.

- Struts: Minimum 300 x 450 mm hole, base of strut to be a minimum 450 mm depth in ground.
- Intermediate posts:

Up to 1400 mm high fencing: 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.
1400–2150 mm high fencing: 450 mm square or 450 mm diameter (augered) post hole, minimum 750 mm depth in ground.

- Gate posts: Depths as for fence straining posts, minimum 450 mm square holes.

Cleft chestnut pale fencing:

- Straining posts:

Up to 1350 mm high fencing: 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.
Over 1350 mm high fencing: 450 mm square or 450 mm diameter (augered) post hole, minimum 750 mm depth in ground.

- Struts: Minimum 300 x 450 mm hole, base of strut to be a minimum 450 mm depth in ground.
- Intermediate posts:

Up to 1350 mm high fencing: Minimum 75 mm concrete surround to all sides, 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.
Over 1350 mm high fencing: Minimum 75 mm concrete surround to all sides, 300 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Close boarded wood fencing:

- Up to 1500 mm high fencing: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.
- Over 1500 mm high fencing: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Wood palisade fencing:

- Up to 1500 mm high fencing: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.
- Over 1500 mm high fencing: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Wood post and rail fencing (sawn or cleft posts):

- Up to 1100 mm high fencing (or 1050 mm high for fencing with cleft rails): Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.
- Over 1100 mm high fencing (or 1250 mm high for fencing with cleft rails): Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 700 mm depth in ground.

Carbon steel vertical bar fencing:

- Up to 1000 mm high fencing: Allow for 100 mm concrete bed (below post) and surround, minimum 450 mm embedded length in ground.
- 1000–1400 mm high fencing: Allow for 100 mm concrete bed (below post) and surround, minimum 550 mm embedded length in ground.
- Over 1400 mm high fencing: Allow for 100 mm concrete bed (below post) and surround, minimum 600 mm embedded length in ground.
- Gate posts: In accordance with BS 1722-9 table 4.

Prefabricated wood panel fencing:

- Up to 1400 mm to top of panel: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 500 mm depth in ground.
- Over 1400 mm to top of panel: Minimum 300 mm square or 300 mm diameter (augered) post hole, minimum 600 mm depth in ground.

Anti intruder fencing:

- Straining posts: 450 mm square or 450 mm diameter (augered) post hole, minimum 750 mm depth in ground.
- Struts: Minimum 300 mm wide x 450 mm deep hole, base of strut to be a minimum 450 mm depth in ground.
- Intermediate posts: 300 mm square or 300 mm diameter (augered) post hole, minimum 750 mm depth in ground.

Steel palisade fencing, general purpose (GP):

- Up to 1800 mm high (GP) fencing: Minimum 350 mm square or 450 mm diameter (augered) post hole, minimum 525 mm embedded length.
- 2100 mm high (GP) fencing: Minimum 350 mm square or 450 mm diameter (augered) post hole, minimum 625 mm embedded length.
- 2400 mm high (GP) fencing: Minimum 350 mm square or 450 mm diameter (augered) post hole, minimum 725 mm embedded length.

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- 3000 mm high (SP) fencing: Minimum 450 mm square or 600 mm diameter (augered) post hole, minimum 925 mm embedded length.
- 3600 mm high (SP) fencing: Minimum 450 mm square or 600 mm diameter (augered) post hole, minimum 1125 mm embedded length.

Open mesh steel panel fencing:

- Up to 1800 mm high general purpose (category 1) fencing: Minimum 450 mm square or 300 mm diameter (augered) post hole, to allow not less than 75 mm concrete surround to post, minimum 600 mm depth in ground.
- Over 1800 mm high general purpose (category 1) fencing: Minimum 450 mm square or 450 mm diameter (augered) post hole, to allow not less than 75 mm concrete surround to post, minimum 750 mm depth in ground.
- Gate posts: Minimum 450 mm square post hole, minimum 750 mm depth in ground.
- Abnormal ground conditions: Give notice.

Foundation/ surround to fencing posts set in concrete

Setting in: Position post/ strut and fill hole with concrete to not less than specified depth, well rammed and consolidated as filling proceeds.
Post holes not completely filled with concrete: Backfill with excavated material, well rammed and consolidated.
Exposed concrete foundations not subsequently covered by paving: Compact until air bubbles cease to appear on upper surface, weather to shed water, and trowel smooth.
Chain link fencing (category 1, general purpose):

- Intermediate and straining posts: Minimum two thirds depth of post hole.
- Gate post holes: Completely fill with rammed concrete to 50 mm above adjacent ground level, weather to shed water, and trowel smooth.

Cleft chestnut pale fencing (straining posts and intermediate posts):

- Concrete surround: Minimum half depth of post hole.

Close boarded wood fencing:

- Concrete surround: Minimum half depth of post hole.

Wood palisade fencing:

- Concrete surround: Minimum half depth of post hole.

Wood post and rail fencing (sawn or cleft posts):

- Concrete surround: Minimum half depth of post hole.

Carbon steel vertical bar fencing:

- Concrete bed: Minimum 100 mm below post.
- Concrete surround: Full depth of post hole.

Anti intruder fencing:

- Concrete surround: Minimum two thirds depth of post hole.

Prefabricated wood panel fencing:

- Concrete surround: Minimum half depth of post hole.

Steel palisade fencing, general purpose (GP):

- Concrete surround: Full depth of post hole.

Open mesh steel panel fencing, general purpose (category 1):

- Concrete surround: Minimum half depth of post hole.
- Gate post holes: Completely fill with rammed concrete to 50 mm above adjacent ground level, weather to shed water, and trowel smooth.

Setting posts in earth

Post holes: Excavate neatly, with vertical sides and as small as practicable to allow refilling.
Setting in: Position posts/ struts and replace excavated material, ramming well as filling proceeds.

Driving wood posts

Preparation: Posts pointed 225 mm length at base.
Protection: Minimize damage to heads of posts when driving and repair by neatly finishing post tops after installation.

Nailed rails to wood post and rail fencing

Minimum span: Not less than two bays, with joints in adjacent rails staggered.
Nailing: Nail each length of rail to each post with two 100 mm galvanized wire nails.
Rails with split ends: Replace.

Cleft wood rails to wood post and rail fencing

Length: Maximum 3050 mm.
Mortice position: Centre line of 150 mm face of post.
Rail fixing: Shape to adequately fill post mortice and fix to prick post with two 4 x 100 mm galvanized clenched wire nails.

Rails with split ends: Replace.

Arris rails

Rail end: Shape to adequately fit the post mortice or recess.
Fixing to recessed posts: Bolt.
Top rails: Fix at both ends.

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Site cutting of wood

Site cutting: Keep to a minimum, with no cutting where timber is to be used below or near ground level.
Cut surfaces: Treat surfaces exposed by minor cutting and drilling with two flood coats of a solution recommended for the purpose by main preservative treatment solution manufacturer.

Completion

Conformity: Submit manufacturer's and installer's certificates in accordance with the appropriate part of BS 1722.

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Q50 SITE AND STREET FURNITURE AND EQUIPMENT

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

DESIGN

Accessibility

Standard: In accordance with BS 8300.

PRODUCTS

Concrete foundations generally

Standard: To BS 8500-2.
Mix: Designated concrete not less than GEN 1 or standard prescribed concrete not less than ST2.
Admixtures: Do not use.

EXECUTION

Setting components in concrete

Foundation holes: Neat vertical sides.
Components: Accurately positioned and securely supported.
Depth of foundations, bedding and haunching: Appropriate to provide adequate support and to receive overlying soft landscape or paving finishes.
Concrete fill: Fully compacted as filling proceeds.
Temporary component support: Maintain undisturbed for minimum 48 hours.
Concrete foundations exposed to view: Compacted until air bubbles cease to appear on the upper surface, then weathered to shed water and trowelled smooth.

Setting in earth

Holes: As small as practicable.
Components being fixed: Accurately positioned and securely supported.
Earth refill: Well rammed as filling proceeds.

Preservative treated timber

Surfaces exposed by minor cutting and drilling: Treated by immersion or with two flood coats of a solution recommended for the purpose by main treatment solution manufacturer.
Heavily worked sections: Re-treat.

Building in to masonry walls

Components being built in: Accurately positioned and securely supported. Set in mortar and pointed neatly to match adjacent walling.
Temporary support: Maintain for 48 hours (minimum) and prevent disturbance.

Erection of timber and prefabricated structures

Checking: 5 days (minimum) before proposed erection date, check foundations, holding down bolts, etc.

- Inaccuracies or defects in prepared bases or supplied structures: Report immediately. Obtain instructions before proceeding.

Fixing timber decking boards.

- Joints: Butt joints over joists.
- Joint frequency: kept to a minimum.
- Length: Each board must span not less than two bays between joists with joints in adjacent boards staggered.

Damage to galvanized surfaces

Minor damage in areas up to 40 mm² (including on fixings and fittings): Make good.

- Material:Low melting point zinc alloy repair rods or powders made for this purpose, or at least two coats of zinc-rich paint to BS 4652.
- Thickness: Sufficient to provide a zinc coating at least equal in thickness to the original layer.

Site painting

Timing: Prepare surfaces and apply finishes as soon as possible after fixing.

R10 RAINWATER DRAINAGE SYSTEMS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

Completion of design

Standard: To BS EN 12056-3, clauses 3–7 and National Annexes.
Collection and distribution of rainwater: Complete, and without leakage or noise nuisance.

PRODUCTS

Gutters

Aluminium: Agrément certified or otherwise submit proposals.
Cast iron:

- Half round: To BS 460.
- Other than standard half round sections: To BS 460 except for shape.

PVC-U: To the relevant parts of BS EN 607 and BS EN 1462, Kitemark certified.

Pipework

Aluminium: Agrément certified or otherwise submit proposals.
Cast iron - flexible couplings: To BS EN 877, Agrément certified.
Cast iron spigot and socket:

- Round: To BS 460.
- Shape other than round: To BS 460 except for shape.

PVC-U:

- External: To BS EN 12200-1, Kitemark certified.
- Sealed: To BS EN 1329-1 or BS 4514, Kitemark certified.

Insulation to internal gutters and pipelines

Fire performance: Class 1 spread of flame when tested to BS 476-7.

EXECUTION

Preparation

Work to be completed before commencing work specified in this section:

- Below ground drainage. Alternatively, make temporary arrangements for dispersal of rainwater without damage or disfigurement of the building fabric and surroundings.
- Painting of surfaces which will be concealed or inaccessible.

Installation generally

Electrolytic corrosion: Avoid contact between dissimilar metals where corrosion may occur.
Plastics and galvanized steel pipes: Do not bend.
Allowance for thermal and building movement: Provide and maintain clearance as fixing and jointing proceeds.
Protection:

- Fit purpose made temporary caps to prevent ingress of debris.
- Fit access covers, cleaning eyes and blanking plates as the work proceeds.

Fixing and jointing gutters

Brackets: Securely fixed.

- Additional brackets: Where necessary to maintain support and stability, provide at joints in gutters and near angles and outlets.

Roofing underlay: Dressed into gutter.

Setting out eaves gutters

Setting out to level: Level and as close as practical to the roof.
Setting out to falls: To true line and even gradient to prevent ponding or backfall. Position high points of gutters as close as practical to the roof and low points 50 mm (maximum) below the roof.
Outlets: Aligned with connections to below ground drainage.

Installing rainwater outlets

Fixing: Secure. Fix before connecting pipework.
Junctions between outlets and pipework: Accommodate movement in structure and pipework.

Fixing pipework
Pipework: Fix securely, plumb and/ or true to line.
Branches and low gradient sections: Fix with uniform and adequate falls to drain efficiently.
Externally socketed pipes and fittings: Fix with sockets facing upstream.
Additional supports: Provide as necessary to support junctions and changes in direction.
Vertical pipes:

- Provide a loadbearing support at least at every storey level.
- Tighten fixings as work proceeds so that every storey is self supporting.
- Wedge joints in unsealed metal pipes to prevent rattling.

Wall and floor penetrations: Isolate pipework from structure.

- Pipe sleeves: As section P31.
- Masking plates: Fix at penetrations if visible in the finished work.

Expansion joint pipe sockets: Fix rigidly to buildings. Elsewhere, provide brackets and fixings that allow pipes to slide.

Jointing pipework and gutters
General: Joint with materials and fittings that will make effective and durable connections.
Jointing differing pipework and gutter systems: Use adaptors intended for the purpose.
Cut ends of pipes and gutters: Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets.
Jointing or mating surfaces: Clean and, where necessary, lubricate immediately before assembly.
Junctions: Form with fittings intended for the purpose.
Jointing material: Strike off flush. Do not allow it to project into bore of pipes and fittings.
Surplus flux, solvent jointing materials and cement: Remove.

Cutting coated pipework and gutters
Cutting: Recoat bare metal.

Fixing insulation to internal pipelines and gutters
Fixing: Secure and neat. Provide continuity at supports and leave no gaps. Fix split pipe insulation with the split on 'blind' side of pipeline.
Timing: Do not fit insulation until completion of pipe airtightness or leakage testing.

Electrical continuity – pipework
Joints in metal pipes with flexible couplings: Clips (or suitable standard pipe couplings) supplied for earth bonding by pipework manufacturer to ensure electrical continuity.

Internal pipework test – England, Wales, Ireland and Northern Ireland
Preparation: Temporarily seal open ends of pipework with plugs.
Test apparatus: Connect a 'U' tube water gauge and air pump to pipework via a plug.
Testing: Pump air into pipework until gauge registers 38 mm.
Required performance:

- Allow a period for temperature stabilization, after which the pressure of 38 mm is to be maintained without loss for at least 3 minutes.

Internal pipework test – Scotland
Standard: To BS EN 12056-2, National Annex NG.

Gutter test
Preparation: Temporarily block all outlets.
Testing: Fill gutters to overflow level and after 5 minutes closely inspect for leakage.

R11 ABOVE GROUND FOUL DRAINAGE SYSTEMS

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.

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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.

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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.

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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.

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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.

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R16 GROUNDWATER PRESSURE RELIEF DRAINAGE SYSTEMS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

Design

General: Read with section R12 Below ground drainage systems.

PRODUCTS

Below ground drainage systems

Products generally: As reference specification section R12.

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.

Pipes, bends and junctions

Vitrified clay perforated: To BS EN 295-5, Kitemark certified.
PVC-U solid wall perforated: To BS EN 1401-1, class SN4 or SN8, with flexible joints.

Silt traps

Standards:

- 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, BS EN 13598-2, or Agrément certified.
- Cover loading grade: To BS EN 124.

EXECUTION

General

Standard: In accordance with relevant parts of BS EN 752, with National Annex NA, and BS EN 1610.
Below ground drainage systems: As section R12.

Class X bedding and surround

Usage: Perforated pipework requiring a granular surround.
Granular material: To BS EN 13242.

- Grade (bedding): 4/10.
- Grade (surround): 4/10 or 6/14 (as appropriate to the perforations of the specified pipe).

Bedding:

- Material: Granular, compacted over full width of trench.
- Thickness: 75 mm (minimum).

Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
Surround:

- Material: Granular.
- Depth: To 150 mm (minimum) above crown of pipe.
- Compaction: By hand.

Backfilling: Soil or topsoil, as appropriate.

Laying filter drain cappings

Geotextile membrane or polyethylene sheet: Lay over completed surround before backfilling.
Jointing: Overlap 300 mm (minimum).

Backfilling with as-dug material

Material: As excavated from the trench.
Placing and compaction: Maximum 300 mm thick layers, up to finished ground level. Compact each layer before placing the next.
Heavy compactors: Do not use before there is 600 mm of material over pipes.

R17 SOAKAWAY AND SEPTIC TANK AND SEWAGE TREATMENT UNITS

GENERAL

Cross-reference

General: Read with A90 General technical requirements.

Design

General: Read with section R12 Below ground drainage systems.

PRODUCTS

Below ground drainage systems

Products generally: As reference specification section R12.

Concrete (general)

Standards: To BS 8500-1 and -2.
Usage: In small quantities for general purposes including bedding, 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.

Distribution and sampling chambers

Cover loading grade: To BS EN 124.

Pipes, bends and junctions

Vitrified clay perforated: To BS EN 295-5, Kitemark certified.
PVC-U solid wall perforated: To BS EN 1401-1, class SN4, with flexible joints.

Private packaged septic tank units

Standard: To BS EN 12566-1 or Agrément certified.

- Cover loading grade: To BS EN 124.

Private packaged sewage treatment units

Standard: To BS EN 12566-3 or Agrément certified.

- Cover loading grade: To BS EN 124.

EXECUTION

General

Standard: In accordance with relevant parts of BS EN 752, with National Annex NA, and BS EN 1610.
Below ground drainage systems: As section R12.

Soakaways – granular fill

Geotextile membrane: Line bottom and sides of pit.

- Jointing: Overlap 300 mm.

Inspection and distributor pipes: Insert as required.
Height of fill: Above crown of inlet pipe.
Top of fill: Cover with geotextile membrane.
Backfill: As-dug material.
Access covers: Bed and haunch continuously in 1:3 cement:sand mortar.

Installing septic tank and sewage treatment units

Base: Concrete (general).
Surround:

- Preparation: Temporarily fill tanks with water to prevent flotation.
- Material: Concrete (general).

Installing distribution and sampling chambers

Collar: Concrete (general).

Septic tank drainage fields

Standard: To BS 6297.
Percolation trenches:

- Width (minimum): 300 mm.
- Depth: To suit pipe gradient, thickness of granular material below pipes and to give a pipe invert depth of 200 mm (minimum) below ground level.
- Width of undisturbed ground between trenches (minimum): 1 m.

Granular material:

- Depth below pipe inverts (minimum): 300 mm.
- Compaction: Thoroughly, in maximum 300 mm thick layers.
- Thickness above pipe crowns: 50 mm.

Pipes:

- Uniform gradient (maximum): 1 in 200 away from distribution and sampling chamber.
- Laying: Dig slightly into bed, resting uniformly on barrels and adjust to line and gradient.

Barrier layer across the top of granular material:

- Laying: Tuck 75 mm down trench sides. Lap joints 300 mm.

Backfill to surrounding ground level: As-dug material.

Laying cable ducts

Drawlines: Thread through during laying.

Backfilling with as-dug material

Material: As excavated from the trench.
Placing and compaction: Maximum 300 mm thick layers, up to finished ground level. Compact each layer before placing the next.
Heavy compactors: Do not use before there is 600 mm of material over pipes.

Commissioning of septic tanks and sewage treatment units

Testing: Test the operation of all pumps, valves, controls, sensors and the like to verify correct operation, and make good if necessary.
Hand over at completion:

- Manufacturers' operating and maintenance instructions.
- Tools for operation, maintenance and cleaning, including keys for access covers.

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.

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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.

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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.

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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.

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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

Standard: To BS EN 12831-1.
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

Standard: To BS EN 12831-1.
Heat-up load: To BS EN 12831-1.

PRODUCTS

Central heating boilers

Gas fired:

- Condensing boiler (Type B appliance): To BS EN 297 and BS EN 677 or the relevant parts of BS EN 15502.
- Condensing boiler (Type C appliance): To BS EN 483 and BS EN 677 or the relevant parts of BS EN 15502.
- Condensing combination boiler (Type B appliance): To BS EN 297, BS EN 625 and BS EN 677 or the relevant parts of BS EN 15502.
- Condensing combination boiler (Type C appliance): To BS EN 483, BS EN 625 and BS EN 677 or the relevant parts of BS EN 15502.

Oil fired (atomizing burners only):

- Condensing boiler (Type B appliance): To BS EN 303-1, -2, -4 and BS EN 304.
- Condensing boiler (Type C appliance): To BS EN 303-1, -2, -4, BS EN 304 and BS EN 15035.
- Condensing combination boiler (Type B appliance): To BS EN 303-1, -2, -4, -6 and BS EN 304.
- Condensing combination boiler (Type C appliance): To BS EN 303-1, -2, -4, -6, BS EN 304 and BS EN 15035.

Wood burning stoves

Standard: To BS EN 13240.

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 7977-1.

- Decorative fuel effect gas appliance: To BS EN 509.

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.
Chimneys for non-room-sealed appliances: To BS EN 15287-1.
Chimneys for room-sealed appliances: To BS EN 15287-2.
Flue liners: Flexible, spiral wound, austenitic stainless steel tube to BS EN 1856-2.
Metal flues for gas fired appliances: To BS 715 and BS EN 1856-1.

Oil storage tanks
Steel: In accordance with BS 5410-1 and to BS 799-5 or BS EN 12285-1 or OFS T200.
Plastics: In accordance with BS 5410-1 and to BS EN 13341 or OTS T100.

LPG storage tanks
Tanks: To BS EN 12542 and BS EN 13445 series, or PD 5500.
Fittings: To BS EN 13175.

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 442-1 and -2.

Convectors
Natural convectors: To BS EN 442-1 and -2.
Fan assisted convectors: To BS EN 16430-1 and -2.

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.

Coated copper pipelines
Copper pipe: To BS EN 1057, Kitemark certified.

- Plastic coated: To BS EN 13349.
- Chrome plated: To BS EN ISO 1456.

Temper: As copper pipelines for general use.
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
Standard: To BS 5422, section 9.
Material: Preformed flexible plastics closed cell foam or mineral fibre split tube.
Thermal conductivity: 0.04 W/m²K (maximum).
Thickness: To BS 5422, Table 19 and Table 20 (minimum). For pipe diameters and plastic pipe not covered by these tables, refer to Annex H.
Fire performance: Non-combustible, limited combustibility or Class O as defined in BS 5422, Annex E.

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
Standard: To BS EN 14336.
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.

Boilers
Installation of gas fired boilers: To BS 6644 or BS 6798.
Installation of oil fired boilers: In accordance with BS 5410-1 or BS 5410-2.
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: Minimum clearances as per manufacturer's literature.
Combination boilers:

- Expansion vessel connection pipework: In accordance with boiler manufacturer's literature.
- Fill point location: In accordance with boiler manufacturer's literature.

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 of inset live fuel effect fires: To BS 5871-2.
Installation of decorative fuel effect fires: To BS 5871-3.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 EN 15287-1 or BS EN 15287-2 or 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: In accordance with 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: Not less than 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).

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Circulating pumps
Location: Readily accessible positions.
Installation: As recommended by manufacturer.

Pipelines
Generally to:

- BS 8000-0 and 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.
- Eng: Approved Document A, section 1B6.
- Wales: Approved Document A, section 1B6.
- 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.

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.

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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

Standard: To BS EN 14336.
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.

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U90 GENERAL VENTILATION

GENERAL

Cross-reference

General: read with A90 General technical requirements.

PRODUCTS

Ventilators for heating appliances

General: Not adjustable. Not restricted, e.g. with mesh.

Air vents and ducts for gas appliances (rated input not exceeding 70 kW)

Standard: To BS 5440-2.

Safety of household and similar electrical equipment

Range (cooker) hoods: To BS EN 60335-2-31, BEAB approved.
Fan units: To BS EN 60335-2-80, BEAB approved.
Pull cord switches: To BS EN 61058-2-1.

EXECUTION

Site applied insulation

Location: Fit insulation to ductwork in unheated spaces.
Installation: Fix securely. Leave no gaps. Make continuous.

Ductwork

Rigid duct: Install complete, with necessary bends, junctions, reducers, connectors, and adaptors.

- Installation: Do not distort or reduce cross-sectional area. Do not strain joints.

Flexible duct: Install complete, with necessary junctions, reducers, connectors, and adaptors.

- Installation: Fully extend. Do not overstretch. Form smooth flowing curves without kinking, sagging or slumping.

Joints: Seal. Provide a robust airtight installation.
Falls: Fall away from fans, dampers and other in-line accessories.
Sleeves: Where ducts pass through building fabric. Bed solidly to the surrounding construction.

- Gap filling: 10–20 mm between sleeve and duct, fill completely.

Passive stack ventilation systems

Duct runs: As short and straight as possible: Smooth curvature to offsets.
Arrangement: Do not install ducts at more than 45° from vertical.
Air leakage: Prevent where ducts enter rooms and around inlet grilles.

Ventilators for heat appliances

Free area: Do not obstruct or restrict.
Opening adjustment: Not permitted.
Insect screens: Not permitted.

Condensate drains

Access: Provide for cleaning.

COMPLETION

Commissioning

Ventilation system: Balance airflow using methods recommended by the system manufacturer.
Operation: Examine ductwork for leakage.

- Test: Fans, equipment, controls and sensors.
- Submit: Report verifying correct operation.

Operation and maintenance

Operating and maintenance instructions:

- Submit: Manufacturers' operating and maintenance instructions for equipment and controls.

Tools: Supply tools for operation, maintenance and cleaning purposes, including keys for valves and vents.

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.

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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.

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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.

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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.

W50 FIRE DETECTION AND ALARM SYSTEMS

GENERAL

Cross-reference

General: Read with section A90 General technical requirements.

PRODUCTS

Equipment and accessories

Detectors:

- Manual call points: To BS EN 54-11.
- Optical beam smoke detectors: To BS EN 54-12.
- Point flame detectors: To BS EN 54-10.
- Point heat detectors: To BS EN 54-5.
- Point smoke detectors: To BS EN 54-7.
- Point type carbon monoxide detectors: To BS EN 54-26.
- Point type combined smoke and heat detectors: To BS EN 54-29.
- Point type combined carbon monoxide and heat detectors: To BS EN 54-30.

Alarms:

- Carbon monoxide alarms: To BS EN 50291-1.
- Heat alarms: To BS 5446-2.
- Smoke alarms: To BS EN 14604.
- Fire alarm and carbon monoxide alarm systems for deaf and hard of hearing people: To BS 5446-3.

Control and indicating equipment:

- Automatic release mechanisms: To BS 5839-3.
- Control and indicating equipment: To BS EN 54-2.
- Electrically powered hold-open devices: To BS EN 1155.
- Power supply equipment: To BS EN 54-4.
- Sounders: To BS EN 54-3.
- Visual alarm devices: To BS EN 54-23.

Cables

PVC insulated and sheathed cables: To BS 6004.
Thermosetting insulated and thermoplastic sheathed (LSHF) cables: To BS 7211.
Light duty mineral insulated cables: To BS EN 60702-1.
Fire resistant screened (LSHF) cables: To BS 7629-1.

General

Minor accessories needed to complete the installation: Types recommended for purpose by relevant manufacturer.

EXECUTION

Design and installation of fire detection and alarm systems

Standard: In accordance with BS 7671, and BS 5839-1 (in non-domestic premises) or BS 5839-6 (in domestic premises).

Installing equipment and accessories

Location: To provide safe access for maintenance and testing.
Environment at installation: Clean and dust free.
Mains power supply: Dedicated circuit from the building's main switchboard or distribution board.

Testing and commissioning fire alarm detection and alarm systems

Notice: 24 hours (minimum) before testing.

Cleaning

All 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.

Selection and installation of carbon monoxide detection and alarms
Standard: In accordance with BS EN 50292.

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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.

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Anodizing

Processor requirements:

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

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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.

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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.

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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.

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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.