Elevated Switch House

EDS 07-0105

SPECIFICATION FOR

BUILDING & CIVIL / STRUCTURAL WORKS

Originated by:

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<tr>
<th>Name</th>
<th>Role</th>
<th>Signature</th>
<th>Date</th>
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<tbody>
<tr>
<td>Mark Dunk</td>
<td>Civil Standards Manager</td>
<td>Signature</td>
<td>23/05/2013</td>
</tr>
</tbody>
</table>

Reviewed and Approved by:

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Signature</th>
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D20 Excavating and filling

To be read with Preliminaries/ General Conditions.

GENERALLY/THE SITE

112 SITE INVESTIGATION REPORT
This section assumes that a site Investigation Report has been produced for this site.

150 EXISTING SERVICES, FEATURES AND STRUCTURES
The contractor must verify all existing services prior to excavation and not rely solely on information provided.

CLEARANCE/EXCAVATING

168 SITE CLEARANCE
Clear site of rubbish and debris.
Clear site of vegetation
Grub up and dispose of large roots without undue disturbance of soil and adjacent areas.

240 ADJACENT EXCAVATIONS
• Where an excavation encroaches below a line drawn at an angle of 30º from the horizontal 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

250 PERMISSIBLE DEVIATIONS FROM FORMATION LEVELS
• Beneath mass concrete foundations: ±25 mm.
Beneath ground bearing slabs and RC. foundations: ±15 mm.
• Embankments and cuttings: ±50 mm.
• Ground abutting external walls: ±50 mm, but such as to ensure that finished level is not less than 150 mm below dpc.

260 INSPECTING FORMATIONS
• Make advance arrangements with Project Manager for inspection of formations for the following:
  Foundations to switch house.
  Remove the last 150 mm of excavations just before inspection. Trim excavations to required profiles and levels, and remove all loose material.
  Unless otherwise instructed seal formations within 4 hours of inspection with concrete or other specified fill.

270 FOUNDATIONS GENERALLY
Obtain instructions if:
A natural bearing formation of undisturbed subsoil is not obtained at the depth shown on the drawings.
The formation contains soft or hard spots or highly variable material.

280 TRENCH FILL FOUNDATIONS
• Excavation: Form trench down to formation in one operation.
• Safety: Prepare formation from ground level.
• Inspection of formations: Give notice before commencing excavation.
  Period of notice: Five working days.
• 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.
290 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.

310 UNSTABLE GROUND
- Generally: Ensure that the excavation remains stable at all times. Inform the Project Manager without delay if any newly excavated faces are too unstable to allow earthwork support to be inserted.
- Take action: If instability is likely to affect adjacent structures or roadways, take appropriate emergency action.

330 UNRECORDED FEATURES
- Give notice: If unrecorded foundations, beds, voids, basements, filling, tanks, pipes, cables, drains, manholes, watercourses, ditches, etc. not shown on the drawings are encountered. Do not disturb or enter before further instructions are received.

360 EXCESS EXCAVATION
- Backfill any excavations taken:
  Wider than required with the material specified for backfilling.
  Deeper than required with well graded granular material or lean mix concrete.

DISPOSAL OF MATERIALS

415 EXCAVATED TOPSOIL REMOVAL
Remove from site surplus excavated material not specified to be used as backfill.

441 SURPLUS SUBSOIL
Remove from site surplus excavated material not specified to be spread and levelled or stockpiled.

450 WATER
Generally: Keep all excavations free from water until:
- Formations are covered.
- Below ground constructions are completed.
- 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 or soakaways (new and existing) with silt laden water.

454 GROUND WATER LEVEL, SPRINGS OR RUNNING WATER
Inform the Project Manager immediately if it is considered that the excavations are below the water table so that the ground water level can be determined.

457 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.
  Locations: Submit proposals.
FILLING

500 PROPOSED FILL MATERIALS
- Details: Submit full details of proposed fill materials to demonstrate compliance with specification, including:
  - Type and source of imported fill.
  - Proposals for processing and reuse of material excavated on site.
  - Test reports as required elsewhere.
- Timing: At least 21 days before starting filling.

510 HAZARDOUS, AGGRESSIVE OR UNSTABLE 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, including 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.
  - Unacceptable, class U2 as defined in the Highways Agency ‘Specification for highway works’, clause 601.

512 LIMITATION OF SULFATE CONTENT IN FILL MATERIALS
- Test specification: To BS 1377-3.
- Sulphate content: Expressed as SO3.
  - Water soluble sulphate (maximum): 1 mg/L in 2:1 water/soil extract.
- Certificates of test result, from UKAS/NAMAS accredited laboratory: Submit.

520 FROST SUSCEPTIBILITY
- General: Except as allowed below, fill must be non frost-susceptible as defined in Highways Agency ‘Specification for highway works’, clause 801.8.
- Test reports: If the following fill materials are proposed, submit a laboratory report confirming they are non 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:
  - At depths below the finished ground surface greater than 600 mm.
  - Within the external walls of buildings below spaces that will be heated. Protect from frost during construction.
  - Where frost heave will not affect structural elements.

530 PLACING FILL
- Ensure that excavations and areas to be filled are free from loose soil, rubbish and standing water.
  - Do not use frozen materials or materials containing ice. Do not place fill on frozen surfaces.
  - Take all necessary precautions to avoid overloading of adjacent structures and to ensure stability. Place and compact fill against structures, membranes or buried services in a sequence and manner which will ensure stability and avoid damage.
  - Plant employed for transporting, laying and compacting must be suited to the type of material.
  - Lay differing materials separately so that only one type of material occurs in each layer.
540 BENCHING FILL
- Where, during the progress of work, the difference in level between adjacent areas of filling exceeds 600mm, cut into edge of higher filling to form benches having minimum width of 600mm and a height equivalent to the depth of a layer of compacted filling. Spread and compact new fill layer to ensure maximum continuity with the previous filling.

610 COMPACTED FILLING FOR LANDSCAPE AREAS
- Fill: Material capable of compaction by light earthmoving plant.
- Filling: Layers not more than 200 mm thick. Lightly compact each layer to produce a stable soil structure.

626 COMPACTED GENERAL FILL
Well graded granular material, as defined below, arising from the excavations or imported. If both suitable and unsuitable material is excavated, select and keep separate sufficient suitable material. If there is insufficient suitable excavated material provide PM with details and obtain instructions regarding the importation of material.
Well graded sands and gravels with a uniformity coefficient of more than 10.
Crushed hard rock or quarry waste (other than chalk).
Crushed concrete, crushed brick or tile, free from plaster, wood, organic material and rubbish.
Sound blast furnace slag (other than from steel making foundries).
Well burnt non plastic shale.
Lay and compact in layers using suitable plant as in the table below. The figures given alongside each type of plant and for each material group are the maximum depth of compacted layer in mm and (in parentheses) the minimum number of passes.

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Smooth wheeled roller:</th>
<th>Vibrating roller:</th>
<th>Vibrating plate compactor:</th>
<th>Vibro-tamper:</th>
<th>Power rammer:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Tonnes per m width of roll</td>
<td>per m width of roller</td>
<td>tonnes per sq m of base plate</td>
<td>Static load in kg</td>
<td>Static load in kg</td>
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<tr>
<td>2.1-2.7</td>
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<td>125(8)</td>
<td>75(6)</td>
<td>100(3)</td>
<td>150(6)</td>
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<td>2.7-5.4</td>
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<td>150(8)</td>
<td>125(6)</td>
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<tr>
<td>Over 5.4</td>
<td>150(8)</td>
<td></td>
<td>Over 1.8</td>
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<tr>
<td>0.7-1.3</td>
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<td>Over 3.6</td>
<td>225(4)</td>
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700 BACKFILLING AROUND FOUNDATIONS
- Under oversite concrete and pavings: Hardcore.
- Under grassed or soil areas: Material excavated from the trench, laid and compacted in 300 mm maximum layers.
710 HARD CORE FILLING
Granular material, free from harmful matter and excessive dust, well graded, passing a 75 mm BS sieve and in any one layer only one of the following:
- Crushed hard rock or quarry waste (other than chalk) 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
- Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay
- Sound blastfurnace slag (other than from steelmaking foundries)
- Unburnt colliery spoil (minestone).
Spread and level both backfilling and general filling in layers not exceeding 150 mm. Thoroughly compact each layer with a vibratory roller, vibrating plate compactor, vibro-tamper, power rammer or other suitable means.

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

890 SITE COMPOUND
- LANDSCAPE: Within site boundary accept paved areas, 40mm single size, clean washed natural (rounded where possible) shingle (coarse aggregate) to Table 3, BS 882:1992, 100mm deep. As specified on the drawings. Shingle laid over porous geotextile membrane (UK Power Network's current standard is 'Mypex', an alternative is 'Terram' or similar) to aid weed control. The formation to be weed killed prior to laying membrane, subject to UK Power Network's environmental policy with respect to Site Sensitivity Category's 1, 2 and 3.
E05 In situ concrete construction generally

To be read with Preliminaries/ General Conditions.

110 ARRANGEMENT OF INFORMATION
The different parts of in situ concrete construction are specified in separate sections as follows:
E10 In situ concrete mixes, casting and curing
E20 Formwork
E30 Reinforcement
E40 Designed joints
E41 Worked finishes
Clauses dealing with particular aspects of certain types of construction may thus be dispersed over several sections.

310 SURFACE REGULARITY OF CONCRETE FLOORS TO BS 8204 - GENERAL
Sudden irregularities are not permitted. When measured with a slip gauge to BS 8204:Part 1 or 2, Figure 3 or equivalent, the variation in gap under a straightedge (with feet) placed anywhere on the surface to be not more than the following:
Floors which are to be self-finished, and floors to receive sheet or tile finishes directly bedded in adhesive:
5 mm under a 3 m straightedge
2 mm under a 1 m straightedge
Floors to receive screeds/toppings/beds up to 50 mm thick:
10 mm under a 3 m straightedge.
Floors to receive mastic asphalt flooring or underlay laid over mastic asphalt levelling coat(s): 10 mm under a 3 m straightedge.
Floors to receive mastic asphalt flooring or underlay laid direct: To the same surface regularities as defined in clause M11/760.

320 EXPOSED CONCRETE CONSTRUCTION
The following clauses in other sections relate specifically to exposed concrete:
Concrete mix: E10/105, 110, 115, 120, 125
Curing periods: E10/821
Protection: E10/840
Fine smooth finish: E20/600
Cover spacers: E30/491
Rust staining: E30/510
Checking cover: E30/520
Construction joints: E40

410 IN SITU CONCRETE CONSTRUCTION - SUPERVISION/ CHECKING
Standard: To BS EN 13670, Execution Class 2.
E10 Mixing/casting/curing in situ concrete

To be read with Preliminaries/ General Conditions.

CONCRETE MIXES

101 SPECIFICATION
- Concrete generally: To BS 8500-2.
- Exchange of information: Provide concrete producer with information required by BS 8500-1, clauses 4 and 5.

105 DESIGNATED CONCRETE FOR BLINDING
- Designation: GEN3.
- Fibres: Not required.
- Aggregates:
  - Size (maximum): 20 mm.
  - Coarse recycled aggregates: Not permitted.
  - Additional aggregate requirements: None.
  - Special requirements for cement/ combinations: None.
  - Consistence class: Contractor's choice.
  - Chloride class: Normal.
  - Admixtures: None.
  - Additional mix requirements: None.

105 DESIGNATED CONCRETE FOR SCREED TO PCC FLOOR SLABS
- Designation: RC28/35.
- Fibres: Not required.
- Aggregates:
  - Size (maximum): 10 mm.
  - Coarse recycled aggregates: Not permitted.
  - Additional aggregate requirements: None.
  - Special requirements for cement/ combinations: None.
  - Consistence class: Contractor's choice.
  - Chloride class: Normal.
  - Admixtures: None.
  - Additional mix requirements: None.

110 BASIC DESIGNATED CONCRETE FOR SWITCH HOUSE FOUNDATIONS AND FENCE FOUNDATIONS
- Designation: RC30/37.
- Coarse recycled aggregates: Not permitted.
- Consistence class: Contractor's choice.
- Additional requirements: Submit proposals.

MATERIALS, BATCHING AND MIXING

215 READY-MIXED CONCRETE
- must be used for designed mixes and must be obtained from a plant which holds current certification meeting the requirements of the NACCB, Category 2 for product conformity. Each mix must be obtained from only one source unless otherwise approved. Confirm name and address of depot(s) to Project Manager before any concrete is delivered. Retain all delivery notes for inspection.
225 CHANGES TO SPECIFICATION
- Changes to specification of fresh concrete (outside concrete producer's responsibility): Submit proposals.

255 CEMENTS:
- The following abbreviations apply:
  - PC42.5 Portland cement, Class 42.5 (in lieu of OPC)
  - PC52.5 Portland cement, Class 52.5 (in lieu of RHPC)
  - SRPC Sulphate resisting Portland cement
  - PBFC Portland blastfurnace cement
  - HSBC High slag blastfurnace cement (in lieu of LHPBC)
  - PPFAC Portland pulverised-fuel ash cement
  - ggbs Ground granulated blastfurnace slag
  - pfa Pulverized fuel ash

Cements, ggbs and pfa must comply with the relevant British Standards. Portland cements must have cement certification meeting the requirements of the NACCB, Category 2 for product conformity.

315 AGGREGATES FOR EXPOSED VISUAL CONCRETE
- To BS 882, of consistent colour, free from absorbent particles which may cause 'popouts', and other particles such as coal and iron sulphide which may be unsightly or cause unacceptable staining. Obtain from one source, and ensure that adequate supplies can be maintained throughout the contract. Provide samples of proposed aggregates on request.

325 EXPOSED CONCRETE
- Obtain approval before altering constituent materials or proportions of concrete which will be exposed in the finished work.

415 ADMIXTURES
- Calcium chloride and admixtures containing calcium chloride: Do not use.

460 ENRICHMENT OF MIX
- Subject to approval, the aggregate: cement ratio may be reduced by up to 10% for the first layer of concrete in walls and columns

490 PROPERTIES OF FRESH CONCRETE:
- To be determined by the Contractor in consultation with the concrete supplier to suit the on site circumstances and methods, but in all respects maintaining compliance with this Specification.
PROJECT TESTING/ CERTIFICATION

510 COMPLETE CORRELATION OF RECORDS:
must be maintained for each Designed and Prescribed mix, including:
Information in accordance with BS 8500-2:2006:Part 3, clauses 3.1 and 3.2.
All sampling, site tests and identification numbers of all specimens tested in the laboratory.
The location of the part(s) of the structure represented by each sample.
The location in the structure of the batch from which each sample is taken.

520 TEST LABORATORY
All specified testing of concrete other than slump testing of cubes to be carried out by one
NAMAS accredited laboratory. Submit the name of the selected laboratory to Project
Manager as soon as possible and in any case before making trial mixes or concrete for use
in the works:

530 TESTS RESULTS
• Submission of reports: Within one day of completion of each test.
  Number of copies: Three.
• Reports on site: A complete set, available for inspection.

540 BROKEN CUBES
Keep separately the pieces of each cube which fails to meet the compliance requirements
for individual results. Obtain agreement of Project Manager before discarding.

580 FAILURES
If a concrete sample fails to achieve specified criteria or to pass specified tests, inform the
Project Manager without delay and submit: Confirmation of the validity of the test results, and/or
Proposals for further tests to assess the strength of the concrete in the structure, as set
out in BS 6089, and/or Proposals for rectification.
Obtain approval of all such evidence and proposals before proceeding. The Project
Manager may issue instructions for the work to be stopped or delayed until reasons for
the failure have been established, possible consequences assessed, and appropriate
preventative and remedial measures taken

590 FAILURES
Wherever the specified sampling, testing and compliance procedures show that a concrete
mix is not in accordance with the specification (even if the work is eventually accepted), and
measures are taken to help in establishing whether or not the work is acceptable, such
measures:
will be at the expense of the Contractor, and will not be considered as grounds for extension of
time.

PLACING/ COMPACTION/ CURING AND PROTECTION

630 PREMATURE WATER LOSS
• Requirement: Prevent water loss from concrete laid on absorbent substrates.
  Underlay: Select from:
  Polyethylene sheet: 250 micrometres thick.
  Building paper: To BS 1521, grade B1F.
  Installation: Lap edges 150 mm.

640 CONSTRUCTION JOINTS
• Submit details of proposed locations and obtain approval before proceeding.
  Carefully brush and spray surface while concrete is still green to remove surface laitance
  and expose aggregate finish. Obtain approval from the PM for any alternative method.
  Surface to be clean and damp when fresh concrete is placed against it.
SURFACES TO RECEIVE CONCRETE
- Cleanliness of surfaces immediately before placing concrete: Clean with no debris, tying wire clippings, fastenings or free water.

PLACING
- Records: Maintain for time, date and location of all pours.
- Timing: Place as soon as practicable after mixing and while sufficiently plastic for full compaction.
- Temperature limitations for concrete: 30°C (maximum) and 5°C (minimum), unless otherwise specified. Do not place against frozen or frost covered surfaces.
- Continuity of pours: Place in final position in one continuous operation up to construction joints. Avoid formation of cold joints.
- Discharging concrete: Prevent uneven dispersal, segregation or loss of ingredients or any adverse effect on the formwork or formed finishes.
- Thickness of layers: To suit uneven dispersal, segregation or loss of ingredients or any adverse effect on the formwork or formed finishes.
- Poker vibrators: Do not use to make concrete flow horizontally into position, except where necessary to achieve full compaction under void formers and cast-in accessories and at vertical joints.

COMPACTING
- General: Fully compact concrete to full depth to remove entrapped air. Continue until air bubbles cease to appear on the top surface.
  Areas for particular attention: Around reinforcement, under void formers, cast-in accessories, into corners of formwork and at joints.
- Consecutive batches of concrete: Amalgamate without damaging adjacent partly hardened concrete.
- Methods of compaction: To suit consistence class and use of concrete.

VIBRATORS
- Inform Project Manager of the number and type of vibrators to be used. Provide standby vibrators. Do not use external vibrators without approval.

PLASTIC SETTLEMENT
At the top of deep sections and at significant changes in the depth of concrete sections, closely and continuously inspect the fresh concrete for signs of settlement during the first few hours after placing. While the concrete is still capable of being fluidized by the vibrator, re-vibrate as necessary to remove settlement cracking which may be forming either on the top surface or against the upper part of the vertical formwork.

CURING GENERALLY
Evaporation from surfaces of concrete: Prevent, including from perimeters and abutments, throughout curing period.
Surfaces covered by formwork: Retain formwork in position and, where necessary to satisfy curing period, cover surfaces immediately afterstriking.
Top surfaces: Cover immediately after placing and compacting. If covering is removed for finishing operations, replace it immediately afterwards.
Surface temperature: Maintain above 5°C throughout the specified curing period or four days, whichever is longer.
COVERINGS FOR CURING
Coverings for curing may be suitable impervious sheet materials or a suitable curing
compound containing a fugitive dye and with an efficiency of at least 75% (90% for surfaces
exposed to abrasion). They:
Must be effective in preventing evaporation, particular attention being paid to sealing at
dges and junctions.
Must not disfigure permanently exposed surfaces.
Must not affect the satisfactory bond of subsequent construction and finishes.
Curing compounds applied to surfaces which will be exposed in the finished work or which
are to receive bonded finishes must be removed by light, even grit blasting.
Until the exposed top faces of fresh concrete are in a state suitable to receive sheets in
direct contact or a sprayed curing compound as applicable, cover with waterproof
sheeting held clear of the surface and well sealed against draughts at edges and junctions.

CURING PERIODS IN DAYS
Concrete surfaces which in the finished building will be exposed to the elements; concrete
wearing surface floors and pavements; watertight concrete:

<table>
<thead>
<tr>
<th></th>
<th>Concrete made using PC42.5, PC52.5, SRPC,</th>
<th>Concrete made using PPFAC, PBFC, HSBC, pfa, ggbs</th>
</tr>
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<tbody>
<tr>
<td>November to April</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>May to October</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

Other structural concrete surfaces: No special requirements if in damp weather and
Protected from sun and wind, otherwise as follows (cements as above):

<table>
<thead>
<tr>
<th></th>
<th>Concrete made using PC42.5, PC52.5, SRPC,</th>
<th>Concrete made using PPFAC, PBFC, HSBC, pfa, ggbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>November to April</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>May to October</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

Obtain prior approval for curing periods for mixes using admixtures or other types of cement.

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

To be read with Preliminaries/Generic Conditions.

GENERALLY/ PREPARATION

110 LOADINGS
- Requirement: Design and construct formwork to withstand the worst combination of the following:
  - Total weight of formwork, reinforcement and concrete.
  - Construction loads including dynamic effects of placing, compacting and construction traffic.
  - Wind and snow loads.

120 DETAILS
Provide details of forms as follows:
- Positions and types of construction joints.
- Layout of panel joints where exposed to view.
- Layout of form tie holes where exposed to view.
- Means of sealing panel joints, form tie holes and at construction joints.
- Surface of forms and other means of obtaining required finish.
- Access doors

170 WORK BELOW GROUND.
- Vertical faces of strip footings, bases and slabs may be cast against faces of excavation, provided:
  - Prior approval is obtained.
  - The faces are sufficiently accurate and stable.
  - Supports to faces are withdrawn progressively as concrete is placed.
  - Adequate measures are taken to prevent contamination of concrete.
  - Faces of walls must be cast against formwork.

172 FIXING PERMANENT STEEL SHUTTERING TO IN SITU CONCRETE SLAB
- Length/width of sheet bearing onto support: refer to the details.
- Fixing to supports:
  - As specified on the drawings and to comply with the product manufacturers recommendations

176 TEMPORARY SUPPORTS TO PROFILED STEEL SHEETS
- Nature: Continuous across full width of slab.
- Number in each span: Two.
- Location: At third points of each span.
- Width of bearing (minimum): 100 mm.
- Deflection of bearer (maximum): 5 mm.
- Removal of temporary supports: Obtain instructions.

178 FORMATION OF OPENINGS IN COMPOSITE ACTION SLABS
- Generally: Except as otherwise agreed, box out for openings in concrete.
- Forming holes in profiled steel sheet:
  - Timing: For openings not trimmed by structural steelwork, do not cut sheet until concrete reaches 50% of its 28 day strength.
  - Method: Cutting.
CONSTRUCTION

310 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 any required cambers).
- Intersections, lines and angles: Square, plumb and true.

315 SUBSTRUCTURE FORMWORK AND UNDERSLAB INSULATION
- Cutting: Neat and accurate to edges, and around penetrations and downstands.
- Laying: Tightly butted and fully supported on firm, even substrate.
- Vertical faces: Stiffen as necessary to act as shutter.
- Formwork/insulation surfaces: Protect from indentation by spacers and other items.
- Joints in formwork/insulation and with edge structure and penetrations: Seal to prevent penetration of concrete.
- Concrete placement: Restrain formwork/insulation against movement.

320 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.

330 INSERTS, HOLES AND CHASES
- Confirm positions and details to ensure that alterations to and decisions about their size and location are not made without the knowledge and approval of the Project Manager. Fix inserts or box out as required in correct positions before placing concrete. Form all holes and chases. The approval of the PM must be given prior to cutting hardened concrete.

340 FORM TIES
- No metal part of any device for securing forms is to remain within the specified concrete cover.

350 RELEASE AGENTS
- Type(s) which are suitable for use with the type(s) of formwork, formed finishes and specified applied finishes. Use the same type and make throughout the entire area of any one finish. Apply evenly to form faces, from top downwards, and to horizontal surfaces last. Use the minimum amount necessary to obtain a clean release and prevent excessive local collection. Prevent release agent touching the reinforcement, hardened concrete, other materials not part of the form face, and permanent forms.

360 SURFACE RETARDERS
- Do not use without approval. Prevent retarder from touching the reinforcement.
STRIKING

510 STRIKING FORMWORK
• Strike formwork without disturbing, damaging or overloading structure, and without disturbing props.
  Notwithstanding other clauses in this specification and any checking or approvals by the Project Manager, the responsibility for safe removal of any part of the formwork and any supports without damaging the structure rests with the Contractor.

521 MINIMUM PERIOD FOR RETAINING FORMWORK/ TEMP SUPPORTS IN POSITION
• The following periods (in days) for retaining formwork in position before striking apply to Class 42.5 or sulphate-resisting Portland cement concrete with no cement replacement materials or admixtures:

<table>
<thead>
<tr>
<th>Type of formwork during the period</th>
<th>Average mean of daily minimum and maximum air temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16 °C</td>
</tr>
<tr>
<td>Vertical formwork to columns, walls and beams</td>
<td>0.5</td>
</tr>
<tr>
<td>Soffit forms to slabs</td>
<td>4</td>
</tr>
<tr>
<td>Props to slabs and soffit forms to beams</td>
<td>10</td>
</tr>
<tr>
<td>Props to beams</td>
<td>14</td>
</tr>
</tbody>
</table>

Submit details of proposed periods for mixes using admixtures or other types of cement.

522 MINIMUM PERIODS
• Alternative methods of determining minimum periods for retaining formwork in position may be submitted for approval.
  The contractor will accept responsibility for cost of checking of proposals by Project Manager and for any testing.

FORMED FINISHES

600 FINE SMOOTH FINISH TO EXPOSED CONCRETE FACES
• Produce a smooth even finish with an impervious sheet material (e.g. resin film faced plywood), with panels as large as is practicable and arranged in an approved regular pattern as a feature of the surface.
  Do not replace parts of formwork panels where this may cause a change of colour in the concrete.
  Abrupt irregularities to be not greater than 3 mm. Gradual irregularities, expressed as maximum permissible deviation from a 1 m straight edge, to be not greater than 3 mm.
  Variation in colour resulting from the use of an impermeable form lining will be permitted but the surface is to be free from discoloration due to contamination or grout leakage.
  Cover spacers: Do not use without prior approval of the PM.
  Blowholes less than 3 mm in diameter will be permitted but otherwise surface to be free from voids, honeycombing, segregation and other defects.
  Making good: Projecting fins are to be removed and rubbed down with a carborundum stone but otherwise the finish is to be left as struck. Making good will not normally be permitted.
  Edges to be chamfered with a 25mm or 50mm corner face as architects details
  Formwork tie holes to be in an approved regular pattern, filled with matching mortar to an approved sample.

Complete a sample area of the finished work, size 2 sq m, in advance of the remainder, in an approved location, and obtain approval of appearance before proceeding.
E30 Reinforcement for in situ concrete

To be read with Preliminaries/ General Conditions.

110 Quality Assurance of Reinforcement
All steel reinforcement specified to comply with BS 4449 and cut and bent to BS 8666:2005 is to be obtained from firm(s) holding a valid certificate of approval for the manufacture and/or fabrication of steel reinforcement issued under a third party quality assurance scheme operated by a certification body approved by the National Accreditation Council.

140 Plain Bar Reinforcement
• Standard: To BS 4482.
  Strength grade: 250.

150 Ribbed Bar Reinforcement
• Standard: To BS 4449.
  Strength grade: B500B.

210 Standard Fabric Reinforcement
• Standard: To BS 4483.
• Strength grade: B500B.

310 Cutting and Bending Reinforcement
• Reinforcement to schedules and to BS 8666:2005. Do not bend when below 5 °C without approval from the PM. Steel may be warmed to not more than 100 °C. Do not rebend bars without approval from the PM.
  Tag bundles of reinforcement with labels to BS 4466.

320 Protection of Reinforcement
• Dropping from height, mechanical damage and shock loading: Prevent.
• Cleanliness of reinforcement at time of pouring concrete: Free from corrosive pitting, loose mill scale, loose rust and contaminants which may adversely affect the reinforcement, concrete, or bond between the two.

335 Adjustment of Reinforcement
• Provide onsite facilities for hand bending to deal with approved minor adjustments from the PM.

345 Projecting Reinforcement
• Grade B500B bars must not be bent or straightened without approval from the PM.

410 Laps Not Detailed on Drawings
Obtain instructions from the PM, following approval from the design engineer if details are not shown on drawings.

420 Laps
• In nominal bar reinforcement to be not less than 300 mm

421 Laps in Fabric Reinforcement
• Where not detailed, to be not less than 450 mm. Where necessary seek instructions from the PM to avoid a four-layer build-up at corners.

431 Structural Weld Joints in Bars
• Will not be permitted.
451 FIXING REINFORCEMENT GENERALLY
Unless otherwise permitted fix reinforcement in position before placing concrete. In addition to any spacers and chairs shown on drawings or schedules, provide adequate support, tie securely and maintain the specified cover. Comply generally with Concrete Society Report CS 101 'Spacers for reinforced concrete' 1989
Unless otherwise specified tie using 16 swg annealed tying wire. Ensure that tying wire does not intrude into the concrete cover. Do not tack weld unless authorised by the Project Manager and recommended by the reinforcement manufacturer.
Do not fix or place reinforcement in contact with nonferrous metals.

470 COVER
Not less than the nominal cover minus 5 mm.
Where reinforcement is located in a particular direction in relation to only one face of a member, not more than the nominal cover plus:
5 mm on bars up to and including 12 mm size.
10 mm on bars over 12 mm up to and including 25 mm size.
5 mm on bars over 25 mm size.
Before concreting check thoroughly that the specified cover dimensions have been achieved.

491 SPACERS
To formed concrete finishes, contractor is to provide details for the Project Manager's approval. Contractor to be responsible for adequate chair bars etc of acceptable standard to the Project Manager's approval.

500 DAMAGE
- Prevent damage to and disfigurement of forms, form linings and adjacent work.

510 RUST STAINING
- Prevent rust staining of surfaces of concrete which will be exposed to view in the finished work, caused by, e.g. rust stained formwork or unprotected projecting reinforcement.

520 CHECKING COVER
- Check the position of the reinforcement in the hardened concrete as soon as practicable after casting using a magnetic induction digital display type cover meter in accordance with manufacturer's recommendations and BS 1881:Part 204. Pay particular attention to columns, beams, cantilevers, soffits of slabs and all faces which will be exposed to the weather in the finished building. Inform Project Manager when such checking is to be carried out, confirm that it has been carried out and that the results were satisfactory.
E40 Designed joints in insitu concrete

**To be read with Preliminaries/General Conditions.**

120 CONSTRUCTION/MOVEMENT JOINTS GENERALLY
Form joints accurately to detail and in locations shown on the drawings. If modifications to any joint design or location are necessary on site, agree revisions with Project Manager before proceeding. Do not allow concrete to enter any gaps or voids in the formwork or to render the movement joints ineffective. Do not allow concrete to impregnate or penetrate any materials used as compressible joint fillers. Do not place concrete simultaneously on both sides of movement joints.

121 ACCURACY
All joints to be accurately located, straight and well-aligned, and truly vertical or horizontal or parallel with the setting out lines of the building.

141 CONSTRUCTION JOINTS IN CONCRETE EXPOSED TO VIEW
Additional to joints required by the designer, will normally be permitted, but not in exposed bund walls. If such additional joints are required, allow accordingly in the rates. Obtain approval of proposed locations.

210 FORMED JOINTS
- Forms/stop ends generally: Rigid and grout-tight.
- Forms/stop ends for projecting continuity reinforcement: To accommodate bars or fabric without temporary bending or displacement.

230 PREPARATION OF CONSTRUCTION JOINTS
- Roughening of joint surfaces: Select from:
  - Brushing and spraying: Remove surface laitance and expose aggregate finish while concrete is still green.
  - Other methods: Submit proposals.
- Condition of joint surfaces immediately before placing fresh concrete: Clean and damp.

410 TIE BARS
- To BS 4449:2005, Grade 250, clean and free from loose millscale, loose rust, ice, oil and other deleterious substances. Fix securely at the stated centres, at the required depth and centred on the joints.

420 FABRIC TIE STRIPS
- Standard: To BS 4483.
- Cleanliness: Free from corrosive pitting, loose mill scale, loose rust and contaminants which may adversely affect the fabric, concrete, or bond between the two.
- Position: Width of the mesh strip centred on the joint.

520 SHEET JOINT FILLER FOR EXPANSION JOINTS
- Manufacturer: Serviced.
- Product reference: Kork-Pak or similar approved.
- Joints finished with sealant: Leave sufficient space for sealant by using temporary formers.

530 SEALANT FOR INTERNAL MOVEMENT JOINTS
- Manufacturer: Serviced.
- Product reference: Paraseal or similar approved.
- Colour of surfaces exposed to view: to match surrounding finish colour.
- Preparation and application: As section Z22.
E41 Worked finishes to in situ concrete

To be read with Preliminaries/ General Conditions.

150 FINISHING
• Timing: Carry out at optimum times in relation to setting and hardening of concrete.
• Prohibited treatments to concrete surfaces:
  Wetting to assist surface working.
  Sprinkling cement.

330 TROWELLED FINISH FOR WEARING SURFACES
• For Slabs, and exposed fence foundations.
  Float concrete to an even surface with no ridges or steps, then immediately commence curing as specified in section E10.
  Successively hand or power trowel at intervals, applying sufficient pressure to close the surface, to give a uniform smooth finish free from trowel marks and other blemishes.
  Resume specified curing without delay.
  Complete a sample area of the finished work, size 6m², in advance of the remainder, in an approved location, and obtain approval of appearance before proceeding.

331 SURFACE TREATMENT
  to receive surface sealer finish. All surfaces to be correctly prepared using appropriate mechanical equipment in accordance with manufacturers’ recommendations.

520 SURFACE SEALER
• Apply an approved resin sealer to concrete wearing surface floors in accordance with manufacturer’s recommendations.
  Contractor to provide proposals for approval.

530 SLIP RESISTANCE TESTING OF WEARING SURFACES
• Test: To BS 7976-2 using a Transport Research Laboratory (TRL) Pendulum.
  Timing: Give adequate notice.
• Test results: Submit, inclusive of slip resistance values (pendulum test value [PTV]), in the wet and dry states.
G10 Structural steel framing

To be read with Preliminaries/ General Conditions.

GENERAL REQUIREMENTS/ INFORMATION

115 DESIGN CONSTRAINTS - GENERAL
• The structural steelwork shown on the drawings and described in this specification has been
designed to BS EN 1993-1-1 where applicable, unless otherwise stated. The Building Designer
is to undertake a full analysis and design of the steel frame, including design and details of joints,
wind bracing and cladding fixings to reflect the site conditions and the Switchroom layout that is
specified in their Clients Brief.

116 DESIGN CONSTRAINTS - STEELWORK TO BE GALVANIZED
Steel grades: Do not use steel downgraded from a higher specification.
Detail design: Avoid details that will increase the risk of initiating liquid metal assisted cracking
(LMAC).
Particular restrictions: None.
Other requirements: Drill holes for bolts and Seal vent and drainage holes in hollow sections
using non-ferrous plugs.

117 BASEPLATES
All steelwork baseplates to be painted on all surfaces as Section M60

118 STEELWORK BELOW GROUND
Exposed external steelwork that will be below finished ground level to be bitumen coated or
similar approved, by main contractor.

125 SPECIFICATION STANDARD
Comply with the latest edition of the National Structural Steelwork Specification unless
otherwise stated
All rolled steel sections, flats, plates shall consist of Grade S275 Steel, complying in all
respects with BS EN 10025

COLD FORMED MATERIALS

170 COLD-FORMED GALVANIZED STEELROOF PURLINS AND WALL CLADDING RAILS
• Manufacturer: Kingspan.
  Product reference: Refer to drawings.
  Material: Galvanized steel sheet to BS EN 10326.
  Thickness: As specified on the drawings.
  Designation: As shown on drawings.

176 PROFILED SHEET FOR COMPOSITE FLOOR SLABS
Nature of permanent supports: Steel.
Manufacturer: Richard Lees.
Product reference: Holorib 51/1.0.
Material: Galvanized steel sheet to BS EN 10326.
Thickness: 1.0 mm.
Designation: S350.
Metal accessories: Provided by sheet manufacturer unless otherwise indicated:
Edge trims and restraint straps;
Side closure pieces; and
End closures.
Finish: As for sheet.
Seam stitching:
Fixings/ centres: As recommended by Manufacturer.
Coating applied by manufacturer: Galvanized.
178 FIXING PROFILED SHEET TO STEELWORK

- End supports:
  - Length of sheet bearing onto support (minimum): 50 mm.
  - Fixing type/size: 19 mm diameter x 100 mm high through welded shear connectors.
  - Coating applied by manufacturer: None.
  - Location: In trough of sheet.
  - Number/centres of fixings: Every trough at end of sheet; alternate troughs at internal supports.
  - Distance from end of sheet (minimum): 20 mm.
  - Distance from edge of support (minimum): 20 mm.

- Side supports:
  - Width of sheet bearing onto support (minimum): 50 mm.
  - Fixing type/size: 6.3 mm diameter self-drilling screws.
  - Coating applied by manufacturer: Zinc plated.
  - Centres of fixings (maximum): 200 mm.
  - Distance from edge of sheet (minimum): 20 mm.
  - Distance from edge of support (minimum): 20 mm.

- Other requirements: Install temporary supports before fixing sheets to permanent supports.

FABRICATION

180 NOTIFICATION OF COMMENCEMENT

- Inform PM when fabrication is due to start. Do not fabricate steelwork for which the drawings have not been checked by Project Manager.
- Before fabricating, ensure that surface condition of steel which is to be coated complies with requirements for cleaning given elsewhere in this specification.
- Ensure that fabrication processes do not cause changes in properties of materials resulting in non-compliance with specified requirements.

WELDING

255 SITE WELDING

- Notwithstanding NSSS clause 8.7, site welding is not permitted unless shown on drawings or otherwise approved.
- When permitted, ensure suitable, safe working conditions. Do not weld when surfaces are wet or when the ambient temperature is below 0 degC.

290 FINISHING WELDS

Carefully dress welds to remove slag by light hammering, wire brushing or other methods that do not deform the surface of the weld.

295 ADDITIONAL - WELDING

Do not place any welds (including tack welds) not shown on drawings, without approval, even for temporary attachment or repair of faulty plates.

BOLT ASSEMBLIES

305 WASHERS, SCREWS, BOLTS AND NUTS

- Manufacturer and reference: Hilti as indicated on drawings or similar approved.
- Finish: Electro zinc plated by manufacturer.
- The grade of black bolts shall be as shown on the drawings and be in accordance with relevant British Standards.
- Other requirements:
  - Plain washers shall be made of steel. Taper or other specially shaped washers shall be made of malleable cast iron to BS 4320
  - All bolts and nuts shall have a tensile strength not less than 40 Kg/mm2 and minimum elongation 14% as defined in table 14 of BS 4190
390 SEALEO D HOLLOW SECTIONS
• Holes: Sealed to prevent access of moisture.
Method of sealing: Submit proposals.

ERECTION

410 PRE-ERECTION CHECKS
• Not less than 7 days before proposed start date, check foundations and other structures to which steelwork will be attached for accuracy of setting out, and holding down bolts for position, protruding length, condition and slackness.
Report any inaccuracies and defects to Main Contractor and Project Manager without delay.
Obtain permission of Project Manager to commence erection.

425 MODIFICATIONS
• Inform Project Manager of any defects due to detailing or fabrication errors.
Obtain approval of methods of rectification before starting modification or remedial work.

432 TEMPORARY SUPPORT
• Permanent bracing system:
  Vertical: Steel wall bracing as detailed.
  Horizontal: Composite action floors.
• Temporary bracing/ restraints: Provide as necessary until permanent bracing system is complete and sufficiently mature to carry loads and all connections have been made to the permanent system.
• Elements to be supported: frames.
• Bracing/ Restraints: Provide as necessary until permanent connection can be made to foundations.
• Forces and moments in elements: Contractor to make an independent assessment.

435 MOVEMENT JOINTS
Coat sliding surfaces with molybdenum disulphide grease before connecting.
Ensure that bolts are in centre of slotted holes after erection of structure and that the joint is free to move.

440 COLUMN BASES
• Levels: Adjust using steel shims or folding wedges no larger than necessary.
• Location of shims/ wedges: Position symmetrically around perimeter of base plate. Do not use a single central pack.
• Give notice: If space beneath any column base is outside specified limits for bedding thickness.
• Accuracy of erection: Check, and correct errors before filling and bedding beneath bases and carrying out other adjacent work.

443 PROPRIETARY FILLING/ BEDDING OF COLUMN BASES
• Bedding thickness range: 25 - 40 mm.
• Preparation: Concrete surfaces scarified to provide a good mechanical key.
• Bolt pockets and spaces beneath base plates: Completely filled with Non-shrink grout conforming to ASTM C827 Early Volume Change of Cementitious Mixtures mixed for pourable mix as per manufacturer's instructions.
Use Weber SBD 5 Star grout or similar approved.
Saint-Gobain Weber Ltd, Dickens House, Enterprise Way, Flitwick, Bedford. MK45 5BY
Tel 08703 330070 (Technical Services 01525 722110)
PROTECTIVE COATINGS

515 OPERATIVES
must be appropriately skilled and experienced in the use of specified materials and methods of application

520 COATING MATERIALS
Wherever possible, to be from one manufacturing batch. Where more than one batch is to be used, keep separate, allocate to distinct parts or areas of the work, and inform the Project Manager accordingly.
Check that all coating materials to be used are recommended by their manufacturers for the particular surface and conditions of exposure, and that they are compatible with each other.

521 ALTERNATIVE MANUFACTURERS
• Coating materials to be obtained from one only of the following manufacturers unless specified otherwise. Inform Project Manager of selected manufacturer at an early date.
Approval to be gained before ordering.

540 HANDLING AND STORING OF COATED STEELWORK
Use methods and equipment which will minimise chafing, chipping and other damage to coated components.
Ensure an adequate drying/curing period for each coat before handling.
Use suitable packings, lashings, lifting harnesses, nylon slings, rubber protected chains and chocks, etc.
Stack coated components clear of the ground, separated by timber chocks, and so that ponding does not occur.
545 REMEDIAL WORK
Early degradation of coatings by blistering, peeling, flaking, cracking, lack of adhesion, etc. must be made good by complete removal, preparation and reapplication of all coats, as instructed.
Inadequate dry film thickness or surface defects due to adverse weather may, depending on the type of paint, be remedied by rubbing down and applying further coat(s), as instructed.
Mechanical damage to coatings must be made good by local cutting back of coatings, preparation and reapplication of all coats to leave a neat, continuous and flat finish.
Where damage to coatings or subsequent surface preparation has exposed bare metal, it must be thoroughly cleaned and primed within two hours.

PROTECTIVE COATING SYSTEMS

620 GALVANIZING TO BLAST CLEANED STEEL
Use/location: All steel
Preparation: Blast cleaning to BS 7079:Part A1, preparation grade 2.5 using chilled iron grit grade G24 to give a coarse surface profile, followed by acid pickling.
Galvanizing: To EN ISO 1461:1999, minimum average coating thickness 140 micrometres.

PREPARATION FOR PAINTING

710 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 (option 3): 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.

715 INACCESSIBLE SURFACES
The sequence of working must be such as to ensure that surfaces inaccessible after assembly receive the full specified treatment and coating system including, if necessary, local shop application of site coatings.

755 UNCOATED FASTENERS
• Treatment: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Without delay, coat to match adjacent shop painted areas.

760 GALVANIZED FASTENERS
• After erection, repair any damage, thoroughly degrease and clean and apply 'Resistex L722 primer, by Leigh's Paints, Bolton, tel. 01204 521771, or similar approved, building up coats to the required finish as approved by the PM.
PAINTING OF BASEPLATES PRIOR TO ERECTION

810 ENVIRONMENTAL CONDITIONS

- Do not apply coatings:
  - To surfaces affected by moisture or frost.
  - Unless the steel temperature is at least 3 °C above the dew point with conditions stable or improving.
  - Unless the relative humidity is below 85%.
  - When heat is likely to cause blistering or wrinkling.
  - Take all necessary precautions including restrictions on working hours, providing temporary protection and allowing extra drying time, to ensure that coatings are not adversely affected by climatic conditions before, during and after application.
  - Application of coatings will be taken as joint acceptance by the Main Contractor and Subcontractor of the suitability of surfaces and conditions within any given area.

815 COATINGS

- Multiple coats of the same material must be of a different tint to ensure that each coat provides complete coverage.
  - Apply coatings to clean, dust free, suitably dry surfaces in dry atmospheric conditions and after any previous coats have cured adequately.
  - Apply coatings evenly to give a smooth finish of uniform thickness and colour, free from brush marks, nibs, sags, runs and other defects.
  - Keep all surfaces clean and free from dust during coating and drying. Adequately protect completed work from damage.

825 STRIPE COAT

- Where specified, brush apply an additional stripe coat to all external angles, nuts and bolt heads, rough weld seams, and areas that are difficult to coat.

850 JUNCTIONS WITH CONCRETE

- Exposed steelwork partially embedded or encased in concrete: Apply two coats of bituminous coating locally to the steel/concrete junction.
  - Bituminous coating: To BS 6949, type 1, class A.
H31 Metal profiled/ flat sheet cladding/ covering

To be read with Preliminaries/ General Conditions.

TYPES OF CLADDING SYSTEM

120 METAL COMPOSITE PANEL ROOF CLADDING
Drawing reference(s): EDS 07-0105-1205, EDS 07-0105-1209.
Supports: Kingspan Multibeam cold rolled purlins.
Bearing width: 50 mm
Pitch: minimum 4° or more after deflection
Manufacturer and reference: Kingspan Limited, roof cladding system for standard internal &
external non-corrosive, inland environments also Loss Prevention Certification Board certified to
LPS 1181 Grade EXT-B.
Test results:
LPS1181: 2005: Part 1: Issue 1, ceiling lining tests: Passed all requirements
Panels:
External facings:
Thickness: 0.5 mm nominal.
Finish/Colour: Kingspan XL FortéTM, colour standard from Symphony Range
Internal facings:
Thickness: 0.4 mm
Finish/Colour: Bright White Polyester.
Core insulation: EcoSafe LPCB certificated PIR formulation. Receiving BREEAM Credit
(Pollution 4: Insulant GWP) 2006 credit.
Panel thickness: 80mm core. (England & Wales)
End laps: 150 mm.
End lap sealant:
Triple line of factory applied weather seals (FAWS) on underside of panel cut-back.
Side lap sealant:
Single line factory applied weather seal (FAWS) on underside of panel side-lap.
Fasteners: As determined by clause 220A
Number and location:
Primary fasteners: As determined by clause 197A, but with each panel fixed to each support
using not less than three fastenings. Fix through every valley of profile, as recommended by
cladding manufacturer.
Secondary fasteners: Stitch external side laps at 450 mm maximum centres. End laps to be
stitched with one stitching screw per crown, 50mm from end lap.
Accessories:
Profile fillers as clause 300A.
Thermal Transmittance (U Value) calculated using the method required by the Building
Regulations Part L2A (England & Wales): 0.25 W/m2K.
Manufacturers 25 year thermal guarantee.
Air leakage rate of 5m3/hr/m2 at 50 Pa, based on the assumption that the full building
envelope is constructed using Kingspan panels.
Other requirements:
Internal face of panel to be air sealed along the full length by an unbroken run of 8mm
diameter butyl rubber sealant, Class A, ref: NFRC TB36.
Single line of non-setting gun-grade, PremSeal CV or similar, site applied across panel
side lap in line with internal air seal, located at eaves and ridge locations.
Manufacturers 40 year maintenance and inspection free coating guarantee.
Manufacturers coating guarantee to be available on project completion and be fully
transferrable for future changes of building ownership.
Panels manufactured under the following ISO standards 14001, 18001, 9001 Cladding
contractor to attend a product training course at Kingspan
PERFORMANCE COMPLIANCE
Verification: The system has an approved environmental profile with BRE Ecopoints score of 0.76 Cradle to Grave over 60 year study period.
Verifying authority: BRE Certification Ltd. – Scheme Document SD 028.

ATTACHMENT DESIGN PARAMETERS
(The Building Designer is to establish the various parameters for analysis of the structure that are appropriate for the location of their specific site location and is to record that information below:).
Determine the number and location of cladding fasteners recommended by the cladding manufacturer to resist wind loads calculated in accordance with BS 6399:Part 2 Standard Method and BS 5427:Part 1.
Calculate wind loads on roof and wall cladding appropriate to location, exposure, roof height, building shape and size in accordance with BS 6399:Part 2 Standard Method and BS 5427:Part 1.

Basic wind speed (Vb): m/s
Altitude factor (Sa):
Direction factor (Sd):
Seasonal factor (Ss): 1
Probability factor (Sp): 1
Terrain and building factor (Sb):
External and internal size effect factors (Ca): 1
External pressure coefficients (Cpe): As determined from BS 6399:Part 2, clauses 2.4 and 2.5.
Internal pressure coefficients (Cpi): As determined from BS 6399:Part 2, clause 2.6.
Dominant opening:

FIXING CLADDING/ COVERING

STRUCTURE
Check that structure is in a suitable state to receive cladding before commencing fixing.
Subcontractor must confirm acceptance to Main Contractor and Project Manager.

STRUCTURE
Do not fix cladding until final coats of paint have been applied to outer surfaces of supporting structure.

FASTENERS
Recommended manufacturer: One of the following:
SFS Intec Limited, tel. 0113 208 5500
Ejot UK Limited, tel. 01977 687 040
Mage Fasteners Limited, tel. 01451 822 777
Primary fasteners: High threaded screws with bonded washers.
Type(s), size(s) and drilling capacity: As recommended by fastener manufacturer to suit type and thickness of supports, and thickness of cladding panels.
Screw material: Anti-corrosion coated carbon steel.
Washer material: Non-ferrous
Washer size: 19 mm diameter.
Heads: Coloured plastic heads
Secondary fasteners: Stitching screws with bonded washers.
Screw/washer material: As primary fasteners.
Washer size: 14 mm diameter.
Heads: As primary fasteners.
221 FITTINGS AND ACCESSORIES
- Unspecified fittings and accessories: Recommended for the purpose by the cladding/covering manufacturer.

222 FITTINGS AND ACCESSORIES - INCLUDING GUTTERS AND DOWNPIPES
- Cappings, closure pieces, flashings, trims, sills, gutters, down pipes, fillers, spacers, tapes, sealants, fixings, etc.,
  where not specified, to be types recommended by cladding manufacturer.

223 PREVENTION OF ELECTROLYTIC ACTION
- Isolating tape: Type recommended by cladding/covering manufacturer.
  Location: To contact surfaces of supports and sheets of dissimilar metals.

234 GUTTERSEAVES LEVEL
- Provide Kingspan box gutter together with all support brackets, fixings, seals, liners, adaptors and own pipes plus their connectors and brackets.
  Colour to match cladding.

275 CONTINUITY THERMAL INSULATION
Junctions between the roof panel system and walls/penetrations insulated with PIR board insulation any gaps filled with Premier Sealants (01724 864100) Firefoam (class B1 rated) or similar, fire rated gun applied canister urethane insulation.
  Placement: Secure and continuous with cladding/covering insulation.

300 PROFILE FILLERS GENERALLY
Drawing reference(s): EDS 07-0105-1205, EDS 07-0105-07-1209.
Manufacturer and reference: Premier Sealant Systems Limited ref: M25 or similar, type to suit cladding profile.
Material: MP (Metallocene polyolefin)
Colour: Black.
Fixing: Seal the top, bottom and sides of each profile filler with a single line of non-setting gun-grade, PremSeal CV or similar.
Locate where shown on drawings and wherever necessary to close off corrugation cavities from the inside and outside of the building. Ensure a tight fit and leave no gaps.

310 PURPOSE MADE COLD FORMED METAL ACCESSORIES - INTERNAL
Drawing reference(s): EDS 07-0105-1205, EDS 07-0105-07-1209.
Material/finish: As internal face of cladding.
Thickness: 0.4 mm
Colour: White.
Workmanship as section Z11.
Fixing: Stitch to internal face of panels at max. 450 mm centres using secondary fasteners as specified for the cladding system.
Sealing: Single line of 8mm diameter butyl rubber tape, Class A, ref: NFRC TB36, site applied between flashing and panel.
End laps to be air sealed with Film backed Butyl tape/PremSeal SWRPIO or similar, or gun grade sealant.

311 PURPOSE MADE COLD FORMED METAL ACCESSORIES – EXTERNAL
Drawing reference(s): EDS 07-0105-1205, EDS 07-0105-07-1209.
Material/finish: As external face of cladding.
Thickness: 0.63 mm
Colour: To match external face of cladding.
Workmanship as section Z11.
Fixing: Stitch to external face of panels at 450 mm centres using secondary fasteners as specified for the cladding system.
Sealing: Single line of 4mm diameter butyl rubber sealant, Class A, ref: NFRC TB36, site applied between flashing and panel.
410 FIXING SHEETS GENERALLY
- Cut sheets and flashings to give clean true lines, with no distortion. Remove burrs and any lubricant.
- Cut openings in sheets for outlets, vent pipes, flues, etc. to the minimum size necessary.
- For double skin construction do not line out building completely before installation of outer sheets.
- Lay sheets with exposed joints of side laps away from prevailing wind unless shown on drawings.
- Ensure that ends of sheets, and end laps are fully supported with fixings at top of lap.
- Ensure that raking cut edges at hips and valleys are fully supported.
- Drill all holes and install fasteners perpendicular to the surface of the cladding. Position fasteners at regular intervals in straight lines, centred on supports.
- Locate fasteners centrally within holes that are oversized.
- Remove dust and any other foreign matter before finally fixing sheets into position.
- Protect sheets adequately during fixing and up to Practical Completion against mechanical damage and disfigurement. Rectify any defects as quickly as practicable to minimise damage and nuisance.
- Install fasteners to correct tightness using any special tools recommended by the fastener manufacturer. When used, screw guns must be fitted with depth sensitive devices and used at the correct speed.
- Check fastenings on completion and adjust as necessary to ensure that they are watertight and sheeting is secure but not buckled or distorted.
- Paint all cut edges to match face finish.

480 FLASHINGS/ TRIMS GENERALLY
- Lap joint treatment:
  - Vertical and sloping flashings/ trims: End laps to be same as for adjacent sheeting.
  - 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 sheeting. Otherwise to sheeting.
- Fasteners: As specified by cladding manufacturer.

550 SEALING LAPS ON EXTERNAL SHEETS
- Sealant tape: If not specified elsewhere type(s) to be as recommended for the purpose by sheet manufacturer.
  - Position sealant tape in straight, unbroken lines below fixing positions, parallel to edge of sheet. Place into corrugations or troughs.
  - Do not allow to stretch or sag into position.
  - Ensure continuity and effectiveness of seal, especially at corner of sheets. Do not overcompress.
  - Seal end laps as specified elsewhere with a single or double line of sealant tape. Single line sealant tape to be located immediately below the line of fasteners. A second line, if specified to be slightly set back from the edge of the external sheet.
  - Seal side laps, as specified elsewhere with a single or double line of sealant tape. Single line sealant tape to be located outside of the line of fasteners. A second line, if specified to be located on the other side of the fasteners.

580 INSULATED PANEL IDENTIFICATION & LABELLING
When the roofing and/or the wall cladding to this building is completed, a label identifying the composition of the insulated panels is to be fitted.
- This label illustrates the type of Insulated panels fitted, to assist Insurers, Fire Officers, Owners and Occupiers identify the envelope composition.
- It is a recommendation of the Kingspan Total Guarantee that the insulated panel identification label, which will have a specific project registration number, is installed in an agreed location. The project architect, cladding subcontractor or owner should locate or instruct the location of these labels in an appropriate and accessible location on the building.
H43 Metal composite panel cladding/ covering

To be read with Preliminaries/ General Conditions.

10 METAL COMPOSITE PANEL WALL CLADDING

Drawing reference(s): EDS 07-0105-1205, EDS 07-0105-07-1209.
Supports: Kingspan Multibeam cold rolled rails.
Bearing width: Min 60mm intermediate, Min 130mm vertical joint.
Manufacturer and reference: Kingspan Limited, horizontally laid wall cladding system for
standard internal & external non-corrosive inland environments also Loss Prevention
Certification Board certified to LPS 1181 Grade EXT - B.
Test results:
LPS 1181: 2005: Part 1: Issue 1 Wall Lining Test: Passed all requirements
Panels:
Profile reference: KS1000 MM EcoSafe – Mini Micro Insulated Wall Panel.
Cover width: 1000mm
External facings:
Thickness: 0.5 mm nominal.
Finish/Colour: Kingspan XL FortéTM, colour standard from Symphony range
Internal facings:
Thickness: 0.4mm nominal. Finish/Colour: Bright White Polyester.
Core insulation: EcoSafe LPCB certificated PIR formulation. Receiving BREEAM Credit
(Pollution 4: Insulant GWP) 2006 credit.
Panel thickness: 70mm (England & Wales)
Male/female panel joint sealant:
Factory applied weather seal set in rebate.
Kingspan AWP filler and non-setting gun-grade, PremSeal CV or similar, site applied at the
end of each panel where flashings pass over the joint.
Bridging seal across panel joint in line with AWP filler and internal air seal to be non-setting
gun-grade, PremSeal CV or similar.
Fasteners: As determined by clause 220A
Number and location:
For panels: As determined by clause 197A, but with each panel fixed to each support using
not less than one fastener at panel ends and two fasteners at intermediate supports, located
through tongue section, as recommended by cladding manufacturer.
For panel bearers: Fix each one using two fasteners.
For vertical top-hat fix to vertical support at 500mm centres.
Vertical joints:
Type: Option A with recessed top-hat flashing and insert with 4mm diameter butyl rubber
sealant, Class A, ref: NFRC TB36.
Finish/colour: Finish as external face of panels.
PIR insulation board with any gaps between board and panels, fill with Premier Sealants
(01724 864100) Firefoam (class B1 rated) or similar, fire rated gun applied canister urethane
insulation.
Vertical panel joint to have VJ2 EPDM 95mm x 10mm self adhesive air seal bubble gasket
applied to vertical supporting steelwork and lapped over drip flashing
Accessories:
Panel bearers located at panel ends and at maximum 1500mm intervals in-between, located
in positions recommended by cladding manufacturer to support the bottom row of
horizontally laid panels.
Thermal Transmittance (U Value) calculated using the method required by the Building
Regulations Part L2A (England & Wales) and Building (Scotland) Regulations Section 6:
0.30 W/m²K (England & Wales) or 0.30 W/m²K (Scotland). Manufacturers 25 year thermal
guarantee required.
Air leakage rate of 5m³/hr/m² at 50 Pa, based on the assumption that the full building
envelope is constructed using Kingspan panels
Other requirements:
Internal face of panel to be air sealed along the full length by an unbroken run of 6mm bead of non-setting gun-grade, PremSeal CV or similar.
Factory made pre-formed corner panels.
Manufacturers 40 year maintenance and inspection free coating guarantee. Manufacturers coating guarantee to be available on project completion and be fully transferrable for future changes of building ownership.
Panels manufactured under the following ISO standards 14001, 18001, 9001.
Cladding contractor to attend a product training course at Kingspan.

11 METAL COMPOSITE PANEL INTERNAL COMPARTMENT WALL
Drawing reference(s): EDS 07-0105-1203, EDS 07-0105-07-1209.
Building Application: vertically laid non-loadbearing internal compartment wall system for standard internal non-corrosive building environments, also Loss Prevention Certification Board certified to LPS 1208 Grade FR60.
Manufacturer: Kingspan Limited, Greenfield Business Park No 2, Greenfield, Holywell, Flintshire, North Wales CH8 7GJ. Tel: 0800 970 9181 (technical), 01352 716400 (sales). Email: technical@kingspanCE.com
Test results:
Panels:
Product reference: KS1100 CS EcoSafe - Internal Insulated Wall Panel
Cover Width: 1100mm
External facings:
Material: Hot-dip zinc coated steel to BS EN 10147.
Thickness: 0.5 mm nominal.
Profile: Equi-Bead
Internal facings:
Material: Hot-dip zinc coated steel to BS EN 10147.
Thickness: 0.5 mm nominal.
Profile: Equi-Bead
Core insulation: EcoSafe & FireSafe LPCB certificated PIR formulation Receiving BREEAM credit (pollution 4 insulant SWP) 2006 credit.
Panel thickness: 175mm
Fire Performance:
Reaction to fire (according to BS EN 13501-1): B–s1, d0.
The steel outer and inner facings are Class 0, as defined by Building Regulations.
Thermal Transmittance (U Value): 0.11 W/m2K. Manufacturer's 25 year thermal guarantee required.
Panel Joint Air Tightness (according to BSEN 14509): 0.02m3/hr/m2 at 50 Pa
Panel Joint Water Tightness (according to BSEN 14509): 0.54m3/hr/m2 at 1000 Pa
Male/female panel joint sealant:
Continuous 6mm diameter bead of FR silicone sealant Nullifire M703 or similar, in female joint on internal & external face prior to panel installation.
Fasteners: As determined by clause 220A
Flashing to Panel: All primary flashing fixings are to be carbon steel stitching screws fixed at 300mm centres fixed through flashing to panel facings, as recommended by panel manufacturer.
Wall Panel to Support: Each panel fixed to each support using not less than three fasteners located through the panel and equally spaced across the face of the panel, as recommended by cladding manufacturer.
Other requirements:
The panel must be limited to a maximum span of 4000mm. Where this is exceeded intermediate support must be introduced. The secondary support system must be a 'Fire Wall' system satisfying fire resistance requirement.
Stitch the male/female joints on one face using stitcher screws 5.5 x 40 or similar screws at 500mm centres.
Manufacturers 25 year coating guarantee required.

15 DESIGN
Complete the design of the cladding system in accordance with IACSC Design, Construction, Specification and Fire Management of Insulated Envelopes and the requirements of this specification.
Co-ordinate detailed design with that of all related works.
Submit detailed design proposals to the CA before commencing any cladding fabrication work.

17 DEFLECTION OF METAL CLADDING
Maximum permitted wall deflection under combined loads including openings: Span/150.

20 PERFORMANCE COMPLIANCE
Verification: The system has an approved environmental profile with BRE Ecopoints score of 0.76 Cradle to Grave over 60 year study period.
Verifying authority: BRE Certification Ltd. – Scheme Document SD 028.

25 CONTINUITY THERMAL INSULATION
Junctions between the roof panel system and walls / penetrations insulated with PIR board insulation any gaps filled with Premier Sealants (01724 864 100) Firefoam (class B1 rated) or similar, fire rated gun applied canister urethane insulation.
Placement: Secure and continuous with cladding/ covering insulation.

35 PREVENTION OF ELECTROLYTIC ACTION
- Isolating tape: Type recommended by cladding/ covering manufacturer.
  Location: To contact surfaces of supports and panels of dissimilar metals.

45 FIXING GENERALLY
- Cut edges: Clean true lines.
- Penetrations: Openings to minimum size necessary.
  Edge reinforcement: Sections to details.
- Panel 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: Drill holes.
  Position at regular intervals in straight lines, centred on support bearings.
  Position of fasteners in oversized drill 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 watertightness and that panels are secure.
- Cut edges: Paint to match face finish.
FASTENERS
Recommended manufacturer: One of the following:
SFS Intec Limited, tel. 0113 208 5500
Ejot UK Limited, tel. 01977 687 040
Mage Fasteners Limited, tel. 01451 822 777
Panel fasteners: Self drilling, self tapping screws with bonded washers.
Type(s), size(s) and drilling capacity: As recommended by fastener manufacturer to suit type and thickness of supports, and thickness of cladding panels.
Screw material: Anti-corrosion coated carbon steel.
Washer material: Non-ferrous.
Washer size: 16 mm diameter.
Heads: Hexagon head.
Fasteners for vertical joint flashings/trims: As panel fasteners.
Fasteners for panel bearers: As panel fasteners but with 15 mm diameter washers.
Flashings fasteners: Stitching screws with bonded washers.
Screw/washer material: As panel fasteners.
Washer size: 14 mm diameter.
Heads: With low profiled heads to match colour of the flashing.

FASTENERS TO INTERNAL PARTITION
Recommended manufacturer: One of the following:
SFS Intec Limited, tel. 0113 208 5500
Ejot UK Limited, tel. 01977 687 040
Mage Fasteners Limited, tel. 01451 822 777
Fixfast Limited, tel. 0845 450 7483
Primary fasteners: High threaded screws with bonded washers.
Type(s), size(s) and drilling capacity: As recommended by fastener manufacturer to suit type and thickness of supports, and thickness of cladding panels.
Screw material: Anti-corrosion coated carbon steel.
Washer material: Non-ferrous.
Washer size: 16 mm diameter.
Heads: Coloured plastic heads
Secondary fasteners: Stitching screws with bonded washers.
Screw/washer material: As primary fasteners.
Washer size: 14 mm diameter.
Heads: With low profiled heads to match colour of the flashing.

ATTACHMENT DESIGN PARAMETERS
(The Building Designer is to establish the specific wind loading parameters that apply to the specific site location for use in the analysis and is to record that information below)
Determine the number and location of cladding fasteners recommended by the cladding manufacturer to resist wind loads calculated in accordance with BS 6399:Part 2 Standard Method and BS 5427:Part 1.
Calculate wind loads on roof and wall cladding appropriate to location, exposure, roof height, building shape and size in accordance with BS 6399:Part 2 Standard Method and BS 5427:Part 1.
Basic wind speed (Vb): m/s
Altitude factor (Sa):
Direction factor (Sd):
Seasonal factor (Ss): 1
Probability factor (Sp): 1
Terrain and building factor (Sb):
External and internal size effect factors (Ca): 1
External pressure coefficients (Cpe): As determined from BS 6399:Part 2, clauses 2.4 and 2.5.
Internal pressure coefficients (Cpi): As determined from BS 6399:Part 2, clause 2.6.
Dominant opening:
49 **PURPOSE MADE COLD FORMED METAL ACCESSORIES – INTERNAL BASE CHANNEL**
- **Type:** 1.6mm x 50 x 127 x 50 Channel
- **Material:** Hot-dip zinc coated steel to BS EN 10326:2004 and BS EN 10143:1993, grade S280GD with Z275 zinc coating.
- **Finish:** PPC to BS 6497:1984 Section 2 - ‘Powder Organic Coatings of Hot Dip Galvanized Steel’
- **Thickness:** Minimum of 60µm
- **Colour:** White (RAL9010).
- **Fixing to Floor:** Fix to floor at max. 600mm centres using 6 x 40mm hammer fixings or similar.
- **Fixing to panel:** Stitch to panel facings at max. 300 mm centres using secondary fasteners as specified for the cladding system.
- **Sealing:** Bedded on two continuous single lines of 6mm diameter butyl strip sealant, Premseal DGR30 or similar, site applied between channel and floor. Each leg of channel to have continuous bead of fire rated silicone ref.: Nullifire M703 FR or similar, site applied on the inner face prior to panel installation. Manufacturer's 25 year guarantee required.

57 **PURPOSE MADE COLD FORMED METAL ACCESSORIES – EXTERNAL**
- **Drawing reference(s):** EDS 07-0105-1205, EDS 07-0105-07-1209.
- **Material/finish:** As external face of cladding.
- **Thickness:** 0.63 mm
- **Colour:** To match external face of cladding.
- **Workmanship as section Z11.**
- **Fixing:** Stitch to external face of panels at 450 mm centres using secondary fasteners as specified for the cladding system.
- **Sealing:** Single line of 4mm diameter butyl rubber sealant, Class A, ref: NFRC TB36, site applied between flashing and panel.

59 **PURPOSE MADE COLD FORMED METAL ACCESSORIES – INTERNAL**
- **Drawing reference(s):** EDS 07-0105-1203, EDS 07-0105-07-1209.
- **Material/finish:** As internal face of cladding.
- **Thickness:** 0.4 mm
- **Colour:** White.
- **Workmanship as section Z11.**
- **Fixing:** Stitch to internal face of panels at max. 450 mm centres using secondary fasteners as specified for the cladding system.
- **Sealing:** Single line of 6mm bead non-setting gun-grade, PremSeal CV or similar, site applied between flashing and panel.
- **End laps to be air sealed with Film backed Butyl tape/PremSeal SWRPIO or similar, or gun grade sealant.**

60 **SEALING EXTERNAL LAPS**
- **Sealant tape:** Types recommended by panel manufacturer.
- **Position:** Below fixing positions in straight unbroken lines, parallel to and slightly back from edge of panel.
- **Seal quality:** Effective, continuous and not overcompressed.

62 **INSULATED PANEL IDENTIFICATION & LABELLING**
When the roofing and/or the wall cladding to this building is completed, a label identifying the composition of the insulated panels is to be fitted.
This label illustrates the type of Insulated panels fitted, to assist Insurers, Fire Officers, Owners and Occupiers identify the envelope composition.
It is a recommendation of the Kingspan Total Guarantee that the insulated panel identification label, which will have a specific project registration number, is installed in an agreed location. The project architect, cladding subcontractor or owner should locate or instruct the location of these labels in an appropriate and accessible location on the building.
L20 Doors/ shutters/ hatches

To be read with Preliminaries/ General Conditions.

GENERAL

110 EVIDENCE OF PERFORMANCE
• Certification: Provide to the Project Manager independently certified evidence that all incorporated components comply with specified performance requirements.

115 FIRE RESISTING DOORS/ DOORSETS/ ASSEMBLIES
• Evidence of fire performance: Provide certified evidence, in the form of a product conformity certificate, directly relevant fire test report or engineering assessment, that each door/ doorset / assembly supplied will comply with the specified requirements for fire resistance if tested to BS 476-22, BS EN 1634-1 or BS EN 1634-3. Such certification must cover door and frame materials, glass and glazing materials and their installation, essential and ancillary ironmongery, hinges and seals. The fire resistance shall be a minimum of one hour for all external doors.

150 SITE DIMENSIONS
• Procedure: Before starting work on designated items take site dimensions, record on shop drawings and use to ensure accurate fabrication.
• Designated items: External doors.

PRODUCTS

480 EXTERNAL DOORSETSFD60S FIRE RESISTING AND SMOKE CONTROL
• Generally: All double and single access and egress doors to be insulated steel high security, double skin, to UK Power Networks approval.
Manufacturer and reference: Gosport Engineering Co., Ltd (020 8808 2326), Prima Doors Ltd (0161 487 3286) or Benweld (01299 251750 www.benweld.co.uk) or similar approved.
Glazing: None
Finish as delivered: internally and externally - high performance powder coat finish in goose wing grey (BS 00 A 05) or as specified by local conditions.
For full specification, ironmongery schedule references and structural door opening refer to Drawings
Perimeter seals: Weatherseal
Other requirements:
Single doorsets to suit minimum structural opening of 2250mm high – refer to drawings
All panic exit door furniture to be in accordance with EN 1125
Doors and frames to be galvanised or impregnated 'Zintec' mild steel to prevent corrosion
Unfolded edges of all steel sheets to have suitable edge protection to resist paint finish damage.
Doors to be suitably protected with Powder Coat or other high performance paint finish.
Where required, hinged top panels and removable transoms to be of similar construction to doors
Door hinge face to be fitted with anti-jemmy pins/’dog bolts’ locating into hinge jamb. (or hinges used with same)
Locks and emergency bars to utilise Euro-profile cylinders matching the local licence area locking suite.
Contractor to supply unique locks until site is commissioned, after which Contractor will replace with standard Operational Cylinders, supplied by UK Power Networks.
Multi-point locking mechanisms may be utilised in place of standard mortise locks provided that standard cylinders can be accommodated.
Ventilation Grill to be fitted within external door to Battery Room by door manufacturer (refer to Section U10/190)
Fixing: By manufacturer
481 SINGLE SWING INTERNAL DOORSET WITHIN SWITCH HOUSE
For full specification, ironmongery schedule references and structural door opening refer to Drawing
Door type: 44mm thk. overall, solid hardwood (min half hour fire rated, (with smoke seal to top and sides) or steel (min half hour fire rated)
Glazing details: 1no. safety glazed vision panel 500x500mm located 1300mm centrally from bottom of door
Frame: solid rebated to match door (min half hour fire rated)
Finish as delivered: shop primed ready for painting or powder coated
All panic exit door furniture to be in accordance with EN 1125
Ironmongery per door: 2 No. Heavy duty hinges, 1 No mortise latch, 2 No lever handle (Briton 1413E/LE*) or 1No lever handle (Briton 1413E/LE *) plus 1 No Panic bar (internal to Switchroom – Briton 379-NE*), 1 no. door closer Briton 2000E* series with fixing application and arm length to suit door frame (* or similar approved)
Other requirements: Hardwood architraves required where hardwood door used.

EXECUTION

710 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.

730 PRIMING/ SEALING
• Wood surfaces inaccessible after installation: Primed or sealed as specified before fixing components.

740 CORROSION PROTECTION
• Surfaces to be protected: Any site cut ends.
• Protective coating: Two coats of bitumen solution to BS 6949 or approved mastic impregnated tape.
Timing of application: Before fixing components.

760 BUILDING IN
• General: Not permitted unless indicated on drawings.

809 FIRE RESISTING/ SMOKE CONTROL DOORS/ DOORSETS/ ROLLER SHUTTERS/ CURTAINS
• Installation: By a firm currently registered under a third party accredited fire door installer scheme in accordance with instructions supplied with the product conformity certificate, test report or engineering assessment.

820 SEALANT JOINTS
Sealant manufacturer and reference: polysulphide mastic sealants
Colour: To match surrounding finishes
Prepare joints and apply sealant as section Z22.
Finish triangular fillets with a flat or slightly convex profile.
830  **FIXING IRONMONGERY GENERALLY**
- Fasteners: Supplied by ironmongery manufacturer.
- Finish/Corrosion resistance: To match ironmongery.
  - Holes for components: No larger than required for satisfactory fit/operation.
  - Adjacent surfaces: Undamaged.
  - Moving parts: Adjusted, lubricated and functioning correctly at completion.

840  **FIXING IRONMONGERY TO FIRE RESISTING DOOR ASSEMBLIES**
- General: All items fixed in accordance with door leaf manufacturer’s recommendations ensuring that integrity of the assembly, as established by testing, is not compromised.
- Holes for through fixings and components: Accurately cut.
- Clearances: Not more than 8 mm unless protected by intumescent paste or similar.
- Lock/Latch cases for fire 60 doors requiring >60 minutes integrity performance: Coated with intumescent paint or paste before installation.

850  **LOCATION OF HINGES**
- Primary hinges: Where not specified otherwise, positioned with centre lines 250 mm from top and bottom of door leaf.
- Third hinge: Where specified, positioned on centre line of door leaf.
- Hinges for fire resisting doors: Positioned in accordance with door leaf manufacturer's recommendations.

860  **GROUTING TO THRESHOLD**
- Non-shrink grout conforming to ASTM C827 Early Volume Change of Cementitious Mixtures mixed for pourable mix as per manufacturer's instructions.
- Weber SBD 5 Star grout or similar approved.
- Saint-Gobain Weber Ltd, Dickens House, Enterprise Way, Flitwick, Bedford. MK45 5BY Tel 08703 330070 (Technical Services 01525 722110)
L30 Stairs/ ladders/ walkways/ handrails/ balustrades

To be read with Preliminaries/ General Conditions.

PRELIMINARY INFORMATION/ REQUIREMENTS

107 COMPLETION OF DESIGNSTAIRS AND LANDINGS TO SWITCHROOM AND AUXILIARY ROOM
- Requirement: Complete the detailed design to satisfy specified performance criteria and coordinate with the detailed design of related and adjacent work.
Standard: Straight stairs and winders to BS 5395-1 and To Building Regulations (E&W) Approved Document M as appropriate.
- Structural requirements: As section B50.
- Additional requirements: The contractor is responsible for coordination of the design, fit and statutory compliance of all access stairs, walkways and handrailing, in the temporary and permanent state.
- Design and production information: As Preliminaries section A31.

130 SITE DIMENSIONS
- Procedure: Before starting work on designated items take site dimensions, record on shop drawings and use to ensure accurate fabrication.
Designated items: Access stairs.

COMPONENTS

310 PROPRIETARY ACCESS STAIRS TO SWITCH ROOM AND AUXILIARY ROOM
Manufacturer: Redman Fisher Eurogrid.
Product reference: 'Safety Grid' designed and detailed to suit the requirements of the as built switchhouse.
Component material, finish as delivered and light reflectance value contrast where applicable:
- Treads: open type 30/100 with 25 x 3 loadbearing bars.
- Slip resistance value of integral tread – water wet (minimum): PTV of 40 to BS 7976.
- Slip resistance value of integral nosing – water wet (minimum): Rz of 20 µm to BS 1134.
- Colour of integral nosing: Manufacturer's standard.
- Risers: To suit site measured conditions.
- Strings: Refer to drawings.
- Newels: Refer to drawings.
- Guarding: Refer to drawings.
- Handrails: Refer to drawings.
- Lower handrail: Refer to drawings.
- Other requirements: None.

460 WALKWAYSTO SWITCH ROOM AND AUXILIARY ROOM
- Component material, grade and finish as delivered:
  - Flooring: 'Safe Grid' low carbon steel tread plate 30 x 100 (30 x 5), galvanized to BS EN ISO 1461.
  - Slip resistance value of finish - water wet (minimum): Rz of 20 µm to BS 1134.
  - Guarding: Refer to drawings.
  - Edge protection: 100 mm as BS 8300.
  - Handrails: Galvanized low carbon steel - 'Safe Rail' Heavy Duty.
  - Lower handrail: Not required.
- Workmanship: Not applicable.
- Joinery: Not applicable.
- Metalwork: To section Z11.
- Other requirements: Design of main landing outside Switchroom double doors to be designed to sustain a delivery loading of 20 kN/sq m. Joints welded and ground smooth.
PROPRIETARY BALUSTRADE STO WALKWAYS

- Manufacturer: Redman Fisher Eurogrid.
  Product reference: Submit proposals.
- Component material and finish as delivered:
  Guarding: Low carbon steel - galvanized.
  Handrails: Low carbon steel - galvanized.
  Lower handrail: Not required.
- Other requirements: Nylon levelling/packing washers. Panels on main landing to be removable for delivery of switchgear etc.
- Fixing: Side fixed to steel.
  Centres: Refer to fabrication drawings.

INSTALLATION

CORROSION PROTECTION OF DISSIMILAR MATERIALS

- Components/substrates/fasteners of dissimilar materials: Isolate using washers/sleeves or other suitable means to separate materials to avoid corrosion and/or staining.

INSTALLATION GENERALLY

- Fasteners and methods of fixing: To section Z20.
- Structural members: Do not modify, cut, notch or make holes in structural members, except as indicated on drawings.
- Temporary support: Do not use stairs, walkways or balustrades as temporary support or strutting for other work.
- Applied features (finishes, inserts, nosings and the like): Substrates to be even, dry, sound and free from contaminants. Make good substrate surfaces and prepare/prime as applied feature manufacturer's recommendations before application.

COMPLETION

INSPECTION

- Timing: Two weeks prior to date when Contractor expects work to be practically complete.
- Period of notice (minimum): 5 working days.
M60 Painting/ clear finishing

To be read with Preliminaries/ General Conditions.

COATING SYSTEMS

175 SURFACE SEALER
Apply an approved resin sealer such as Watco CemTech to concrete floors in accordance with manufacturer's recommendations.

180 FLOOR COATING TO SLABS
- Apply an approved Mid Grey (or as required by client) concrete floor paint, such as Watco Concrete Floor Paint to concrete floors in accordance with manufacturer's recommendations.

GENERAL

215 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: Store separately.

280 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

400 PREPARATION GENERALLY
- Standard: In accordance with BS 6150.
- Suspected existing hazardous materials: Prepare risk assessments and method statements covering operations, disposal of waste, containment and reoccupation, and obtain approval before commencing work.
- Preparation materials: Types recommended by their manufacturers and the coating manufacturer for the situation and surfaces being prepared.
- 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: Remove.
- Joints, cracks, holes and other depressions: Fill flush with surface, provide smooth finish.
- Dust, particles and residues from preparation: Remove and dispose of safely.
- 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.
- Doors, opening windows and other moving parts:
  - Ease, if necessary, before coating.
  - Prime resulting bare areas.
APPLICATION

711 COATING GENERALLY

• Application standard: In accordance with 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.
  Application: 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.
• Doors, opening windows and other moving parts: Ease before coating and between coats.
N15 Internal fire and safety signage systems

To be read with Preliminaries/ General Conditions.

GENERAL

110 FIRE SIGNAGE SYSTEMS FOR ESCAPE ROUTE
• System manufacturer: Submit proposals.
  Product reference: Submit proposals.
• Layout and dimensions: Submit proposals.
  Language: English.
• Sign type: Aluminium plate.
  Manufacturing process: Manufacturer’s standard.
• Supports/ Fixings: Wall mounted, screw fixed.
• Accessories: Not required.

PRODUCTS

305 INTERNAL SIGNAGE PRODUCTS GENERALLY
• Standard: To BS 559.
  Colorimetric and photometric properties: To BS ISO 3864-4.

320 ALUMINIUM PLATE FOR ESCAPE ROUTE SIGNS
• Manufacturer: Submit proposals.
  Product reference: Submit proposals.
• Component thickness: 2 mm.
• Finish: Manufacturer’s standard.
• Perimeters: Not applicable.

321 ALUMINIUM PLATE FOR WARNING SIGNS
• Manufacturer: Submit proposals.
  Product reference: Submit proposals.
• Component thickness: 2 mm.
• Finish: Manufacturer’s standard.
• Perimeters: Not applicable.

EXECUTION

610 FIXING SIGNS GENERALLY
• Installation: To BS 559.
  Secure, plumb and level.
• Fasteners and adhesives: As section Z20.
• Strength of fasteners: Sufficient to support 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.

COMPLETION

910 DOCUMENTATION
• Submit:
  Manufacturer’s maintenance instructions.
  Guarantees, warranties, test certificates, record schedules and logbooks.
P10 Sundry insulation/ proofing work

SUNDARY INSULATION/ PROOFING WORK

To be read with Preliminaries/ General Conditions

TYPES OF INSULATION

185 SOFFIT INSULATION
- Manufacturer: Isothane Ltd.
- Material: Polyurethane foam spray.
- Thickness: 90 mm.
- Facing: Not applicable.
- Installation requirements: Spray applied.
- Joints: Not applicable.
- Fixing: Not applicable.
- Fasteners: Not applicable.

186 SOFFIT INSULATION SWITCH HOUSE.
- Manufacturer: Isothane Ltd.
- Material: Polyurethane foam spray.
- Thickness: 90 mm.
- Facing: Not applicable.
- Installation requirements: Spray applied. All openings in slab - either for future expansion or with cable penetrations - are to be boarded on the soffit and then spray insulated. Voids above the soffit boarding are to be filled or treated as specified on the drawings.
- Joints: Not applicable.
- Fixing: Not applicable.
- Fasteners: Not applicable.
P12 Fire stopping systems

To be read with Preliminaries/ General Conditions.

GENERAL

130 FIRE STOPPING SYSTEM TO INDIVIDUAL SERVICES PENETRATIONS THROUGH FLOOR SLAB
   • Fire resistance: 1 hour.
   • Penetration seal: Intumescent foam as clause 335.
     Size: To match slab thickness.
   • Capping sealant: Not required.
     Colour: Grey.

160 LINEAR GAP SEALING TO INTERNAL PARTITION WALL
   • Fire resistance: 1 hour.
   • Gap width or height (nominal): 10 mm.
   • Gap filler: Mineral wool.
   • Capping sealant: Fire resisting silicone as clause 390.
     Colour: White.

PRODUCTS

240 FIRE PERFORMANCE OF SWITCH ROOM
   • Resistance to fire: To BS 476-20 and -22, 60 minutes integrity and insulation.
   • Reaction to fire: In accordance with Building Regulations, Class 0.
   • Smoke resistance:
     Air leakage rate (maximum): 10 m³/m²·hr.

305 PRODUCT CERTIFICATION
   • Certification: For products specified generically, submit evidence of compliance with the specification.
     • Acceptable evidence: Agrément certificate.

335 INTUMESCENT FOAM
   • Manufacturer: Hilti or similar equivalent.
     Product reference: CP 611A.

338 INTUMESCENT MASTIC
   • Manufacturer: Hilti or similar equivalent.
     Product reference: CP 601S.

EXECUTION

620 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 on to finished surfaces.

660 APPLYING INTUMESCENT FOAM
   • New joints: Remove builder's debris, mortar droppings, grease, and other contaminants.
   • Old joints: Clean and remove existing sealant from each joint.
   • Priming: Lightly moisten substrate with water.
   • Application: Fill joint to approximately half its depth, and allow foam to expand to face of joint.
   • Trimming: Trim excess foam to give a neat, flush appearance.
APPLYING SEALANTS GENERALLY
- Application: As section Z22.

APPLYING CAPPING SEALANT
- Preparation: Submit proposals.
- Priming: Primer recommended by sealant manufacturer.
- Depth of sealant: 10 mm.
- Temperature: Do not apply water based sealants when they could be damaged by frost.

COMPLETION

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

INSPECTION
- Notice for inspection (minimum): 5 working days.
P21 Door/ window ironmongery

To be read with Preliminaries/ General Conditions.

PRE-TENDER

100 QUANTITIES AND LOCATIONS
• Quantities and locations of ironmongery are given in the schedules.
• Fixing: As sections L10 and L20.

GENERAL

140 SAMPLES
• General: Before placing orders with suppliers submit labelled samples of the following: one of each specified product.
  Conformity: Retain samples on site for the duration of the contract. Ensure conformity of ironmongery as delivered with labelled samples.

170 IRONMONGERY FOR FIRE DOORS
• Relevant products: Ironmongery fixed to, or mortised into, the component parts of a fire resisting door assembly.
• Compliance: Ironmongery included in successful tests to BS 476-22 or BS EN 1634-1 on door assemblies similar to those proposed.
  Certification: Submit evidence of successful testing by UKAS accredited laboratory.
• Melting point of components (except decorative non functional parts): 800°C minimum.

180 CATEGORY OF DUTY FOR DOOR IRONMONGERY
Standard: To DD 171.
Category of duty of doors: Heavy duty.
• General: Durability of ironmongery components to be compatible with stated category of duty of each door leaf.
  Exclusions: Ironmongery with specific duty or 'category of use' defined elsewhere.
• Documentation: Before placing orders with suppliers submit documentation showing product compliance with stated category of duty.
P31 Holes,CHASES, COVERS AND SUPPORTS FOR SERVICES

To be read with Preliminaries/General Conditions.

110 CO-ORDINATION
Liaise with subcontractors to establish locations and dimensions of all holes and chases required for services. Submit details to Project Manager for checking before proceeding with the work.

EXECUTION

620 HOLES AND CHASES IN INSITU CONCRETE
To be cast in. Do not cut hardened concrete or drill holes larger than 12 mm diameter without the permission of the PM and the approval of the Design Engineer.

640 HOLES IN STRUCTURAL STEELWORK
• Cutting and drilling: Not permitted except as indicated on drawings.

650 HOLES, RECESSES AND CHASES IN MASONRY
• Locations: To maintain integrity of strength, stability and sound resistance of construction.
• Sizes: Minimum needed to accommodate services.
  Holes (maximum): 300 x 300 mm.
• Walls of hollow or cellular blocks: 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. Avoid spalling, cracking and other damage to surrounding structure.

680 FIXING FLOOR DUCTING/ TRUNKING
• Bases:
  Fixing method: Plug and screw.
  Fixing level: So as to provide a flush smooth surface when the floor finish is laid.
  Jointing: Standard.
  Fixing of cables from Aux to Switch room to be to soffit of slab using Unistrut racking hung under, attached to Holorb soffit with proprietary dovetail bolt fixings into steel profile.
  Boxing out to be attached prior to overcoating with spray on insulation.

690 INSTALLING PIPE SLEEVES
• Sleeves: Fit to pipes passing through building fabric.
• Material: Match pipeline.
• Size: One or two sizes larger than pipe to allow clearance.
• Finish: Install sleeves flush with building finish. In areas where floors are washed down, install protruding 100 mm above floor finish.
• Masking plates: Fit at visible penetrations, including through false ceilings of occupied rooms.

710 SEALING ALL SERVICE PENETRATIONS FOR FIRE PROTECTION
• Service: As drawings.
• Location: As drawings.
• Sealing material: Expanding foam - see Section P12.
• Method: Gun applied. Trim and seal around all pipes/cables/ducts.
• Performance requirement: As drawings.
Q40 Fencing

To be read with Preliminaries/ General Conditions.

FENCING SYSTEMS

126 OPEN MESH STEEL PANEL SECURITY FENCING
- Weldmesh single skin 358 mesh.
- Height: Approximately 2.1 m - see drawings.
- Finish to be green powder coating to finished assembly
  Posts: Galvanized square hollow section, green powder coated.
- Maximum centres of posts: 3 m.
- Method of setting posts: In concrete foundations to comply with the design loading requirements specified by BS 1722-14 for this category of fence.
- Bottom of fencing: anchored to a concrete sill.
- Accessories: Single leaf entrance gate at pedestrian entrance and rear fire exit as drawings.
- Conformity: Submit manufacturer's and installer's certificates, to BS 1722-14.

GATES AND GATE POSTS

560 STEEL GATES.
- Manufacturer: Submit proposals.
- Standard:
  Domestic gates: To BS 4092.
  Steel palisade gates: To BS 1722-12.
- Manufacturer: Submit proposals.
- Product reference: Submit proposals.
- Materials and workmanship: As section Z11.
- Finish: Powder coated to BS 1722-16 as drawing.
  Colour: As drawing.
- Jointing: Welded.
- Fittings: Refer to drawing.
  Finish: Hot dip galvanized to BS EN ISO 1461.
- Method of fixing: Bolted to top of ground beam/kerb.
- Accessories: As drawing.

EXECUTION

720 POST FIXING
- Posts to be fabricated with end plates to bolt to ground beams. Refer to drawing for details.
  Shim packs and grouting to be provided to erect fence level and vertically aligned.

780 MAKING GOOD GALVANIZED SURFACES
- Treatment of minor damage (including on fasteners and fittings): 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: Apply sufficient material to provide a zinc coating at least equal in thickness to the original layer.
Q41 Barriers/ guardrails

To be read with Preliminaries/ General Conditions.

TYPES OF BARRIERS/ GUARDRAILS

135 PROPRIETARY PROTECTIVE BARRIERS TO WALKWAYS

- Standard: To BS 6180.
- Manufacturer: Redman Fisher.
- Height above datum: 1150 mm.
  Applied horizontally at: Design height.
  Material/ Protection: Steel, galvanized to BS EN ISO 1461 after fabrication.
- Surface finish: Powder coating as section Z31.
  Colour/ Texture: See drawing.
  Minimum film thickness: As recommended by coating specialist.
- Fixings/ Foundations: As shown on drawings.
- Other requirements: Part of handrail along Switchroom entrance landing to be removable - see drawing.

PERFORMANCE/ INSPECTION/ TESTING

300 CONTRACTOR’S STRUCTURAL DESIGN

- Design responsibility: For walkway handrails and stair handrails.
- Requirement:
  Generally: As section B51. Submit drawings and schedules in accordance with the designated code of practice and to satisfy the performance criteria specified in section B51.
  Modifications: None.
  Additional requirements: Removable sections required - see clause 135 above.
- Member sizes and locations: Submit proposals.
- Design and production information: As preliminaries.
- Timing of submissions: four weeks prior to planned fabrication.

INSTALLATION

405 COMPETENCE

- Operatives: Contractors must employ competent operatives.
- Qualifications: Submit certification of training.
  UKAS Sector Scheme 2A sub categories: (b).
  UKAS Sector Scheme 2C sub categories: Not required.

420 ALIGNMENT

- Erection: Fences/ barriers to present a flowing alignment. Tops of posts to follow ground profile.
- Tolerance: ±30 mm of prescribed alignment and, within any 10 m length, ±15 mm from the straight or required radius.

430 ERECTION GENERALLY

- Protection: Coat all internal and external surfaces of aluminium and steel posts below and up to 150 mm above ground level, with two coats of bituminous paint to BS 6949 type 2, unless other applied surface finish is specified.
- Prevention of electrolytic corrosion: Isolate dissimilar metals.
- Steel components: Do not drill, cut or weld after galvanizing.
490 DAMAGE REPAIR TO GALVANIZED SURFACES
• Areas of repair: Minor damage, including fixings and fittings.
  Total area of repair not to exceed 0.5% of total surface area.
  Each area not to exceed 1000 mm².
• Renovation: Use low melting point zinc alloy repair rods or powders or at least two coats of zinc-rich paint to BS 4652.

COMPLETION

900 DOCUMENTATION
• Contents:
  General product information.
  Installation information.
  Inspection and maintenance reports.
• Number of copies: Two copies, one to be given to the Project Manager, the other to be retained by the principal contractor.
• Submission: Two weeks prior to date when principal contractor expects work to be practically complete.
R10 Rainwater drainage systems

To be read with Preliminaries/ General Conditions.

GENERAL

110 GRAVITY RAINWATER DRAINAGE SYSTEM
  • Rainwater outlets: Proprietary.
  • Gutters: Combined fascia, soffit and gutter.
  • Pipework: Standard, compatible with Kingspan roofing and cladding system.
  • Below ground drainage: Refer to general specification.
  • Disposal: Refer to general specification.
  • Controls: Not applicable.
  • Accessories: Refer to Kingspan Standard Details.

SYSTEM PERFORMANCE

210 DESIGN
  • Design: Complete the design of the rainwater drainage system.
  • Standard: To BS EN 12056-3, clauses 3-7 and National Annexes.
  • Proposals: Submit drawings, technical information, calculations and manufacturers' literature.

221 COLLECTION AND DISTRIBUTION OF RAINWATER
  • General: Complete, and without leakage or noise nuisance.

230 DESIGN PARAMETERS - GENERAL
  • Roof and gutter construction and finish: to Switch House.
  • Design rate of rainfall: As BS EN 12056-3, National Annex NB.2.
  • Category: To suit site.
  • Design life of building: 30 years.
  • Available capacity of existing below ground drainage (maximum): To be verified by Principal Contractor.

EXECUTION

600 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.

605 INSTALLATION GENERALLY
  • Install pipework/gutters to ensure the complete discharge of rainwater from the building without 
    leaking.
  • Obtain all components for each type of pipework/guttering from the same manufacturer unless 
    specified otherwise.
  • Provide access fittings and rodding eyes as necessary in convenient locations to permit adequate 
    cleaning and testing of pipework.
  • Avoid contact between dissimilar metals and other materials which would result in electrolytic 
    corrosion.
  • Do not bend plastics or galvanized steel pipes.
  • Adequately protect pipework/gutters from damage and distortion during construction.
  • Fit purpose made temporary caps to prevent ingress of debris.
  • Fit all access covers, cleaning eyes and blanking plates as the work proceeds.
  • Where not specified otherwise use plated, galvanized or nonferrous fastenings, suitable for the 
    purpose and background, and compatible with the material being fixed.
610  FIXING AND JOINTING GUTTERS
   • All fixing, jointing and setting out is to be as specified on Kingspan Standard Details.

635  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.
     - Wedge joints: 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.

650  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.

COMPLETION

910  GUTTER TEST
   • Preparation: Temporarily block all outlets.
   • Testing: Fill gutters to overflow level and after 5 minutes closely inspect for leakage.
Z10 Purpose made joinery

To be read with Preliminaries/ General Conditions.

110 FABRICATION OF TOOL BOXES
   • Standard: To BS 1186-2.
   • Sections: Accurate in profile and length, and free from twist and bowing. Formed out of solid unless shown otherwise.
     Machined surfaces: Smooth and free from tearing, wooliness, chip bruising and other machining defects.
   • Joints: Tight and close fitting.
   • Assembled components: Rigid. Free from distortion.
   • Screws: Provide pilot holes.
     Screws of 8 gauge (4 mm diameter) or more and screws into hardwood: Provide clearance holes.
     Countersink screws: Heads sunk at least 2 mm below surfaces visible in completed work.
     Adhesives: Compatible with wood preservatives applied and end uses of timber.

120 CROSS SECTION DIMENSIONS OF TIMBER
   • General: Dimensions on drawings are finished sizes.
   • Maximum permitted deviations from finished sizes:
     Softwood sections: To BS EN 1313-1:-
       Clause 6 for sawn sections.
     Hardwood sections: To BS EN 1313-2:-
       Clause 6 for sawn sections.
       Clause NA.3 for further processed sections.

130 PRESERVATIVE TREATED WOOD
   • Cutting and machining: Completed as far as possible before treatment.
   • Extensively processed timber:
     Retreat timber sawn lengthways, thicknessed, planed, ploughed, etc.
   • Surfaces exposed by minor cutting and/ or drilling:
     Treat as recommended by main treatment solution manufacturer.

140 MOISTURE CONTENT
   • Wood and wood based products: Maintained within range specified for the component during manufacture and storage.

250 FINISHING
   • Surfaces: Smooth, even and suitable to receive finishes.
     Arrises: Eased unless shown otherwise on drawings.
   • End grain in external components: Sealed with primer or sealer as section M60 and allowed to dry before assembly.
Z11 Purpose made metalwork

To be read with Preliminaries/ General Conditions.

PRODUCTS

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

320 MILD STEEL DOOR THRESHOLD ANGLES
60x60x6 RSA. Cast in floor slab of door threshold.

330 EARTHING PROVISION
40x4mm Copper tape or 70mm2 stranded copper unless otherwise stated. Tape to be fixed to structure with 8mm Ø x 40mm stainless steel fixing pin at 300mm centres. Pins from Alcomet Ltd, Unit 5, Gibbons Industrial Park, Dudley Road, Kingswinford, West Midlands. DY6 8XF Tel 01384 404488 www.alcomet.net or similar approved.

340 EARTH SECURITY GUARD
Guardian Security Guard to suit Earthing from Alcomet Ltd, Unit 5, Gibbons Industrial Park, Dudley Road, Kingswinford, West Midlands. DY6 8XF Tel 01384 404488 www.alcomet.net or similar approved.

FABRICATION

515 FABRICATION GENERALLY
- Contact between dissimilar metals in components: Avoid.
- Finished components: Rigid and free from distortion, cracks, burrs and sharp arrises.
  Moving parts: Free moving without binding.
- Corner junctions of identical sections: Mitre.

520 COLD FORMED WORK
- Profiles: Accurate, with straight arrises.

527 WELDING AND BRAZING GENERALLY
- Thoroughly clean surfaces to be joined. Ensure accurate fit using clamps and jigs where practicable. Use tack welds only for temporary attachment.
  Make joints with parent and filler metal fully bonded throughout with no inclusions, holes, porosity or cracks.
  Prevent weld spatter falling on surfaces of materials which will be self-finished and visible in completed work.
  Remove all traces of flux residue, slag and weld spatter.
537 WELDING OF STEEL

FINISHING

710 FINISHING WELDED AND BRAZED JOINTS VISIBLE IN COMPLETE WORK
  • Butt joints which will be visible in completed work to be smooth, flush with adjacent surfaces.
  • Fillet joints which will be visible in completed work to be executed neatly. Grind smooth where specified.

745 PREPARATION FOR APPLICATION OF COATINGS
  Before applying coating ensure that fabrication is complete and all fixing holes have been drilled, unless otherwise specified.
  Remove all paint, grease, flux, rust, burrs and sharp arrises.
  Make good all defects which would show after application of coating and finish surfaces smooth.

780 GALVANIZING
  • Standard: To BS EN ISO 1461.
  • Preparation:
    Vent and drain holes: Provide in accordance with BS EN 14713-1 and -2. Seal after sections have been drained and cooled.
    Components subjected to cold working stresses: Heat treat to relieve stresses before galvanizing.
    Welding slag: Remove.
    Component cleaning: To BS EN ISO 8501-3.
    Grade: St 2½.
Z22 Sealants

To be read with Preliminaries/General Conditions.

PRODUCTS

310 JOINTS FOR FIRE STOPPING
• Primer, backing strip, bond breaker: Types recommended by sealant manufacturer.

EXECUTION

610 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.

620 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.
• 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.

630 APPLYING SEALANTS
• Substrate: Dry (unless recommended otherwise) and unaffected by frost, ice or snow.
• Environmental conditions: Do not dry or raise temperature of joints by heating.
• Sealant application: 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.