

Technical Specifications

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Cumberland Council

HUB Building

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BGP

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Specification for

EXCAVATING AND FILLING

D20 EXCAVATING AND FILLING

GENERALLY/THE SITE

100 GENERAL

The building will be formed at levels to suit site contours which will involve some degree of upfilling.

The surrounding levels for roads and car parking are to be upfilled as necessary to suit final building levels and the requirements for drainage.

110 SITE INVESTIGATION

Refer to Site Investigation Report.

140 GROUND WATER LEVEL

Refer to site investigation reports for detailed information.

150 EXISTING SERVICES

Approximate positions of known services are shown on the Statutory Authority's drawings. Adequately protect, uphold, maintain and prevent damage to all services.

The Contractor shall adequately verify on site the positions of all existing services.

160 SITE FEATURES TO BE RETAINED

As detailed on Architect's drawings.

180 TREES AND UNDERGROWTH

Refer to Architects drawings for details of any protected areas.

Outside of any protected areas, clear site of trees, bushes, scrub and under-growth. Comply with HSE/Arboricultural and Forestry Advisory Group Safety Guidelines.

Grub up and dispose of large roots.

Where the existing tree roots are in clay material, excavate out the existing clay that contains tree roots and replace with granular material (type 1) compacted in 150mm layers.

EXCAVATING

205 BASIC WORKMANSHIP FOR EXCAVATING

Comply with BS 8000:Part 1, sections 3.1, 3.2 and 3.3.

210 MATERIALS

Materials arising from the excavations and surplus to requirements for filling are to be removed from site by the contractor unless instructed otherwise.

220 STRIPPING TOPSOIL:

Before beginning general excavation of filling, excavate topsoil from areas where there will be regrading, buildings, pavings/roads and other areas where specified.

Remove all top soil and keep separate from excavated subsoil.

Avoid compaction by plant and contamination by subsoil, stone, hardcore or rubbish.

At the time of excavation the topsoil must be reasonably dry and never wetter than the plastic limit.

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

221 TOPSOIL

Not less than two weeks before excavating topsoil treat with a suitable non-residual herbicide.

230 BENCHING

Surfaces of excavations with a gradient greater than 1 in 5, which are to receive filling, must have horizontal benches cut to match the depths of compacted layers of filling.

240 ADJACENT EXCAVATIONS

Where an excavation encroaches below a line drawn at an angle of 45 degrees from the horizontal from the nearest formation level of another higher excavation, the lower excavation, all work within in and backfilling thereto must be completed before the higher excavation is made.

250 ACCURACY

Permissible deviations from formation levels:

Beneath mass concrete foundations: +/-25 mm

Beneath ground bearing slabs and r.c. 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 FORMATIONS GENERALLY

Make advance arrangements with Engineer for inspection of formations.

Remove the last 50 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 MASS CONCRETE FILL FOUNDATIONS

Excavate the whole depth of the foundation down to formation by machine in one operation. Make advance arrangements with Engineer for inspection of formation as soon as it is exposed.

Unless otherwise instructed place concrete immediately after inspection.

290 FOUNDATIONS IN MADE UP GROUND

Excavate down to a natural formation of undisturbed subsoil.

Obtain instructions if this is at a lesser depth than that shown on the drawings.

310 UNSTABLE GROUND

Inform Engineer without delay if any newly excavated face will not remain unsupported sufficiently long to allow the necessary earthwork support to be inserted.

If the instability is likely to affect adjacent structures or roadways, take appropriate emergency action until instructions are obtained.

320 RECORDED FEATURES

Break out old foundations, beds, drains, manholes, etc, where and to the extent stated on the drawings.

Seal off drain ends.

Backfill excavations to Clause D20.625.

321 CONTAMINATION OF EXCAVATED MATERIALS

Inform Engineer without delay if high visible concentration of contaminated materials arise in the excavation to reduced level.

Remove contaminated material to designated storage skip or area prior to removal from site to specialised tip facility.

331 WATER ON EARTHWORKS

The Contractor shall arrange for the rapid dispersal of water shed onto or entering the earthworks from any source or at any time during construction.

The contractor shall provide within the site, where necessary, temporary watercourse, ditches, drains, pumping or other means of maintaining the earthworks free from standing water.

360 EXCESS WIDTH TO FOUNDATIONS

Backfill any excavations taken wider than required with approved material to Clause D20:711 thoroughly compacted in layers not greater than 200mm.

371 EXCESS DEPTH TO FOUNDATIONS

Backfill any foundations taken deeper than required with mass fill concrete, GEN 1.

372 EXCESS DEPTH TO GROUND FLOOR SLAB

Backfill any excavations taken deeper than required with approved material to D20:711.

DISPOSAL OF MATERIALS

410 TOPSOIL

Stockpile all excavated preserved topsoil in temporary spoil heaps at locations to be agreed with client. Any excess topsoil to be removed from site.

420 TOPSOIL SPOIL HEAPS

To be not more than 2m high.

Treat with a suitable herbicide at appropriate times to prevent seeding of weeds.

Prevent compaction and contamination.

443 SURPLUS SUBSOIL

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

FILLING

510 HAZARDOUS, AGGRESSIVE OR UNSTABLE MATERIALS

Do not import or 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.

Soluble sulphate content (SO₃) of imported materials for filling under concrete slabs or within 1 m of substructures must not exceed 0.5 g/litre when tested to BS 1377:Part 3, clause 5 using a 2:1 water-soil extract.

Submit test reports from an approved laboratory demonstrating compliance of the proposed material(s).

530 PLACING FILL GENERALLY

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 ensure stability of adjacent structures.

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 IN FILL

Where, during the progress of the work, the difference in level between adjacent areas of filling exceeds 600 mm, cut into edge of higher filling to form benches having a minimum width of 600mm and a height equivalent to the depth of a layer of compacted filling.

Spread and compact new filling to ensure maximum continuity with the previous filling.

GENERAL FILL MATERIALS – UPFILL BENEATH BUILDINGS/CAR PARKS/ROADS**600 EARTHWORKS MATERIALS SHALL FALL INTO THE FOLLOWING GENERAL CLASSIFICATIONS IN ACCORDANCE WITH VOLUME 1 SPECIFICATION FOR HIGHWAY WORKS, SERIES 600, EARTHWORKS**

If there is a requirement to achieve a BREEAM rating **recycled aggregate** should be used. See appendix A below.

(i) Acceptable Material:

Material imported onto the site which meets the requirements of Table 6/1 and Appendix 6/1 for acceptability for use in the Permanent Works.

(ii) Unacceptable Material:

Material which does not comply with the permitted constituents and material properties of Table 6/1 for acceptable material;

Material, or constituents of materials, composed of the following, unless otherwise described in Appendix 6/1:

- (a) Peat materials from swamps, marshes and bogs;
- (b) logs, stumps and perishable material;
- (c) materials in a frozen condition;
- (d) clay having a liquid limit determined in accordance with BS:1377 Test 2, exceeding 80 or plasticity index determined in accordance with BS:1377 Test 4, exceeding 55.
- (e) material susceptible to spontaneous combustion.

610 GENERAL LANDSCAPE SUBSOIL FILLING

Materials arising from the excavations, but excluding the following:

Material from marshes or bogs.

Peat, logs, stumps, slurry, mud and perishable material.

Material susceptible to spontaneous combustion.

Clay of liquid limit exceeding 80 and/or plasticity index exceeding 55

Material with excessive moisture content.

Unacceptable material class U2 as defined in clause 601 of the Highways Agency 'Specification for highway works'.

Lay in layers not more than 200 mm thick and consolidate each layer.

625 COMPACTED SOIL FILLING

Lay and compact in layers using suitable plant in accordance with Volume 1 Specification for Highway Works, Series 600, Earthworks.

The compaction is to be undertaken in accordance with the requirements of Table 6/1.

Fill under buildings to be class 6N, in accordance with Clause 610 of the Specification for Highways Works and compacted in accordance with Clause 612 of that Specification and Table 6/1.

700 BACKFILLING TO FOUNDATIONS

Graded granular filling as Clause 711.

711 GRADED GRANULAR FILLING

To Department of Transport Specification for Highway Works, Clause 803 (Type 1) or other approved.

Lay and compact to Clause 802.

Well in advance of starting work, submit details of proposed type of plant, maximum depth of each compacted layer, minimum number of passes per layer.

720 GRADED GRANULAR FILLING DIRECTLY UNDER CONCRETE SLABS

To be as Clause 711 and not less than 150mm thick, as shown on the contract drawings. Any requirement for fill material below this is to be as Item 625 above.

730 BLINDING

Surfaces to receive sheet overlays or concrete to have sufficient sand, fine gravel or other approved fine material applied to fill interstices and provide a close smooth surface.

Permissible deviations on surface level: +0 –25 mm.

TOPSOIL AREAS**810 GRADE SUBSOIL**

Grade subsoil to smooth flowing contours and to achieve the specified finished levels of the topsoil.

Excavate locally as necessary for areas of thicker topsoil.

Small planting beds located in general landscape areas may be excavated separately at a later date.

820 LOOSEN SUBSOIL

Loosen subsoil consisting of light, noncohesive material with a 3 tine ripper, drawn 300 mm deep at 600 mm centres in two directions obliquely across the slope, when ground conditions are reasonably dry.

827 REMOVE STONES

Remove stones with largest dimension exceeding 50 mm from surface of subgrade immediately before spreading topsoil.

850 CONTAMINATION

Do not use topsoil contaminated with subsoil, rubbish, oil based products, or other materials toxic to plant life.

Dispose of contaminated topsoil as instructed.

855 HANDLING TOPSOIL

When moving topsoil within the site, or when stripping topsoil and importing to site:

If aggressive weeds are present, obtain instructions from the CA before moving topsoil.

Select and use plant to minimize disturbance, trafficking and compaction.

Avoid contamination by subsoil, stone, hardcore, rubbish or material from demolition work.

Keep different grades of topsoil separate from each other when handling and stockpiling.

Inform CA where the depth of topsoil is difficult to determine.

880 FINISHED LEVELS OF TOPSOIL

Finished levels of topsoil after settlement, unless otherwise stated, to be:

30mm above adjoining paving or kerbs.

Unchanged where abutting existing trees.

Not less than 150 mm below dpc of adjoining buildings.

30mm higher for shrub areas than for adjoining grass areas.

Married-in with adjoining soil areas.

Appendix A RECYCLED AGGREGATES

100 RECYCLED AGGREGATES SHOULD BE USED TO QUALIFY FOR BREEAM RATING POINTS.

110 ALL RECYCLED MATERIAL MUST BE FREE FROM:

- i) Contaminates at a level which pose a risk to health,
- ii) Combustible material,
- iii) Domestic refuse,
- iv) Other material which, in the opinion of the Engineer, may affect the durability of the permanent works.

115 CLASS OF RECYCLED AGGREGATE ALLOWED AS DEFINED BELOW

CLASS	ORIGIN	BRICK CONTENT BY WEIGHT
RCA(I) NOT ALLOWED	Brickwork	0 – 100%
RCA(II) ALLOWED	Concrete	0 – 10%
RCA(III) NOT ALLOWED	Concrete and brick	0 – 50%

The recycled aggregates are to be stored separately on site.

120 IMPURITIES SEE TABLE 2 BELOW

Table 2 Maximum levels of impurities by weight	
Asphalt and tar	10% in RCA(I) 5% in RCA(II) 10% in RCA(III)
Wood	1% in RCA(1), (II), (III)
Glass	5% in RCA(I), (II), (III)
Other foreign materials eg. metals, plastics, clay lumps	1% in RCA(1), (II), (III)

125 TESTING OF MATERIALS

Before the commencement of works, the Engineer will require samples of the various materials to be used in the construction to be sampled and tested. If approved, these samples shall then be taken as representative of the standard required by the Engineer.

The Engineer reserves the right to sample and test at any time any materials and goods that will form part of the permanent works to ensure compliance with the specification requirements.

The contractor shall ensure that all assistance is provided to obtain any sample at any time before or during the works.

All sampling and testing used for construction design purposes and to judge compliance to specification shall be carried out by a laboratory which holds United Kingdom Accreditation Service (UKAS) accreditation for the appropriate test.

Where the Contractor submits to the Engineer sampling and/or test certificates for any goods or materials for which there is a requirement for UKAS accreditation then the certificates shall be accompanied by the UKAS testing schedule for the test laboratory and shall indicate the following:-

- (i) address of the permanent laboratory
- (ii) Laboratory contact
- (iii) Issue date of schedule and issue number

130 METHOD STATEMENT FOR PRODUCTION

The contractor shall provide a method statement detailing the process, process control and the range of products produced and the procedures for storing materials on site.

135 INSPECTION AND TESTING REGIME

The material should come from a recognised and approved recycled aggregate supplier that provide regular source testing of material. Source testing certificates should be provided for approval.

Where the product is intended for use of SUB-BASE TYPE 1 then RCA(II) shall be used and the following test and acceptance criteria is required:-

TEST	METHOD	FREQUENCY (min)	LIMITS
Water absorption	BSEN1097 and BS812	3 no	8.5% max
Grading	BSEN933 AND BS812	3 no	Table 8/2 vol.1.
Composition	as table 2	3 no	as table 2
Los Angeles Fragmentation Test	BSEN 1097	3 no	50KN min
Soundness	BS812 Part 121	3 no	min of 65
Frost Heave	BS812	1 no	15mm max.

140 ALL TESTING SHALL BE PERFORMED BY A UKAS LABORATORY WHICH HOLDS ACCREDITATION FOR THAT TEST.

145 INFORMATION TO BE PROVIDED BY THE CONTRACTOR:-

test results

test procedure

quality plan

150 REQUIREMENTS FOR GRANULAR SUB-BASE MATERIAL TYPE 1

All to be in accordance with the Highways Agency Manual of Contract Documents for Highway Works, Volume 1, clause 803 and grading from Table 8/2.

155 REQUIREMENTS FOR GRANULAR SUB GRADE IMPROVEMENT LAYER (CAPPING)

To be in accordance with the Highways Agency manual of Contract Document for Highway Works, Volume 1, Table 6/1, Class 6F2.

TEST	METHOD	FREQUENCY (min)	LIMITS
Grading	BS1377 Part 2	3 no	Table 6/2 vol.1
10% Fines	Clause 635 vol.1	3 no	30 kN

Appendix 6/1 – Requirements for Acceptability and Testing ETC. of Earthworks Materials

6.1.1 ACCEPTABILITY LIMITS FOR THE FILLS

The fill is to be placed by method compaction or end product compaction based on the Specification for Highways Works. Acceptable limits for the classes of general fill materials, excavated from site or imported, likely to be adopted for use on the scheme are shown in Table 6/1 'Acceptable Earthworks Materials: Classification and Compaction Requirements', of the Specification for Highways Works. The Contractor will be responsible for assessing the suitability of the site-won material for placement and determining the placement criteria to ensure that the material is placed to achieve the criteria of:

95% maximum dry density as determined by BS1377, 2.5kg rammer compaction method, placed within OMC -1% and OMC +2% of optimum moisture content underneath the building footprint.

A CBR value of greater than 5%, when measured in situ in areas of roads/car parks.

The above criteria will also be applicable to any imported materials.

The following imported materials are permitted: Class 1A, 1B, 6F1, 6F2, 6F5, Type 1 (Clause 803).

During and on completion of the earthworks, a programme of screening and validation testing will be carried out to confirm that the required end product/method compaction has been achieved. The testing frequency is defined in Appendix 1/5 of this specification.

The acceptability of materials arising from the site earthworks or materials imported for use as earthworks fill shall be the responsibility of the Contractor, including classification and testing required. The requirements for earthworks materials testing are indicated in Specification Appendix 1/5. The Contractor shall be responsible for identifying the need for and location of trial pits and excavations required for materials classification and shall agree with CA prior to commencement of excavation.

The Contractor shall submit two copies of all classification test results to CA within one working day of the completion of the test. The copies shall be signed by the Contractor's responsible representative.

Source testing will be required on any proposed imported material to demonstrate that the material is acceptable. The CA must be satisfied that the material is acceptable before any

proposed imported material is deposited on site. In the case of imported materials the testing for acceptability, except frost susceptibility and sulphate content, shall be carried out at the point of deposition. The Contractor is to maintain full records on each sub unit of imported materials including but not limited to, the location of the sources, the suppliers details the acceptability testing and the location it has been incorporated within the works.

Any imported or site won material for use as general fill or capping shall not contain asbestos.

6.1.3 DESIGNATION OF MATERIAL AS CLASS 3

Class 3 material shall not be used in the works.

6.1.4 GROUNDWATER LOWERING AND TREATMENT

Where reasonably practicable, groundwater, if encountered, shall be lowered to allow exposure of formation level and the compaction of fill. Any ground water lowering proposed should be agreed with the CA as it may influence settlement of adjacent areas.

6.1.5 MINIMUM MCV FOR CLASS 9D MATERIAL

Not used.

6.1.6 REQUIREMENTS FOR UN-BURNT COLLIERY SPOIL

No un-burnt colliery spoil will be used on the scheme. The Contractor shall agree with CA scheme specific requirements covering engineering and environmental aspects of its use prior to any proposal to import un-burnt colliery spoil.

6.1.7 PERMITTED USE OF RAPID ASSESSMENT PROCEDURE

Nuclear moisture/density gauge for measuring field densities are permitted. If nuclear density gauge is used this will be calibrated for each soil type to be used in the laboratory in accordance with BS1377: Part 9 prior to use in the field. Relevant permit should be obtained for the use of the Nuclear Density Gauge at the site.

APPENDIX 6/2 - REQUIREMENTS FOR DEALING WITH CLASS U2 UNACCEPTABLE MATERIAL

6.2.1 GENERAL REQUIREMENTS

The Contractor shall comply with all current legislation concerning the handling, transportation and disposal of materials, including those which could be regarded as hazardous, including but not restricted to, the Collection and Disposal of Waste Regulations, the Controlled Waste Regulations 1992, the Control of Pollution Act 1974, the Environmental Protection Act 1990 and amendments, the Environmental Protection (Duty of Care) Regulations 1991, the Landfill Regulations 2002 and other relevant statutes and regulations.

The Contractor will be responsible for the detailed classification of the waste (Class U2 material) for disposal purposes in accordance with the Landfill Regulations 2002 and for selection of appropriate waste disposal facilities. Class U2 material is described as 'the hazardous waste (as defined in the Hazardous Waste (England and Wales) Regulations 2005) and radioactive waste (as defined in the Radioactive Substances Act 1993).

The Contractor shall inform the CA immediately upon discovering any Class U2 Unacceptable Material. The Contractor shall submit to the CA a method statement for dealing with such Class U2 Unacceptable Material prior to commencing any works in that vicinity. Any contaminated Class U2 Unacceptable Material excavated shall be handled and disposed of in accordance with the requirements of the relevant local authority and statutory authority.

6.2.2 CONTAMINANTS PRESENT ON SITE

The contractor should refer to the Site Investigation Report which gives a summary of the ground conditions at the site including contamination, ground gas and ground aggressivity revealed during the past ground investigations. However, previously unidentified contamination arising during the redevelopment of the site is always a possibility, in common with any previously developed site. In recognition of this, the Contractor has a responsibility to notify the CA should any unusual ground conditions or previously unidentified contamination (e.g. evidence of visual or olfactory contamination) be revealed during the redevelopment of the site. If such conditions are encountered then expert advice should be sought and it will be further investigated and relevant and appropriate action taken.

Contaminated materials which may be suitable for re-use on site after treatment shall be classified for the purpose of earthworks operations in accordance with Appendix 6/1. Additional requirements of this Appendix shall also apply where relevant to this material. However, made ground may not be suitable to use as subsoil for landscaping purposes due to the presence of

large particles of stone, concrete, brick, ash, etc. An appropriate thickness of subsoil and topsoil may be required in accordance with the requirements of the landscape architect.

6.2.3 DISPOSAL OF U2 MATERIAL

Where it is anticipated that some soil materials will be disposed off-site, the materials may be re-processed to lower their classification to inert waste. This should be discussed with the selected landfill operator. Further tests may be required by the landfill operator and it is recommended that any soils arising on site that are intended to be disposed to landfill are carefully segregated, stockpiled and retested.

The Contractor shall be responsible for the detailed classification of the waste (U2) material for disposal purposes in accordance with the Landfill Regulations 2002 and for selection of appropriate (suitably licensed) waste disposal facilities. The Contractor shall be deemed to be the producer of the waste (in accordance with the Waste Management Duty of Care Provisions of the Environmental Protection Act, 1990) and in order to satisfy the regulations the Contractor shall as a minimum:

The Contractor shall be responsible for the safe handling, storage, transportation and disposal off site of Class U2 Unacceptable Material in accordance with statutory regulations and legislation.

For contaminated unacceptable material Class U2, transportation off site will be in accordance with statutory regulations and legislation and shall comply with the requirements of the statutory authorities.

Prior to removal of contaminated material from the site, the Contractor shall submit to CA copies of Waste Disposal Notices and Waste Carrier Notices. During the tipping operation the Contractor shall submit to CA copies of the transfer notes which shall include a description of each classification of U2 contaminated material.

If the Contractor does not possess the relevant licences for handling the Class U2 Unacceptable Material, including asbestos, he shall appoint a licensed subcontractor to handle the material.

APPENDIX 6/3 - REQUIREMENTS FOR EXCAVATION, DEPOSITION, COMPACTION (OTHER THAN DYNAMIC COMPACTION)

6.3.1 EARTHWORKS REQUIREMENTS

Cut and Fill earthworks shall be carried out to produce the required landform in accordance with the contract drawings.

No ground disturbing activities, including any earthmoving activities, are to commence prior to the Contractor obtaining any necessary permits or licences relating to protected species or habitats.

Where earthworks are to be constructed over existing road pavement or concrete hardstanding, the existing road pavement or concrete hardstanding is to be completely removed and treated as Class U1B or Class U1A for concrete material only. Material excavated and designated for treatment as Class U1A shall be transported to the appropriate process area for stockpiling and treatment.

The Contractor shall be responsible for the collection and disposal of all surface and groundwater accumulating in the temporary and permanent works and all water from dewatering systems. The Contractor shall be responsible for all aspects of any groundwater dewatering and monitoring systems he considers are necessary to construct the Works. This shall include design, installation, operation, monitoring, protection, maintenance and removal. Wherever temporary dewatering systems are used the Contractor shall ensure that no damage occurs to adjacent vulnerable assets such as structures, services, pipelines, roads, etc immediately or in the long term and he shall put in place monitoring to demonstrate that he is controlling the work in a safe Manner.

6.3.2 BLASTING FOR EXCAVATION

Blasting for excavation is not permitted.

6.3.3 EXCAVATIONS

Where excavations are required adjacent to or around existing structures and roads, appropriate measures shall be taken by the Contractor to prevent differential settlement to avoid damage to the existing structures. The Contractor shall be responsible for all necessary temporary supports and/or restrictions on sequence of construction.

The Contractor shall be responsible for the control and prevention of groundwater ingress into excavations.

6.3.4 FORMING OF CUTTING FACES (SHW CLAUSE 603)

Areas and gradients of permanent cut faces are shown on the drawings. The Contractor shall not deviate from the gradients shown on the drawings. Any undercutting required for trench or other excavations (e.g. foundations) are shown on the contract drawings. Such excavations shall only remain open for minimum periods necessary, so as to prevent risk to permanent works.

The Contractor shall be responsible for all necessary temporary supports and/or restrictions on sequence of construction. The work will be carried out with suitable plant in such a way that it will not cause slope failures by overloading the crest or undercutting the final faces. Foundation excavations on slopes shall be carried out in a manner that it will not cause slope failures. Any slope failures on the final faces will be made good before topsoiling where required.

Temporary slope faces shall not be left unprotected and unsupported for long periods before construction of the retaining structure and granular backfilling.

6.3.5 FILL REQUIREMENTS

The locations of all fills, including embankments and the slope gradients are shown on the drawings. Embankments and other areas of unsupported fills shall not be constructed with steeper side slopes or to greater widths than those shown on the drawings, except to permit adequate compaction at the edges before trimming back or to obtain the final profile following any settlement of the fill and the underlying material.

The classes of materials permitted for fills are given in Appendix 6/1, complying with Table 6/1. The excavated material shall be screened, where necessary, to remove oversized materials or any other unsuitable materials as specified in Appendix 6/1. Granular and cohesive made ground, granular and cohesive natural soils, selected granular fill (as fill to structures), crushed suitable building materials, etc shall be stockpiled separately based on the visual assessment of class of fill in accordance with Table 6/1 of SHW. Contaminated made ground shall not be used in the works (See Appendix 6/2).

Any areas requiring filling shall be made level, by terracing if necessary with a nominal fall of 1 in 50. The base of any such area shall be surveyed prior to placement of any engineered fill, to enable contoured plots of the base of the engineered fill to be placed.

All soft spots present beneath the excavation level shall be removed and replaced with suitable Class 1 or Class 6F or 6N or Type 1 material. The formation below the excavation level shall be proof rolled prior to deposition of first fill layer.

The base of any excavation or surface prepared to accept fill material shall be proof rolled using an appropriate roller and any soft spots encountered will be removed as necessary and replaced with suitable fill materials. The top 300mm of the ground surface and any additional pockets of topsoil should be stripped off before carrying out proof rolling.

Once a clean surface has been exposed and approved suitable by CA, suitable fill materials shall be laid and compacted in accordance with SHW and the Appendices 6/1 to 6/3. The layer thickness and type of compaction plant shall be chosen by reference to SHW. Where fill is placed against existing slope benching will be required. The edge of the existing ground surface should be cut to form benches each having a minimum width of 600mm and a height requirement equal to the layer thickness of compacted fill.

If following placement of the general fill, adverse weather conditions render the upper level of general fill unacceptable, this material shall either be removed and replaced with acceptable material or rendered acceptable through processing or modification to the satisfaction of the CA.

Where filling and compaction is required adjacent to or around existing structures and roads, appropriate measures shall be taken by the Contractor to prevent differential settlement to avoid damage to the existing structures, roads and footpaths.

6.3.6 COMPACTION

Compaction of acceptable material as general fill shall be in accordance with the Specification for Highway Works Clause 612 – Method Compaction

The general fill material, except Type 1 material, shall be compacted to achieve a minimum of 95% of the maximum dry density placed at optimum moisture content, OMC -2% and OMC +2.0%.

The compaction requirements for Type 1 materials will be in accordance with Highways Agency 'Specification for Highway Works', clauses 801 and 802.

The fill will be placed in accordance with the appropriate compaction method stated in Table 6/1 and specified in Table 6/4. Site-won materials should be excavated in a manner which exposes minimum surface area of intact materials to the weather.

The Contractor shall carry out his own laboratory tests and site trials in choosing the appropriate methods for compacting different material types to be excavated in accordance with this Specification and determining the requirements for conditioning the soils.

Where several different types of fill material are to be employed, they shall be deposited in such a way that all parts or particular sections of the site receive roughly equal amounts of a given material, in roughly the same sequence, thus ensuring a uniform distribution of fill types over the whole fill thickness.

All necessary steps shall be taken to ensure that the fill is placed at the moisture content necessary to achieve the specified level of compaction and shall, where necessary, add water to or dry the fill, in order to obtain this value. Cobbles, boulders, rock or waste fragments, the largest dimension of which is greater than two-thirds of the compacted layer thickness, shall not be incorporated into the fill.

No fill shall be placed and left uncompacted at the end of the working day. Compacted fill shall be graded to falls to ensure free run off of rainwater without ponding.

Compaction plant and compaction method shall be selected having regard to the proximity of existing trenches, excavations, retaining walls or other structures and all work shall be performed in such a way as to ensure that their existing stability is not impaired.

If weather conditions are such that the specified moisture content and density values cannot be achieved, the contractor shall cease work until such time as the fill can be placed and compacted to meet specification requirements.

If the results of control tests indicate that the fill is being placed and compacted in such a way that the desired level of compaction is not being achieved, the contractor shall further compact or if necessary, shall excavate the affected area and replace with new fill, compacted to meet the specification requirements.

6.3.7 CLASSIFICATION AND VERIFICATION TESTING

Testing requirements for classification and verification for the compacted site won or imported general fill shall be as shown in Appendix 1/5.

APPENDIX 1/5 : TESTING TO BE CARRIED OUT BY THE CONTRACTOR

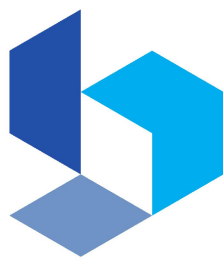
Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificates	Comments
601, 631 to 637 640	Acceptable material				
	Site-won General Cohesive Fill/General Granular Fill Class 1, Class 2	Grading / plastic limit/mc	1 per 250m ³ up to maximum 5 per day	Required	
		Optimum dry density/mc	1 per 250m ³ up to max of 5 per day	Required	
601, 631 to 637 640	Imported Granular Fill	Grading / Uniformity coefficient/mc	1 per 250m ³ up to max of 5 per day	Required	
	Class 1A, 1B	Optimum Dry Density/mc	1 per 250m ³ up to max of 5 per day	Required	
	Selected Granular Fill Class 6F1/6F2, 6F5, Type 1	Grading/uniformity Coefficient/mc	Source approval and 1 per 400 tonnes up to max of 3 per source	Required	
		Frost Susceptibility	Source approval and 1 per 400 tonnes up to max of 3 per source	Required	
		Los Angeles Coefficient	Source approval and 1 per 400 tonnes up to max of 5 per source	Required	

APPENDIX 1/5 : TESTING TO BE CARRIED OUT BY THE CONTRACTOR

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificates	Comments
612	Compaction of Fills End Product Compaction				See Appendix 6/1 requirements and drawings for additional requirements
	General Fill	Grading	1 per 15m x 15m area on each layer placed	Required	Refer to Table 6/2
		mc	1 per 15m x 15m area on each layer placed	Required	
		In situ density (NDT)	1 per 15m x 15m area on each layer placed (Lab or field calibration tests required to determine correlation between NDT and insitu density)	Required	End product to achieve 95% maximum dry density.
		In situ density, Sand replacement test	1 per 6 NDT On finished layer only	Required	
WAC testing	AS specified in EA 2005	As required by the landfill operator	Required	For material to be disposed off site.	
		In situ CBR	On final layer along access road/car parking/hardstanding areas	Required	

Notes:

1. Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or material proposed by the Contractor.
2. All compliance and validation testing shall be UKAS accredited.
3. Earthworks testing requirements shall also be in accordance with information on the drawings. Testing will be undertaken at the frequency proposed. This frequency may be reduced at the discretion of CA.



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Specification for

GRANULAR SUB-BASES TO ROADS/PAVINGS

Q20 GRANULAR SUB-BASES TO ROADS/PAVINGS

110 THICKNESSES OF SUB-BASE/SUBGRADE IMPROVEMENT LAYER(S)

Specified in the following related sections:

Q22 Coated macadam/Asphalt roads/pavings

120 CHECKING CBR OF SUBGRADE

The specified thicknesses of sub-bases and capping layers are based on an assumed subgrade of clay with gravel with an assumed CBR of 2-5%.

If the subgrade material appears to be different from this, or if there are extensive soft spots, test CBR of subgrade, report results to Engineer, and if different from the assumed CBR obtain instructions before proceeding with laying sub-base.

140 COMPACTION OF SUBGRADE

Defer final excavation to formation level until immediately before compaction of subgrade.

Soft spots must be brought to the attention of the Engineer.

Obtain instructions before proceeding.

Subgrade must be relatively dry at time of compaction.

Where use of a roller is impracticable use a suitable mechanical rammer.

Where local excavation and backfilling has taken place make additional passes of the roller.

150 SUBGRADE FOR VEHICULAR AREAS

Immediately before placing sub-base prepare and compact subgrade in accordance with Department of Transport Specification for highway works, clauses 616 and 617.

160 SUBGRADE FOR PEDESTRIAN AREAS

Immediately before placing sub-base thoroughly compact subgrade with a roller weighing not less than 2.5 tonnes or equivalent other plant.

200 SUBGRADE IMPROVEMENT LAYER (CAPPING) MATERIAL

To Department of Transport Specification for highway works, Table 6/1, Class 6F2.

Place and compact to Department of Transport Specification for highway works, Table 6/1, clause 612 and clause 613.3, 613.9 and 613.10.

210 GRANULAR MATERIAL: To Department of Transport Specification for highway works, clause 803 (type 1) or approved equivalent. Test materials as clause 803.5 if required by the Engineer.

230 PLACING GRANULAR MATERIAL GENERALLY

Ensure that subgrade is free from loose soil, rubbish and standing water.

Take all necessary precautions to ensure stability of adjacent structures.

Place and compact material against or over structures, membranes or buried services in a sequence and manner which will ensure stability and avoid damage.

240 GRANULAR SUB-BASES FOR VEHICULAR AREAS

Spread and level in layers and as soon as possible thereafter compact each layer.

Maximum depth of compacted layer, type of compaction plant and minimum number of passes per layer to be as Department of Transport Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works including all amendments current at November 1997 table 8/1.

250 LAYING GRANULAR SUB-BASES FOR PEDESTRIAN AREAS

Spread and level and, as soon as possible thereafter, compact with a roller weighing not less than 2.5 tonnes or other equivalent plant.

310 ACCURACY

Maximum permissible deviation from the required levels, falls and cambers to be as follows:

	Roads	Footways
	Parking areas	Recreation areas
Subgrade	+/-25 mm	+/-20 mm
Sub-base	+/-20 mm	+/-12mm

320 BLINDING

Surfaces to receive interlocking brick or block paving to section Q24 to have sufficient sand, fine gravel, PFA or other approved fine material applied and surface vibrated to provide a close and smooth surface.

330 COLD WEATHER WORKING

Do not use frozen materials containing ice.

Do not lay materials on frozen surfaces.

340 PROTECTION

Cover sub-bases as soon as practicable with subsequent layers, specified elsewhere.

Prevent damage to subgrades and sub-bases from construction traffic, construction operations and inclement weather.



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Specification for

BELOW GROUND DRAINAGE

R12 DRAINAGE BELOW GROUND

100 GENERAL

Unless specified otherwise, all materials and workmanship shall be in accordance with:

- Sewers for Adoption (Latest edition)
- BS EN 752:2008 Drain and Sewer systems outside of buildings

101 EXISTING DRAINS:

Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against information shown on drawings and report any discrepancies to Engineer.

Adequately protect existing drains and maintain normal operation during construction.

107 IN SITU CONCRETE:

Unless specified otherwise, in situ concrete for use in drainage below ground to BS 8500-1:2002, BS 8500-2:2002, BS EN 206-1:2000

Designated mix GEN 1 or GEN 3

Different mixes may be used for different parts of the drainage work.

TYPE(S) OF PIPELINE

121 CLAY PIPELINES

Pipes, bends and junctions: Vitrified clay to BS EN 295-01, with flexible joints, Kitemark certified.

Manufacturer and reference: To be approved.

Strength: Extra strength.

Sizes (s): DN 150, 225mm

Assumed type of subsoil: As indicated in Site Investigation Report.

Bedding class: S or Z.

Warning marker tape: Not required.

Wire detection aid: Not required.

131 CONCRETE PIPELINES

Pipes, bends and junctions: Precast concrete to BS 5911:-1:2002 + A2:2010, with flexible joints, Kitemark certified.

Manufacturer and reference: To be approved.

Cement type: SRC

Strength class: 120

Assumed type of subsoil: As indicated in Site Investigation Report.

Bedding class: S or Z

Warning marker tape: Not required.

Wire detection aid: Not required.

PLASTIC PIPELINES

Pipes, bends and junctions in PVC-u to BS 4660:2000 or BS EN 1401:-1:1998, class SN4 with flexible joints, Kitemark certified.

Bedding class S or Z

EXCAVATING/BACKFILLING**205 EXCAVATED MATERIAL:**

Unless otherwise specified, set aside turf, topsoil, hardcore, etc. for use in reinstatement.

221 LOWER PART OF TRENCH:

Where bedding class S is specified (see clause 370) trench width to be not more than the following, regardless of depth of cover:

Nominal pipe size (DN)	100	150	225	300
Maximum trench width (mm)	600	700	800	900

230 ASSUMED TYPE OF SUBSOIL:

Where the type of subsoil at the level of the crown of the pipe differs from that stated for the type of pipeline, obtain instructions before proceeding.

240 FORMATION FOR BEDS GENERALLY:

Excavate to formation immediately before laying beds or pipes.

Remove mud, rock projections, boulders and hard spots and replace with consolidated bedding material.

Harden local soft spots by tamping in bedding material.

Inform Engineer in advance to give him reasonable opportunity to inspect excavation formation for each section of the work.

250 COMBINED TRENCHES:

Where one pipe is at a lower level than another adjacent pipe in a common trench:

A subtrench is permissible provided the soil of the step is stable and unlikely to break away.

If a subtrench is not permissible, the whole trench must have a depth related to the lower pipe, with increased thickness of bedding to the upper pipe as necessary.

The lower pipe must be backfilled with compacted granular material to not less than half way up the higher pipe.

260 TRENCH SUPPORTS:

Remove trench supports and other obstacles sufficiently to permit compacted filling of all spaces.

281 BACKFILLING UNDER ROADS AND PAVINGS

Backfill from top of specified surround or protective cushion up to formation level with Granular Subbase Material Type 1 to Specification for Highway Works, Clause 803, laid and compacted in layers not exceeding 150mm.

281 BACKFILLING OVER CONCRETE:

Do not start backfilling within 24 hours of placing concrete. Do not use heavy compactors and prevent imposition of traffic loads within 72 hours of placing concrete.

290 TEMPORARY BRIDGES:

Provide temporary bridges over trenches as necessary to prevent construction traffic damaging pipes after backfilling.

BEDDING/JOINTING**310 INSTALLATION GENERALLY:**

Obtain pipes and fittings for each pipeline from the same manufacturer unless otherwise specified.

Joint differing pipes and fittings with adaptors recommended by pipe manufacturer.

Lay pipes to true line and regular gradient on an even bed for the full length of the barrel with sockets (if any) facing up the gradient.

Joint using recommended lubricants, leaving recommended gaps at ends of spigots to allow for movement.

Adequately protect pipelines from damage and ingress of debris.

Seal all exposed ends during construction.

Arrange the work to minimise time between laying and testing.

Backfill after successful testing.

370 CLASS S GRANULAR SURROUND:

Lower part of trench width to be as clause 221.

Granular material Grading: To BS 882:

Bedding Size to WIS 4-08-01 (see table below)

Lay and compact to a thickness not less than 50 mm for sleeve jointed pipes, 100 mm for socket jointed pipes, over full width of trench.

Where trench bottom is uneven due to hard spots or other reason, increase depth to 100 mm.

Scoop out locally at couplings/sockets and lay pipes digging slightly into bed and resting uniformly on their barrels.

Adjust to line and gradient.

After initial testing, lay and compact more granular material in 100 mm layers to 150 mm (300 mm for adoptable sewers) above crown of pipe.

Table A.2 - Processed granular bedding and sidefill materials for flexible pipes

Pipe nominal bore (mm) See note (d)	Nominal maximum particle size (mm)	Maximum CF value for acceptability See note (b)		Materials specified in British Standards See note (a)
		Non-pressure pipe	Pressure pipe	
100	10	0.15	0.30	10mm nominal single-size
Over 100 to 150	15	0.15	0.30	10 or 14mm nominal single-size or 14mm to 5mm graded
Over 150 to 300	20	0.15	0.30	10, 14 or 20mm nominal single-size or 14mm to 5mm graded or 20mm to 5mm graded
Over 300 to 550	20	0.15	0.30	14 or 20mm nominal single-size or 14mm to 5mm graded or 20mm to 5mm graded
Over 550	40	0.15	0.30	14, 20 or 40mm single-size or 14mm to 5mm graded or 20mm to 5mm graded or 40mm to 5mm graded

461 CLASS Z CONCRETE SURROUND:

Concrete mix: GEN 1

Lay concrete blinding, 25mm thick over full width of trench and allow to set.

Lay pipes on blinding on folded wedges of compressible board not less than 100mm above blinding.

Form vertical construction joints in surround at face of flexible pipe joints using 18mm thick compressible board pre-cut to profile of pipe.

Fill any gap between spigot and socket with resilient material to prevent entry of concrete.

After initial testing, place and compact more concrete for full width of trench to encase pipe to 150mm above crown or to other height as specified or shown on drawings.

470 TRENCHES LESS THAN ONE METRE FROM FOUNDATIONS:

Where bottom of trench is lower than bottom of foundation, use Class Z concrete surround as clause 461.

Top of concrete to be not lower than bottom of foundation.

480 TRENCHES MORE THAN ONE METRE FROM FOUNDATIONS:

Where bottom of drainage trench is below a critical level, (defined below) Class Z concrete surround as clause 461 is to be used, the top of the concrete being not lower than the critical level.

For the purpose of this clause the critical level is 'D' mm lower than level of foundation bottom, 'D' mm being equal to the horizontal distance of the near side of the trench from the foundation, minus 150mm.

490 CROSSEOVERS:

Where two pipelines (other than plastics pipes) cross with less than 300mm separation, surround each with Class Z concrete surround as clause 461 for not less than 1 m centred on the crossing point.

Extended length of concrete surrounds as necessary to within 150mm of next nearest flexible joints.

512 PIPELINES PASSING THROUGH STRUCTURES:

Where pipelines must be cast in or fixed to structures (including manholes, catchpits and inspection chambers) provide short length or rocker pipes near each external face, with flexible joint at each end:

Pipe size (DN)	Distance to first joint from structure (mm)	Short length (mm)
100 & 150	150	600
225 & over	225	600

Where pipelines need not be cast in or fixed to structures (eg wall to footings) provide either: short length or rocker pipes as specified above, or openings in the structures to give a 50mm minimum clearance around the pipeline and closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin.

510 BENDS AT BASE OF SOIL STACKS:

Unless specified otherwise, use a 90° nominal rest bend with a minimum radius of 200mm to centreline of pipe.

Invert of horizontal drain at base of stack to be not less than 450mm below centreline of lowest branch pipe.

Stabilise bend(s) by bedding in concrete without impairing the flexibility of couplings.

660 ROADWAY GULLIES: PRIVATE

Gulley pots to be precast concrete to BS 5911: BS 5911:-6:2004 + A1:2010. Bedded and surrounded in GEN 3 concrete.

Size 450 diameter x 900mm deep internally with a 150mm single seal trapped outlet and cleaning eye with approved stopper and chain.

661 ROADWAY GULLIES: ADOPTABLE

Gulley pots to be precast concrete to BS 5911: BS 5911:-6:2004 + A1:2010. Bedded and surrounded in GEN 3 concrete.

Size 450 diameter x 900mm deep internally with a 150mm single seal trapped outlet and cleaning eye with approved stopper and chain.

680 MANUFACTURER:

Obtain each complete assembly of fittings, traps, etc. including appropriate couplings, from the same manufacturer, and check compatibility of components with each other and with the pipe system

MANHOLES/CHAMBERS/SOAKAWAYS/TANKS

710 BRICK MANHOLES/INSPECTION CHAMBERS:

Bases: 200mm thick plain concrete, mix GEN 3.

Brickwork: frogs facing upwards. Class B engineering.

Steps: Galvanised ferrous to BS 1247.

Bed in joints to all chambers over 900mm deep at 300mm vertical centres staggered 300mm horizontally, with lowest step not more than 300mm above benching and top step not more than 450mm below top of cover.

Channels, branches and benching; R12.760

Cover slabs: 150 thick, precast bed solid in 1:3 cement:sand mortar to brickwork.

Openings to suit required access covers.

Reinforcement: T12 at 150mm c/c both ways with additional bars at openings and corners.

Access covers and seating: as clause 816.

721 CONCRETE MANHOLES & INSPECTION CHAMBERS:

In situ concrete bases: minimum 225mm thick GEN 3 concrete.

Manholes: To BS 5911:3:2010, Kitemark certified, all components from the same manufacturer.

Manufacturer and reference: As approved.

Cement type: SRC

Chamber rings: Size(s) DN 1200

Cover slabs: Openings to suit required access covers, heavy duty precast to BS 5911:3:2010.

Joints: As recommended by manhole manufacturer.

Steps: Galvanised ferrous to BS 1247.

In situ concrete surround; 150mm min thickness, mix as specified GEN 1.

Channels, branches and benching: As Clause R12.760.

Access covers and seating: To Clause R12.816.

722 INSPECTION CHAMBERS - PLASTICS

To BS 7158 or BS EN 13598-1, or Agrément certified.

Diameter: 475/600mm

Bases: 100/110, 150/160 nominal diameters

Shaft units: 150, 175

Access covers and frames: Round ductile iron 440 clear opening
Loading grades to BS EN 124

760 CONVENTIONAL CHANNEL(S), BRANCHES AND BENCHING:

Bed main channel solid in 1:3 cement: sand mortar.

Connect branches to channel, preferably at half channel level, so that discharge flows smoothly in direction of main flow.

Where the connecting angle is more than 45° to direction of flow use three-quarter section channel bends.

Form benching in concrete, mix GEN 3, to rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.

Within 3 hours float with coat of RC40 with 10 max. aggregate size.

816 CAST IRON ACCESS COVERS AND SEATING:

Covers: Ductile iron to BS EN 124-1:2015, BS EN 124-2:2015, BS EN 124-3:2015, BS EN 124-4:2015, BS EN 124-5:2015, BS EN 124-6:2015

Manufacturer: Contractor selected to be approved

Type(s):

Adoptable highway areas: BS EN 124, class D400 600 x 600 mm clear opening list 5056 or similar approved.

Footways and landscaping areas: BS EN 124, class B125.

Seating: Make up in engineering bricks to BS 3921:1985, BS EN 771-1:2003

Class B, laid in 1:3 cement:sand mortar, or precast concrete cover frame units, Type 1 or Type 2 to suit cover shape.

Bed and haunch frame solidly in 1:3 cement:sand mortar over its whole area, centrally over opening, top level and square with joints in surrounding finishes. Cut back top of haunching to 30 mm below top of surface material.

835 LIFTING KEYS:

Provide suitable lifting keys for each type of access cover and hand over to the Client/Clients Agent at Practical Completion.

861 CONNECTIONS TO SEWERS:

Connect new pipework to existing adopted sewer(s) to the requirements of the Sewerage Authority or its agent.

CLEANING/TEST/INSPECTION

900 CLEANING:

Flush out the whole of the installation with water to remove all silt and debris before final testing, before CCTV inspection is specified and immediately before handover.

Safely dispose of washings and any detritus without discharging them into sewers or watercourses.

910 TESTING/INSPECTION GENERALLY:

Give Engineer advance notice to allow the opportunity to attend all tests and inspections.

Give the Statutory Authority appropriate notice to enable pipelines to be inspected and tested as required.

Provide water, assistance and apparatus as required.

All lengths of drain, manholes and inspection chambers must pass the tests specified.

If permitted test loss or infiltration is exceeded, remedy defect(s) before retesting after an appropriate period.

920 WATER/AIR TESTING OF GRAVITY DRAINS AND PRIVATE SEWERS UP TO DN 300:

To ensure that pipelines are sound and properly installed, air test short lengths to BS EN 1610:2015, immediately after completion of bedding / surround.

For final checking and statutory authority approval, test to BS EN 1610:2015, all lengths of pipeline from terminals and connections to manholes/ chambers and between manholes/chambers.

930 TESTING OF ADOPTABLE AND LARGE PRIVATE SEWERS:

Test sewers up to and including DN 750 size in accordance with BS EN 1610:2015 as follows:

Initially, before backfilling, by air test as BS EN 1610:2015.

Finally, after backfilling, by water test as BS EN 1610:2015.

Test sewers over DN 750 size before and after backfilling with appropriate equipment on short sections or at joints in accordance with BS EN 1610:2015.

After backfilling check at manholes for infiltration into sewers in accordance with BS EN 1610:2015.

940 WATER TESTING OF MANHOLES/INSPECTION CHAMBERS:

Before backfilling test each manhole or chamber in accordance with BS EN 1610:2015 for:

Exfiltration: Drop in water level to be not more than relevant dimension.

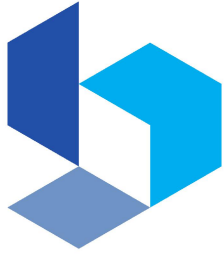
Infiltration: Inflow to be not more than 5 litres per hour per manhole.

975 CCTV INSPECTION OF ADOPTABLE PIPELINES

Permit the Sewerage Authority or its agent to provide equipment and personnel to carry out and record internal CCTV inspection of all new sewers and associated manholes after completion.

Where pipelines are under highways, all construction except for laying of the wearing course must be completed before the inspection of adoptable sewers.

Obtain instructions from Engineer on remedying any defects which may be revealed.



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Specification for

COATED MACADAM/ASPHALT ROADS/PAVINGS

Q22 COATED MACADAM/ASPHALT ROADS/PAVINGS

TYPE(S) OF PAVING

110 HOT ROLLED ASPHALT CIRCULATION ROAD:

Materials and workmanship to Department of Transport Manual of Contract Documents for highway works, Volume 1, Specification for Highway Works including all amendments current.

Surface Course:

Thickness: 40mm

Material: Hot Rolled Asphalt 55/10. (40/60 Pen. Machine Laid) or (100/150 Pen. hand laid.)

Binder Course:

Thickness: 60mm

Material: 20mm nominal size dense bituminous macadam binder course to Clause 906. 100/150pen.

Base Course:

Thickness: 150mm

Material: 32mm nominal size dense bituminous macadam binder course to Clause 906. 100/150pen.

Sub-base – 250mm of type 1 clause 803.

Capping – 275mm 6F2 well compacted. May vary dependant on ground conditions.

111 ASPHALT CONCRETE ACCESS ROAD

Materials and workmanship to Department of Transport Manual of Contract Documents for highway works, Volume 1, Specification for Highway Works including all amendments current.

Surface Course:

Thickness: 40mm

Material: 10mm nominal size close graded bituminous macadam surface course to clause 912. 100/150 pen.

Base Course:

Thickness: 60mm

Material: 20mm nominal size dense bituminous macadam binder course to Clause 906. 100/150 pen.

Sub-base – 375mm of Coarse Graded Aggregate 4/20 to BS7533-13:2009 minimum 30% void ratio.

112 ASPHALT CONCRETE FOOTPATH (HEAVY VEHICLE PAVEMENT)

Materials and workmanship to Department of Transport Manual of Contract Documents for highway works, Volume 1, Specification for Highway Works including all amendments current.

Surface Course:

Thickness: 25mm

Material: 6mm nominal size close graded bituminous macadam surface course to clause 912. 100/150 pen.

Base Course:

Thickness: 90mm

Material: 20mm nominal size dense bituminous macadam binder course to Clause 906. 100/150 pen.

Sub-base – 250mm of Type 1 clause 803.

220 MATERIALS GENERALLY:

Not less than 2 weeks before starting work submit to the CA the name(s) of all supplier(s) of bituminous material

At the time of delivery submit to the CA a test certificate for each manufacturing batch of bituminous material, certifying compliance with this specification and the relevant British Standard and giving complete information on the composition of each mix.

240 ACCEPTANCE OF SUB-BASE: Before starting work ensure that:

All Buried services have been identified and made safe.

The base is sound, free of debris, mud and soft spots, and suitably close textured.

The levels and falls of the sub-base are as detailed, within the specified tolerances of +/- 20mm (vehicular areas) and +/- 12mm (pedestrian areas).

Drainage outlets are within +0 to -10mm of the required finished level.

Kerbs and edgings are complete, adequately bedded and haunched and to the required levels.

250 ABUTMENTS: Clean edges of manholes, kerbs and other abutment and paint with a thin uniform coating of bitumen.**LAYING****310 LAYING GENERALLY:**

Remove all loose material, foreign matter and standing water from surfaces to receive paving materials.

Form neat junctions with and prevent damage to adjacent work. Keep clean all channels, kerbs, inspection covers etc.

Keep new paving free from traffic until it has cooled to prevailing atmospheric temperature.

Do not allow rollers to stand on paving at any time.

Do not use pavings as a building platform or for storing, mixing or preparing materials.

Lines and levels of finished surface to be smooth and even, with regular falls to prevent ponding.

Finished surface of paving to have an even overall texture. Leave in a clean state on completion.

320 COLD WEATHER:

Do not use frozen materials or lay paving on frozen or ice covered surfaces.

Do not lay coated macadam if the temperature of the laying surface is below 2 degC (or -1 degC on a rising thermometer).

Do not lay rolled asphalt if the temperature of the laying surface is below 5 degC or the air temperature is below 0 degC.

330 LEVELS:

levels of finished surface to be within +/- 6mm of required levels (+6mm -0mm adjacent to gullies and manholes).

340 REGULARITY:

Where appropriate in relation to the geometry of the surface, the variation in gap under a 3m straightedge (with feet) placed anywhere on the surface to be not more than:

Wearing course 3mm

Basecourse 6mm

Basecourse/Roadbase 25mm

Roadbase 25mm

Where a straightedge cannot be used the surface must be of a comparable standard of accuracy when judged by eye.

395 PAVEMENT MARKING TO ROADS:

Drawing reference

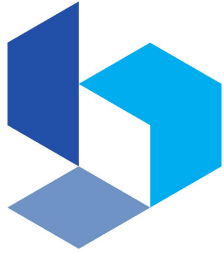
Materials and application to BA 2151: Parts 1,2, and 3

Class A

Colour: White/yellow as required

Reflectorisation to be incorporated into material

Surfaces to receive marking to be clean and dry. Remove all loose material and apply paint uniformly with no streaks or ragged edges. Use thinners in accordance with paint manufacturer's instructions.



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Specification for

CONCRETE KERBS, EDGINGS, CHANNELS

Q10 STONE/CONCRETE/BRICK KERBS/EDGINGS/CHANNELS**TYPE(S) OF KERB/EDGING/CHANNEL****110 PRECAST CONCRETE KERB**

To BS 7263

Method of manufacture: Hydraulically pressed.

Manufacturer and reference: To be as approved.

Type/size: As HB2, 125mm wide x 255mm high.

Special shapes: As required.

Finish/colour: Standard/Standard

Joints: Narrow as Clause 320.

Other requirements: Dowelled haunching as Clause 260.

111 PRECAST CONCRETE KERB

To BS 7263

Method of manufacture: Hydraulically pressed.

Manufacturer and reference: To be as approved.

Type/size: As BNC, 125mm wide x 150mm high x 915mm. (6mm pedestrian access check).

Special shapes: As required.

Finish/colour: Standard/Standard

Joints: Narrow as Clause 320.

Other requirements: Dowelled haunching as Clause 260.

112 PRECAST CONCRETE KERB

To BS 7263

Method of manufacture: Hydraulically pressed.

Manufacturer and reference: To be as approved.

Type/size: As DK, (dropper kerbs L/R or R/L).

Special shapes: As required.

Finish/colour: Standard/Standard

Joints: Narrow as Clause 320.

Other requirements: Dowelled haunching as Clause 260.

113 PRECAST CONCRETE KERB

To BS 7263

Method of manufacture: Hydraulically pressed.

Manufacturer and reference: To be as approved.

Type/size: As CB, 150mm wide x 150mm high x 915mm

Special shapes: As required.

Finish/colour: Standard/Standard

Joints: Narrow as Clause 320.

Other requirements: Dowelled haunching as Clause 260.

114 PRECAST CONCRETE EDGING

To BS 7263: Part 1

Method of manufacture: Hydraulically pressed.

Manufacturer and reference: To be as approved.

Type/size: As CKC, 125mm wide x 178mm high x 915mm

Special shapes: As required.

Finish/colour: Standard/Standard

Joints: Narrow as Clause 320.

115 PRECAST CONCRETE EDGING

To BS 7263: Part 1

Method of manufacture: Hydraulically pressed.

Manufacturer and reference: To be as approved.

Type/size: As PK, 50mm wide x 150mm high x 915mm

Special shapes: As required.

Finish/colour: Standard/Standard

Joints: Narrow as Clause 320.

210 LAYING GENERALLY

Where necessary cut units neatly and accurately with a masonry saw and without spalling to give neat junctions.

Bed units in mortar, true to line and level along top and front faces, on accurately cast foundations and secure with a continuous haunching of concrete. Allow bedding to set before placing haunching.

Keep exposed faces of units clean and free from concrete and mortar droppings.

220 ADVERSE WEATHER

Do not cast foundations, lay units or place haunching if the temperature is below 3 degC on a falling thermometer or 1 degC on a rising thermometer.

Adequately protect foundations, bedding and haunching against frost and rapid drying by sun and wind.

230 CONCRETE FOR FOUNDATIONS AND HAUNCHING

To BS 5328, Designated mix not less than GEN0 or Standard mix not less than ST1, very low workability.

260 HAUNCHING DOWELS

Mild steel hooped bars to BS 4482, 10mm diameter x 150 mm long.

Insert hooped bars vertically into foundation while concrete is still plastic, at 1000 mm centres, 50 mm from back face of kerb and with 75 mm projecting.

Haunching to be rectangular cross section, so as to fully enclose and protect dowels

290 RADIUS KERBS/CHANNELS

To be used for all radii of 12m or less.

300 ANGLE KERBS

To be used for both internal and external 90 deg changes of direction: cutting of mitres will not be permitted.

310 ACCURACY

Maximum deviations:

Level: +/- 6mm.

Horizontal and vertical alignment: 3 mm in 3 m.

320 NARROW JOINTS

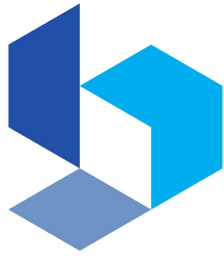
Joints shall be left slightly open (maximum 5 mm) to allow for expansion and the finished Kerb face shall be normally 125mm at the channel for adoptable areas and 100 mm elsewhere.

325 EDGE OF CARRIAGEWAY CHANNELS

Shall be rectangular, 150 mm x 125 mm (BS 7263 Figure 1g Type CB).

330 UNITS OF KERBING AND/OR CHANNELLING

Shall not deviate by more than 3 mm in 3 metres from true line and level.



BGP

1st Floor, Wellington House,
Wellington Court, Stockton-on-Tees
TS18 3TA

Specification for

INTERLOCKING BLOCK ROADS/PAVINGS

Q24 INTERLOCKING BRICK/BLOCK ROADS/PAVINGS

To be read with Preliminaries/General conditions.

TYPE(S) OF PAVING

110 CONCRETE BLOCK PAVED FOOTWAY (TRAFFIC CATEGORY 4)

Blocks: To BS 6717:Part 1

Size: 200 x 100 x 80 mm thk. (Landscape Architect to specify)

Special blocks: None

Colour/pattern: by Architect

Bond: by Architect

Granular sub-base as section Q20, thickness 225 mm.

111 CONCRETE BLOCK PAVED PARKING BAYS (PERMEABLE - TRAFFIC CATEGORY 3)

Blocks: To BS 6717:Part 1

Size: 200 x 100 x 80 mm thk. (Landscape Architect to specify)

Special blocks: None

Colour/pattern: by Architect

Bond: by Architect

Granular sub-base as 375mm min. Coarse Graded Aggregate 4/20 to BS7533-13:2009 minimum 30% void ratio. Depth varies, see drainage drawings.

210 LAYING GENERALLY

Ensure that sub-bases are suitably accurate and to specified gradients before laying paving.

Cut blocks/pavers neatly and accurately without spalling to give neat junctions at edge restraints and changes in bond.

Select blocks/pavers vertically from at least 3 separate packs in rotation to avoid colour banding.

Lay blocks/pavers on a well graded sand bed and vibrate to produce a thoroughly interlocked paving of even overall appearance with regular sand filled joints and accurate to line, level and profile.

220 SAMPLES

Before placing orders submit for approval representative sample(s) of:

All kerbs and paving.

Ensure that delivered materials match sample(s).

240 INCLEMENT WEATHER

Do not use frozen materials or lay bedding on frozen or frost covered sub-bases.

Protect stockpiled bedding material to ensure it does not become saturated.

Protect uncompacted areas of paving from heavy rainfall.

250 ACCEPTANCE OF BASE

Before starting work ensure that:

The base is sound, clean and suitably close textured.

The levels and falls of the base are as detailed, within the specified tolerance of +/-20 mm.

Drainage outlets are within +0 to -10mm of the required finished level.

Edge restraints are complete, adequately bedded and haunched and to the required levels.

Haunching to gullies, manholes and the inside face of edge restraints is vertical so that pavings do not 'ride up' when compacted.

260 LEVELS OF PAVING

Permissible deviation from specified levels to be +/-6mm generally.

Paving at drainage outlets to be set +6mm above outlet.

270 REGULARITY

Sudden irregularities not permitted.

Where appropriate in relation to the geometry of the surface, the variation in gap under a 3 metre straight edge (with feet) placed anywhere on the surface to be not more than 10mm.

The difference in level between adjacent blocks/pavers to be not more than 2 mm.

280 SAND FOR BEDDING

Free from deleterious salts and contaminants.

Maintain at an even moisture content which will give maximum compaction during any laying period.

Category 2 for road hump.

Category 3 for car parking.

The bedding sand course shall consist of a naturally occurring silica sand.

The grading of the sand shall comply with BS 6717 : Part 3 : 1989 Table 2.

In addition the percentage passing the 600 micron and 75 micron sieves shall be in accordance with the following table:

Sand Category	Percentage by mass passing	
	The 75 micron sieve	The 600 micron sieve
1	less than 0.1%	less than 60%
2	less than 1.0%	less than 60%
3	less than 3.0%	less than 70%

290 SAND FOR JOINTING

The sand shall be dry and comply with BS882 and be free from all soluble deleterious salts and other contaminants and shall comply with the grading below:-

Jointing Sand	
BS Sieve	% By Mass passing
10mm	100
5mm	100
2.36mm	100-95
1.18mm	100-90
600um	100-55
300um	50-15
150um	15-0
75um	3-0

All surplus sand must be removed before traffic is allowed on the paving.

300 LAYING BEDDING

Lay, level and compact a layer of bedding material to a thickness of approximately 30 mm, then lay and screed to levels a further, uniformly loose layer with sufficient surcharge to give the required finished levels and an overall bedding thickness of not less than 40 mm after compaction of paving.

Subject to approval of accuracy and regularity of the finished paving, the bedding may be laid in a single layer.

Maintain a prepared area of bedding not less than 1 m in advance of the laying face at all times, including at the conclusion of any working period.

Do not deliver bedding sand to working area over uncompacted paving.

Ensure that there is no disturbance to the bedding course by pedestrian or wheeled traffic.

310 LAYING BLOCKS/PAVERS

Commencing from an edge restraint, lay blocks/pavers hand tight with a joint width of 2-5mm:

Do not use mechanical force to obtain tight joints.

Place blocks/pavers squarely with minimum disturbance to bedding.

Supply blocks/pavers to laying face over newly laid paving but stack at least 1 metre back from laying face.

Do not allow plant to traverse areas of uncompacted paving.

Continually check alignment of pavers with string lines as work proceeds to ensure maintenance of accurate bond.

Infill at edge restraints as work proceeds.

Wherever the type of bond and angle of edging permit, avoid very small infill pieces at edges by breaking bond on the next course in from the edge, using cut blocks/pavers not less than 1/3 full size.

320 CUT BLOCKS/PAVERS

Cut with masonry saw.

330 VIBRATING PLATE COMPACTOR FOR BLOCK PAVING

Plate area:	Force range:	Frequency range:
0.35 to 0.5 sq m	75 to 100 kN/sq m	75 to 100 Hz

331 VIBRATING PLATE COMPACTOR FOR BRICK PAVING

Plate area:	Force range:	Frequency range:
0.2 to 0.4 sq m	50 to 75 kN/sq m	60 to 100 Hz

Compactor to be fitted with rubber sole plate.

340 COMPACTING AND JOINTING

Thoroughly compact blocks/pavers with vibrating plate compactor as laying proceeds but after infilling at edges. Apply the same compacting effort over the whole surface.

Do not leave uncompacted areas of paving at the end of working periods, except within 1 metre of unrestrained edges.

Check paving after compacting first few metres, then at frequent intervals to ensure that surface levels are as specified; if they are not, lift blocks/pavers and relay.

Brush sand into joints, revibrate surface and repeat as required to completely fill joints.

Avoid damaging kerbs and adjacent work during vibration.

345 JOINT SEALING

All joints in block paving to be sealed by applying "Resiblock

22" high performance block paving joint bonding sealer in accordance with the manufacturers instructions.

350 REMEDIAL WORK

During the Contract or Defects Liability Period:

Any areas of paving which settle must be relaid as specified.

Where early trafficking leads to settlement of the jointing sand, refill the joints as specified.

National Structural Concrete Specification for Building Construction

Fourth edition complying with BS EN 13670: 2009

Standard Specification

Section 1 Scope

The NSCS has the same scope as BS EN 13670 for Building Structures.

The NSCS is laid out in terms of processes, and it uses the same sequence as BS EN 13670. European and British Standards are referenced rather than reproduced within the document.

The NSCS covers requirements for the construction of concrete building structures of in-situ concrete, precast concrete, and hybrid concrete systems. It is intended for use with structures designed to BS EN 1992, although it can be used when other design standards are used. Where the NSCS is to be used for structures in extreme environments, those produced by specialist construction techniques or those of a specialist design nature, the Project Specification should include the particular requirements where appropriate.

It is expected that the requirements for concrete in more specialist geotechnical works will be covered by a specification such as the ICE *Specification for piling and embedded retaining walls* (SPERW). The NSCS should be coordinated where required with other project specifications such as the SPERW.

The NSCS is written with safety in mind but does not specify Health and Safety requirements as they are legal regulations that apply to all construction and are inherent within this specification.

Where specifications, standards or regulations are referred to they shall refer to the latest editions unless reference is made to a specific dated clause in a standard.

Specific obligations are placed on the Constructor, the Employer and the Engineer. In some cases these will be different organisations; sometimes any or all will be represented by the same organisation. However, their responsibilities remain as required under the Contract.

The NSCS Project Specification is to be read in conjunction with this Standard Specification and outlines project information specific to a particular project that is additional to the requirements of Standard Specification.

The NSCS Project Specification covers the exchange of information necessary between the Employer and Constructor at tender stage and contract stage. Completion of the Project Specification is intended to be as required for the stage for which it is being used, i.e. at time of tender or contract commencement.

The NSCS Project Specification allows the Engineer responsible for the design the freedom to incorporate specific clauses to vary and add to the Standard Specification clauses. It is emphasised that the Standard Specification has been produced as a non-prescriptive specification to meet the standards required by BS EN 13670 and therefore any amendments through the Project Specification should be as few as possible.

The pro-forma layout of NSCS Project Specification acts as an aide memoire to the disclosure of relevant information for most types of project.

NSCS Guidance provides background information on the content and explains why certain clauses have been adopted. NSCS Guidance is designed to be 'dipped into', and read with the relevant clause in Standard and Project Specification; as a result there is some intentional duplication.

Section 2 Bibliography

2.1 Standards

BS 4449: 2005	<i>Steel for the reinforcement of concrete – Weldable reinforcing steel – Bar, coil and decoiled product – Specification.</i>
BS 4483: 2005	<i>Steel fabric for the reinforcement of concrete – Specification.</i>
BS 4486: 1980	<i>Specification for hot rolled and hot rolled and processed high tensile alloy steel bars for the prestressing of concrete.</i>
BS 5896: 1980	<i>Specification for high tensile steel wire and strand for the prestressing of concrete.</i>
BS 5975: 2008	<i>Code of practice for temporary works procedures and the permissible stress design of falsework (incorporating corrigendum No. 1).</i>
BS 7973-1: 2001	<i>Spacers and chairs for steel reinforcement and their specification – Product performance requirements.</i>
BS 8102: 2009	<i>Code of practice for protection of structures against water from the ground.</i>
BS 8500-1: 2006	<i>Concrete – Complementary British Standard to BS EN 206-1 – Part 1: Method of specifying and guidance for the specifier.</i>
BS 8500-2: 2006	<i>Concrete – Complementary British Standard to BS EN 206-1 – Part 2: Specification for constituent materials and concrete.</i>
BS 8666: 2005	<i>Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete – Specification (incorporating amendment No. 1).</i>
BS EN 197-1: 2000	<i>Cement – Compositions, specifications and conformity criteria for common cements.</i>
BS EN 206-1: 2000	<i>Concrete – Specification, performance, production and conformity.</i>
BS EN 287-1: 2004	<i>Qualification test of welders – Fusion welding – Steels (AMD Corrigendum 15578) (AMD 16275) (AMD Corrigendum 16831).</i>
BS EN 446: 2007	<i>Grout for prestressing tendons – Grouting procedures.</i>
BS EN 447: 2007	<i>Grout for prestressing tendons – Basic requirements.</i>
BS EN 1011-2: 2001	<i>Welding. Recommendations for welding of metallic materials – Arc welding of ferritic steels (AMD 14926).</i>
BS EN 1090-2: 2008	<i>Execution of steel structures and aluminium structures – Technical requirements for the execution of steel structures.</i>
BS EN 1990: 2002	<i>Eurocode – Basis of structural design.</i>
BS EN 1991	<i>Eurocode 1 – Actions on structures (10 parts). BSI, 2002–2006.</i>
BS EN 1992	<i>Eurocode 2 – Design of concrete structures (3 parts). BSI, 2004–2006.</i>
BS EN 12350: 2009	<i>Testing fresh concrete (7 parts).</i>
BS EN 12390: 2009	<i>Testing hardened concrete (8 parts).</i>
BS EN 12812: 2004	<i>Falsework – Performance requirements and general design.</i>
BS EN 13139: 2002	<i>Aggregates for mortar.</i>
BS EN 13369: 2004	<i>Common rules for precast concrete products.</i>
BS EN 13391: 2004	<i>Mechanical tests for post-tensioning systems.</i>
BS EN 13670: 2009	<i>Execution of concrete structures, and National Annex to BS EN 13670.</i>
BS EN ISO 4157: 1999	<i>Construction drawings – Designation systems (3 parts).</i>
BS EN ISO 9000: 2005	<i>Quality management systems – Fundamentals and vocabulary.</i>
BS EN ISO 9001: 2008	<i>Quality management systems – Requirements (incorporating corrigendum July 2007).</i>

BS EN ISO 14001: 2004	<i>Environmental management systems – Requirements with guidance for use.</i>
BS EN ISO 15614	<i>Specification and qualification of welding procedures for metallic materials – Welding procedure test. (13 parts). BSI, 2002–2008.</i>
BS EN ISO/IEC 17025: 2005	<i>General requirements for the competence of testing and calibration laboratories (AMD corrigendum 16767).</i>
BS OHSAS 18001:2007	<i>Occupational health and safety management systems.</i>

2.2 General

BAMFORTH, P. B. *Early-age thermal crack control in concrete*, C660. CIRIA, 2007.

CARES and European Technical Approvals:

CARES Post-tensioning systems, Part 2 – *The supply and/or installation of post-tensioning systems*. November 2007.

CARES Post-tensioning systems, Part 9 – *CARES Registration scheme for post-tensioning operatives*. November 2007.

CARES Steel for reinforced concrete, Appendix 6 – *Quality and operations assessment schedule for the tack welding of reinforcing steel*. January 2006.

CARES Steel for reinforced concrete, Appendix 10 – *Quality and operations assessment schedule for pre-assembled welded fabrications using welded semi-structural and/or structural joints*. January 2006.

EOTA. ETAG 013 *Guideline for European Technical Approval of post-tensioning kits for prestressing of structures*. Brussels, EOTA, 2002.

fib. *Corrugated plastic ducts for internal bonded post-tensioning*, fib Bulletin 7. fib, 2000.

HARRISON, T. A. *Formwork striking times – criteria, prediction and method of assessment*, R136. CIRIA, 1995.

ICE. *ICE Specification for piling and embedded retaining walls*, 2nd edition. Thomas Telford, 2007.

INSTITUTION OF STRUCTURAL ENGINEERS. *Standard method of detailing structural concrete. A manual for best practice*, 3rd edition. IStructE, 2006.

PALLET, P. F. *Guide to flat slab falsework and formwork, CS140*. The Concrete Society, on behalf of CONSTRUCT, 2003.

THE CONCRETE SOCIETY. *Formwork – A guide to good practice*, CS030, 2nd edition. The Concrete Society, 1995.

THE CONCRETE SOCIETY. *Post-tensioned concrete floors – Design handbook*, TR43, 2nd edition. The Concrete Society, 2004.

Section 3 Definitions

The following definitions, in addition to those given in BS EN 13670: 2009, apply for the purpose of this Specification.

3.1 Agreement, acceptance

When by or of the CA, agreement or acceptance shall have the following limitations.

3.1.1 Samples

When given in respect of samples of materials, execution or proposals for methods of construction submitted in accordance with this Specification, shall not be interpreted as denoting any degree of satisfaction with the materials used in, or the execution of the Works.

3.1.2 Documents

When given in respect of drawings, documents, or schemes called for by the Specification or proposed by the Constructor, is only for conformity with the design concept and design information given in the Contract Documents or contained in subsequent instructions from the CA.

Acceptance or agreement shall not diminish or relieve the obligations of the Constructor under the Contract.

3.2 Contract Administrator (CA)

The named individual or company, engaged to act for and on behalf of the Employer for the purpose of accepting proposals from the Constructor, issuing technical information to the Constructor and monitoring the work of the Constructor.

3.3 Design calculations

The calculations produced generally by the Engineer. For some specialist work they may be produced by the Constructor.

3.4 Drawings and schedules

3.4.1 General arrangement drawings (GAs)

Plans and sections indicating the layout and dimensions of each floor of the Works. The drawings will be in sufficient detail to allow the formwork to be constructed and will show or reference all inserts or cast-in items and holes. Drawings should indicate the locations of concrete grades and finishes.

3.4.2 Design information drawings

Drawings prepared to show the design information required to enable reinforcement detail drawings to be produced.

3.4.3 Specialist drawings – prestressed concrete

Fully dimensioned drawings, plans and cross-sections of tendons and anchorage layouts indicating tendon profiles at regular intervals along each length, support details, stressing sequences etc. Stressing end, dead end anchorages, and any ordinary reinforcement sizes and locations required to supplement the post-tensioning design and bursting reinforcement at anchorages to suit anchor type and layout, shall be clearly defined.

3.4.4 Reinforcement detail drawings

Drawings prepared to show the layout of the various types of reinforcement used in the construction of the Works. They shall be prepared in accordance with the requirements of BS EN 1992 and the *Standard method of detailing structural concrete – A manual for best practice* (IStructE).

3.4.5 Builders' work drawings

Drawings prepared to show coordinated builders' work – holes, cast-in services and fixings, etc.

3.4.6 Temporary works and erection drawings

Drawings prepared to show necessary falsework, formwork and propping that are employed to construct the Works in a safe manner.

3.4.7 As-built drawings

Drawings to indicate what was built.

3.4.8 Reinforcement schedules

Schedules prepared to show the details of each bar to be cast into the concrete. They shall be prepared in accordance with BS 8666

3.4.9 Construction sequence information

Drawings, sketches or other information, prepared by the CA, indicating any special requirements or methods, which the Constructor must consider in the preparation of their temporary works in order to erect the Works in a safe manner.

3.5 Employer

The individual or company placing the contract with the Constructor.

3.6 Engineer

The individual or organisation responsible for the overall design of the Structure.

3.7 Manufacturer

For precast concrete proprietary products the manufacturer is the individual or organisation responsible for the design of the precast proprietary products.

3.8 Project specification

National structural concrete specification for building construction – NSCS Standard Specification and NSCS Project Specification.

3.9 Prestressed concrete

Concrete that is subjected to pre-tensioning or post-tensioning.

3.10 Reference panels

Full size concrete panels of Plain and Ordinary formed finishes located regionally by CONSTRUCT.

3.11 Site

The designated place where the Constructor will construct the Works.

3.12 Spacers

All chairs, blocks, supports and devices of a special nature required to hold the reinforcement in the correct position during concreting.

3.13 Temporary Works Coordinator

The named individual employed by the Constructor responsible for coordinating the temporary works for construction of the works.

Section 4 Execution management

4.1 General requirements

4.1.1 Standards

Execution shall be in accordance with BS EN 13670 as supplemented by the Project Specification and all statutory requirements.

Where there is a difference between the requirements of BS EN 13670 and the Project Specification, the Project Specification takes precedence.

4.1.2 Materials

4.1.2.1 General

All materials used in the structure shall comply with the Project Specification and current versions of standards referred to therein. The CA may specify samples for testing and the Constructor shall arrange for such samples to be supplied, identified, stored and tested and the results delivered to the CA in accordance with the relevant standards and the Project Specification requirements.

4.1.2.2 Proprietary products and materials

These shall be used in accordance with the manufacturer's written instructions and relevant European Product Standards where available.

4.1.2.3 Third-party inspections

Allow reasonable access to the site for technical inspection by third parties at all times.

4.1.2.4 Water-resisting construction

Where water-resisting construction is specified, submit to the CA for agreement: details of the materials used and the execution, which are to be in accordance with BS 8102; and written confirmation from the supplier of the water-resisting materials that they will not be adversely affected by the proposed environment, concrete, curing and release agents, placing methods, joints, finishes, reinforcement and its support details, or loads.

4.2 Documentation

4.2.1 Quality plan

Operate an agreed quality management system to BS EN ISO 9000 unless otherwise agreed with the CA. The system shall be accessible for audit.

If it is agreed that a quality management system to BS EN ISO 9000 is not required the Constructor shall prepare a quality plan for the project.

The Quality Plan shall be given to the CA for acceptance at least five working days before the works start.

4.2.2 Execution documentation

Produce the documents as required and provide one copy to the CA at the time stated in the NSCS Project Specification or no later than five working days after each is prepared.

4.2.3 Information coordination and availability

4.2.3.1 NSCS Project Specification

When NSCS Project Specification is revised all changes must be clearly identified.

4.2.3.2 Availability

Copies of all documents required for the construction of the structure, including all inspection reports, shall be available for review on site during the contract period.

4.2.3.3 Coordination

The Constructor shall ensure that the coordinated information they prepare (as required by the NSCS Project Specification Cl. P1.3, P1.4, P1.8, P1.10 & P1.11 and Section P2) is submitted to the CA for agreement in accordance with the requirements of NSCS Project Specification Tables P1.3 & P1.4.2.

4.2.4 Drawings and reinforcement schedules**4.2.4.1 Standards**

To be in accordance with BS EN ISO 4157. Revisions, with the date made, and status shall be clearly shown. A circle or cloud around drawing revisions should identify the changes made for the latest revision symbol. The changes should be described in notes on the drawing corresponding to the latest revision symbol.

4.2.4.2 Register

The Constructor shall maintain a register of all drawings they receive and issue, identifying the source of the drawing, revision symbol and date received or issued by the Constructor.

4.2.4.3 Production

Drawings are to be produced as detailed in NSCS Project Specification Table P1.3. Where the drawings are to be prepared by a manufacturer of precast concrete products, or a specialist post-tensioning contractor, the Constructor is to ensure that the drawings are issued to the CA in accordance with the requirements of NSCS Project Specification Table P1.3.

4.2.4.4 Circulation

The method of circulation, number of drawings to be issued and dates for issue of drawings shall be in accordance with NSCS Project Specification Table P1.3, agreed with the CA and recorded in the quality plan.

4.2.4.5 Reinforcement schedules

The Constructor shall be responsible for the accuracy of any schedules that they produce.

4.2.4.6 As-built drawings

The Constructor shall provide sufficient information to the CA to allow coordination of the production of as-built drawings, where these are to be produced by the CA.

4.2.4.7 Builders' work drawings

Where the Constructor is to produce coordinated builders' work drawings the CA shall provide the required information in accordance with an agreed programme.

4.2.5 Construction planning – temporary works

The CA's construction sequence information must be considered in the preparation of the Constructors' temporary works drawings showing all stability requirements during erection.

Method statements for erection and dismantling of temporary works including all details of propping/repropping and backpropping through the structure are to be prepared by the Constructor and agreed with the CA.

4.3 Quality management

4.3.1 Execution class

The works are to be built in accordance with Execution Class 2, other than for post-tensioned construction where Class 3 is to be used, unless otherwise specified in NSCS Project Specification.

4.3.2 Setting out

Set out the structure to the given setting out information.

4.3.3 Inspection

In addition to the Constructor's inspection of the materials and execution in accordance with BS EN 13670 the Constructor is to give reasonable notice, as given in NSCS Project Specification, to allow inspection by the CA at the following stages:

- Before each concrete pour.
- Before prestressing work starts.
- Before covering up or backfilling.
- For water-resisting construction to allow inspection jointly with Constructor as Cl. 8.4.2 of this Specification.

4.3.4 Modifications

Obtain the written agreement of the CA to any modifications of this Specification before any work is started.

4.3.5 Storage

All materials shall be stored in an agreed manner that prevents damage or degradation and is in accordance with all manufacturers' requirements.

4.3.6 Acceptance procedure

The CA shall comment on all information supplied within five working days of receipt.

Acceptance or agreement by the CA shall have no effect unless given in writing.

4.3.7 Testing

Supply three copies of all test reports to the CA as soon as they are available.

4.3.8 Action in the event of a non-conformity

- Any test or inspection reports that show that any part of the structure does not meet the specified criteria shall be reported to the CA, as soon as the results are available.
- Provide proposals for dealing with the non-conformity to the CA within five working days of reporting the results.
- A course of action shall be agreed within a further five working days.

The cost of all additional testing and remedial works shall be at the Constructor's expense.

Section 5 Falsework and formwork

5.1 Standards

Design and construction should be in accordance with the following where applicable:

- BS 5975: *Code of practice for temporary works procedures and the permissible stress design of falsework*
- *Formwork: a guide to good practice* (Concrete Society Publication) CS030
- *Guide to flat slab falsework and formwork* CS140 (Pallet, 2003, Concrete Society publication on behalf of CONSTRUCT)
- CIRIA Report 136 *Formwork striking times – Criteria, prediction and method of assessment* (Harrison, 1995)
- BS EN 1990 & BS EN 1991
- BS EN 12812

5.2 Materials

Permanent formwork may be used subject to the agreement of the CA.

New timber and wood products should all be certified as legally sourced by CPET (The Central Point of Expertise on Timber) recognised schemes.

5.3 Release agents

Release agents shall be chosen to suit the method of construction and the finish required, and shall take note of the requirements of following trades. They shall not be adversely affected by the weather.

5.4 Formwork use

5.4.1 Ground support

Concrete shall not be cast directly against existing construction or faces of excavations without prior agreement of the CA. Where structural concrete relies on permanent or temporary support from the ground, ensure that the support is firm enough for concreting operations.

5.4.2 Cleanliness

Formwork shall be clear of all debris, water, snow and ice before concrete is placed.

5.5 Block outs and cast-in items

Set out and fix all cast-in items shown or referenced on the drawings. Any clashes between holes, cast in items and reinforcement shall be resolved to the agreement of the CA before any concrete is placed.

Block out items shall be cleared out after concreting.

5.6 Formwork ties

Through ties may be used to support vertical faces of formwork other than in water-resisting construction or as agreed with the CA.

No ferrous metals shall be left in the concrete cover zone when formwork has been struck.

Any holes left exposed to view in the faces of the concrete shall be filled to the agreement of the CA.

5.7 Loading, striking and backpropping

5.7.1 Temporary construction loads

Ensure the structure is not subjected to temporary loads during construction that will cause distress, taking account of the maturity of the concrete at the time of loading.

5.7.2 Striking

Falsework and formwork shall be struck at a time determined by the Constructor to comply with this Specification.

Formwork shall be removed carefully so as to avoid damage to the concrete surface.

5.7.3 Backpropping

The exact sequence of propping/repropping and backpropping through the structure, set out in a method statement by the Constructor, shall be agreed with the CA in advance, and should have no damaging effect on the Permanent Works

5.7.4 Cold weather concreting

Any special requirements for the formwork design, including any use of heated forms or changes in design formwork pressure for concreting in cold weather, shall be agreed with the CA in advance.

5.8 Construction joints and pour sizes

5.8.1 Geometry

Produce drawings showing the layout of construction joints and agree their location with the CA. Joints are to be positioned so as not to cause the structure any distress.

Pour sizes for different types of construction, except as agreed otherwise with the CA, shall be as shown below.

Construction	Maximum area (m ²)	Maximum dimension (m)
Water-resisting walls	25	5
Water-resisting slabs	100	10
Slabs with major restraint at both ends	100	13
Slabs with major restraint at one end only	250	20
Slabs with little restraint in any direction	500	30
Walls	40	10

5.8.2 Joint preparation

Carefully prepare construction joint surfaces to expose the coarse aggregate to provide a key by a method to be agreed with the CA.

5.9 Water-resisting construction

5.9.1 Waterstops

Use waterstops in all construction joints and movement joints in accordance with the manufacturer's written instructions. Obtain the agreement of the CA for the methods to be used to

maintain them in their correct locations and prevent damage while the concrete is being placed and during or after removal of the Formwork.

Submit for agreement with the CA drawings indicating the positions of joints and details of waterstops to be used. Details shall include schedules of all junction pieces, which shall be purpose made, and isometric layouts of waterstops.

Where centre section waterstops are proposed submit to the CA for agreement the methods to be used to ensure full compaction of the concrete around the waterstop.

5.9.2 Formwork ties

Methods of fixing formwork that result in holes through the concrete section when formwork is removed shall not be used, unless agreed with the CA.

Formwork ties used shall be of a type to maintain water resistance of the construction.

Section 6 Reinforcement

6.1 Materials

6.1.1 General

6.1.1.1 Standards

All reinforcement shall comply with the requirements of BS 4449, BS 4483, and BS 8666 as appropriate.

Reinforcement in accordance with BS 4449 shall be Grade 500 unless otherwise specified in NSCS Project Specification.

6.1.1.2 Certification – supplier

Unless otherwise agreed by the CA, all reinforcement suppliers shall hold a valid Certificate of Approval for manufacture and/or fabrication issued by the UK Certification Authority for Reinforcing Steel (CARES), or equivalent. A supplier Certificate of Approval Reference shall be stated on all documentation.

6.1.1.3 Certification – cutting and bending

If reinforcing steel is cut and bent by other than a CARES-approved supplier, the fabricator shall operate a quality management system to BS EN ISO 9001, which shall be approved as part of the Constructor's quality management system and comply with BS 8666.

6.1.2 Reinforcement handling

6.1.2.1 Storage

All reinforcement shall be delivered in properly identifiable tagged bundles, mats or prefabricated assembly and shall be stored on site in a manner so as not to become contaminated by deleterious materials or otherwise damaged; fabric shall be stored flat.

6.1.2.2 Handling

Reinforcement shall not be dropped from height, mechanically damaged or shock loaded in any way.

6.1.2.3 Pre-assembled welded fabrications delivered to site

Only firms that have achieved certification to CARES SRC Appendix 10 – *Quality and operations assessment schedule for the manufacture of pre-assembled welded fabrications using welded semi-structural and/or structural joints*, or equivalent, shall be permitted to supply pre-assembled welded fabrications.

Only firms that have achieved certification to CARES SRC Appendix 6 – *Quality and operations assessment schedule for the tack welding of reinforcing steel*, or equivalent, shall be permitted to bid for or undertake contracts to supply pre-assembled tack-welded fabrications.

6.1.3 Spacers**6.1.3.1 General**

Supply, detail and fix all spacers. The materials and workmanship shall be in accordance with BS 7973: *Spacers and chairs for steel reinforcement and their specification – Product performance requirements*. Ensure that the spacers have the required performance characteristics.

6.1.3.2 Exposed finishes

In exposed finish work the type of spacer used shall be agreed with the CA before any work is started.

6.1.4 Continuity strips**6.1.4.1 Supply**

Proprietary continuity strips can be used subject to agreement by the CA.

6.1.4.2 Quality

All continuity strip manufacturers shall hold a valid CARES Technical Approval certificate or equivalent, unless otherwise agreed by the CA.

6.1.5 Couplers**6.1.5.1 Supply**

Details of the source and suppliers shall be forwarded to the CA for agreement.

6.1.5.2 Quality

All coupler manufacturers shall have a valid Technical Approval certificate issued by CARES, or equivalent, unless agreed otherwise by the CA.

All coupler suppliers shall have a valid Technical Approval certificate issued by CARES, or equivalent, for the application of couplers, unless agreed otherwise by the CA.

Reinforcing bars shall be adequately and appropriately prepared by the supplier to receive the agreed couplers.

6.1.6 Punching shear reinforcement systems**6.1.6.1 Supply**

Details of the source and suppliers shall be forwarded to the CA for agreement.

6.1.6.2 Quality

All punching shear reinforcement system manufacturers shall hold a valid Technical Approval certificate issued by CARES, or equivalent, unless otherwise agreed by the CA.

6.1.7 Fibre reinforcement

Unless fully described in NSCS Project Specification, details of the proposed fibres, dosage, source and suppliers shall be forwarded to the CA for agreement.

6.2 Execution

6.2.1 General

All reinforcement shall be fixed in position in accordance with the reinforcement detail drawings and reinforcement schedules. Any alterations of reinforcement shall be carried out only with the prior written agreement of the CA.

6.2.2 Tying

All tying of reinforcement shall be carried out with black annealed mild steel 16 gauge tying wire, unless agreed otherwise with the CA. All ends shall be bent away from the concrete face and all loose ends shall be removed prior to placing the concrete.

6.2.3 Welding

6.2.3.1 General

The location of all welded joints shall be agreed the CA. Tack welding on site will not be permitted, unless agreed with the CA in exceptional circumstances. Provide the CA with evidence of the competence of welders and details of the welding procedures for all loadbearing welds for agreement. When welding on site ensure the welding has adequate protection from the weather.

6.2.3.2 Quality

Welding shall be carried out in accordance with the requirements of BS EN 287-1, BS EN ISO 15614, BS EN 1011-2 and Appendices 6 and 10 to the CARES Steel for the Reinforcement of Concrete Scheme, or equivalent. Details for welding of reinforcement with a carbon equivalent greater than 0.42 must be agreed with the CA.

6.2.4 Projecting reinforcement

All reinforcement ends left projecting from cast concrete shall be free of release agents and shall be protected against damage and corrosion. Light surface rusting will be accepted, unless detrimental to the finished structure or causing rust staining to adjacent exposed concrete surfaces or formwork.

6.2.5 Site bending

6.2.5.1 Conditions

- Bending of reinforcement, including straightening, at temperatures less than -5 °C is not permitted.
- The curvature should be as constant as practicable.
- Bending should be in one operation at a constant rate.
- Reinforcement should not be warmed above 100 °C .
- The bend radius shall be not less than that given in BS 8666 and Cl. 6.3(2) of BS EN 13670: 2009 unless the documented re-bend properties show this can be adjusted.

6.2.5.2 Agreement

A method statement must be prepared for agreement with the CA.

6.2.5.3 Inspection

Inspect each bar bent for any sign of fracture. Any fractured bars must be considered as non-conforming.

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Note: This section is for in-situ concrete post-tensioned construction.

7.1 Design and quality control

7.1.1 General

To be in accordance with CARES, or equivalent, procedures unless agreed in advance with the CA.

7.1.1.1 Contractors

Post-tensioning contractors shall have the necessary experience, knowledge, resources and equipment and CARES certification for the installation of post-tensioning systems in concrete structures as required by CARES Post-tensioning systems, Part 2 – *The supply and/or installation of post-tensioning systems*, or equivalent accredited product certification.

7.1.1.2 Operatives

All post-tensioning operations shall be carried out by operatives with appropriate knowledge, training and proven experience in carrying out similar operations. Supervisors and operators shall be trained and certified to meet the requirements given in the CARES Registration scheme for post-tensioning operatives, 2007, or equivalent. Trainee post-tensioning personnel shall be adequately supervised when performing post-tensioning activities.

7.1.1.3 Quality plan

Details required: Proposed materials, equipment, method statements, quality procedures, records, acceptance procedures, inspection and test arrangements.

7.1.1.4 Stressing calculations

The theoretical extensions shall be calculated by the post-tensioning Contractor. However, the CA may undertake the calculations but should request the values of the necessary parameters from the post-tensioning Contractor. All relevant system data shall be stated e.g. p, k, strand E value and area, wedge draw-in on lock off and any assumed movement at dead end, etc. Extension calculations shall be submitted to the CA for acceptance at least ten working days before stressing. The CA shall confirm agreement, or comment otherwise at least five working days before stressing.

7.1.1.5 Grout testing

Grout shall be tested as required by BS EN 446 and BS EN 447.

7.2 Materials

7.2.1 General

To be in accordance with the relevant parts of this Specification.

7.2.1.1 Grout

The properties of the grout, made with materials and plant proposed for use on site, shall be assessed for suitability for the intended purpose sufficiently in advance of grouting operations to enable adjustments to be made to the materials plant. Personnel proposed for grouting shall be suitably experienced in such work; provide details to the CA sufficiently in advance of such work to enable experience to be reviewed.

Grout shall consist of pre-bagged material requiring only the addition of a measured amount of water and shall comply with the requirements of BS EN 447.

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7.2.1.2 Strand

Strand shall comply with BS 5896. The grade and diameter shall be specified and shall be relaxation class 2 and shall be obtained from firm(s) holding a valid CARES certificate of approval, or equivalent.

7.2.1.3 Stressing bar

Bar shall comply with BS 4486. The grade and diameter shall be specified and shall be obtained from firm(s) holding a valid CARES certificate of approval, or equivalent.

7.2.1.4 Coating material (unbonded tendons)

The coating to unbonded strand shall be 1 mm polypropylene unless otherwise stated in NSCS Project Specification.

7.2.1.5 Anchorages

Anchorages for post-tensioning systems shall comply with the minimum performance requirements of BS EN 13391. Documentary evidence of compliance shall be provided if requested.

7.2.1.6 Ducts and vents

Duct, vent and connection material shall be sufficiently robust to resist damage during construction. It should be smooth galvanised steel with a minimum wall thickness of 0.35 mm or corrugated galvanised steel with a minimum wall thickness of 0.30 mm. Where plastic ducts are used they should comply with fib Bulletin 7: *Corrugated plastic ducts for internal bonded post-tensioning*.

Ducting shall prevent the entrance of paste from the concrete, and shall not cause harmful electrolytic action or any deterioration of the tendon or tendon components. The internal cross-sectional area of the duct shall be at least twice the net area of the tendon's prestressing steel.

Ducting shall be capable of transmitting forces from grout to the surrounding concrete.

7.2.1.7 Other materials

All materials are to be in accordance with ETAG 013 Annex C.

7.3 Execution

7.3.1 Tendons

7.3.1.1 Location

Unbonded tendons may be deviated to avoid obstructions such as openings and columns with the agreement of the CA. The change of direction of the tendon should occur away from the opening and trimmer bars should be provided to avoid any possible cracking at the corners in accordance with TR43 *Post tensioned concrete floors – design handbook*, 2004, Cl. 6.7.

7.3.1.2 Fixing and support

Tendons shall be fixed and supported at centres not exceeding 1 m and shall be securely fixed to prevent movement and flotation during the construction process.

7.3.1.3 Cutting

Tendons shall be cut to length using mechanical means.

7.3.1.4 Marking

The actual position of tendons shall be marked on the slab soffit to indicate the location in both plan and elevation within the slab. The system of marking shall be agreed with the CA.

7.3.2 Vents

Vents shall be fixed at injection and exit points and, where tendon drape exceeds 500 mm, intermediate vents shall be fixed at tendon high points. Vents shall extend approximately 500 mm above the slab surface.

Intermediate vents should be used on tendons over 20 m in length.

7.3.3 Cutting or drilling into prestressed slabs

Where the tendon position is not accurately and authoritatively documented, reinforcement detection equipment must be used to locate tendon positions prior to any cutting or drilling work on the slab.

7.3.4 Stressing**7.3.4.1 Jacking force**

The jacking force should not normally exceed 75% of the tendon's characteristic strength but may be increased to 80% provided that additional consideration is given to safety and the load extension characteristics of the tendon. At transfer, initial prestress shall not normally exceed 70% of the tendon's characteristic strength, and in no case shall exceed 75%.

7.3.4.2 Measurement

For routine stressing, load/extensions shall be measured prior to commencement of stressing, and after stressing and locking off to an accuracy of 2% or 2 mm whichever is more accurate. Measurements shall take into consideration the possible strand movement at the dead end anchor.

Any restrictions on stressing sequence and increments as specified in NSCS Project Specification shall be observed.

7.3.4.3 Commencement

Stressing shall not commence without prior agreement on theoretical extensions nor before the concrete has achieved the transfer strength specified in NSCS Project Specification. The concrete transfer strength shall be based on cubes taken from the last concrete load and cured in similar conditions to the concrete to which they relate.

7.3.5 Stressing equipment

Stressing jacks and their load measuring system should have an appropriate and current calibration certificate, which is traceable to national standards, and no more than 6 months old at the time of stressing. The calibration certificate should be provided by a NAMAS accredited laboratory and should include a calibration curve establishing a correlation between the values given by the measuring system and the loads applied by the jacks. The stressing equipment shall be capable of establishing a tendon load to an accuracy of $\pm 2\%$.

7.3.6 Anchorage protection

The method of anchorage sealing shall be agreed with the CA if not shown on the drawings.

For unbonded tendons anchorage components shall be coated with grease of similar specification to that used in the tendon and a watertight cap shall be applied over the coated area. The minimum concrete end cover to the cap shall be 25 mm.

7.3.7 Grout trials

Where required, full-scale grouting trials shall be carried out using the same personnel, equipment,

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materials and procedures as proposed for the Works. The trial shall demonstrate that the proposed grouting method, materials and equipment fills the ducts to the satisfaction of the CA.

Trials shall be undertaken as early as possible to allow proper inspection and any necessary modifications or adjustments. The details of the trials to be carried out shall be agreed with the CA.

The trials shall reflect the actual duct geometry and shall include typical tendon arrangements. The tendons shall be nominally stressed to ensure that they assume the proper position with respect to the ducts. Trial beams shall normally be cut at five sections for examination but more sections may be specified for complex tendon profiles.

Grouting of the ducts shall normally be shown to leave no void which has a radial dimension greater than 5% of the maximum duct sectional dimension or which poses a risk to the integrity of the tendon. Particular attention shall be given to avoiding bleed collection or void formation at high points in the ducts or anchorages.

There shall be a procedure such as backup equipment or flushing out of ducts for corrective action in the event of breakdown or blockage.

Where it is agreed that a grout trial is not necessary, prior to starting work on site, inform CARES, or equivalent, of the commencement of operations and request an audit of the post-tensioning works. Provide the CA with the outcome of the audit. Should the audit highlight any areas of concern, demonstrate to the satisfaction of the CA that any works carried out before the audit are not defective.

7.3.8 Grouting equipment

Grouting equipment shall comply with the requirements of BS EN 446.

7.3.9 Grouting

Grouting shall be in accordance with BS EN 446.

7.4 Records

7.4.1 General

One copy of the following records shall be sent to the CA not more than five working days after each operation.

7.4.1.1 Anchorages

Data sheets and method statements for anchorage sealing.

7.4.1.2 Tendon installation

- Strand source and cast number
- Anchorage batch number
- Wedge batch number
- Duct batch number
- Location of the products within the structure

7.4.1.3 Stressing

- Date of stressing
- Strength and age of concrete samples, minimum age of concrete at transfer
- Equipment calibration date, operator name

- Serial numbers of gauges and jacks
- Tendon identification
- Theoretical extension, actual extensions and corresponding loads (where required), initial and final jacking loads

7.4.1.4 Grouting

- The materials used, including batch numbers
- Grout properties including temperatures
- Ambient temperature and weather conditions
- The date and time
- Details of any interruptions and any problems encountered during the grouting process, e.g. blockages, loss of grout or loss of grout pressure
- Name of the supervisor responsible for the operation
- Records for each individual duct, including inspection of end caps and vent tubes

Section 8 Concrete and concreting

8.1 Concrete

8.1.1 General

8.1.1.1 Standards

Concrete shall conform to BS 8500–2 and BS EN 206–1, and shall be as specified in NSCS Project Specification.

8.1.1.2 Materials

Portland cement, fly ash, ggbs and silica fume products shall be produced by certified suppliers operating BS EN ISO 14001 and BS OHSAS 18001 certified systems.

The chloride content of the proposed concrete including chlorides contained in the admixtures shall be limited in accordance with BS EN 206–1: 2000, Cl. 5.2.7 and BS 8500–2: 2006, Cl. 5.3. Provide evidence of conformity.

Calcium chloride shall not be included in any concrete.

Provide evidence of conformity to the provisions to minimise the risk of damage by alkali-silica reaction given in BS 8500–2: 2006, Cl. 5.2.

Recycled aggregate (RA) and recycled concrete aggregate (RCA) shall conform to BS 8500–2: 2006, Cl. 4.3.

Precautions shall be taken to restrict the amount of sulfate in the proposed concrete, based on past experience or when using RCA in accordance with BS 8500–2: 2006, Cl. 4.3.

No additions or changes to the fresh concrete shall be made after batching, without prior agreement of the CA.

8.1.1.3 Records

Submit, as appropriate, details of the proposed concretes in accordance with BS EN 206–1: 2000, Cl. 7.2 and BS 8500–1: 2006, Cl. 5.2 to the CA for approval.

Daily maximum and minimum atmospheric shade temperatures shall be recorded using a calibrated thermometer(s) located close to the structure.

8.1.1.4 Site addition of water to ready-mixed concrete

Water should not be added on site but IF it is added to the concrete truck mixer drum, before discharge on site, the concrete shall be deemed non-conforming – until identity testing for strength shows that the concrete is acceptable – unless the addition is made by the producer using a procedure agreed in advance with the CA.

8.1.2 Testing

8.1.2.1 Testing of fresh concrete

Where required to be in accordance with BS EN 12350.

8.1.2.2 Conformity testing

The concrete producer shall carry out testing of the concrete in accordance with BS EN 206 and BS 8500. Where the producer identifies a non-conformity that was not obvious at the time of delivery, this shall be reported to the CA and the Employer within 24 hours of the Constructor receiving notification.

8.1.2.3 Identity testing

Inform the producer if identity testing is required by NSCS Project Specification. The criteria for acceptance will be those given in BS EN 206–1: 2000, Appendix B and BS 8500–1: 2006, Annex B5.

8.1.2.4 Compression testing

Concrete test cubes prepared by the constructor, or his authorised agent, shall be manufactured, initially cured and subsequently transported to an independent laboratory, in accordance with BS EN 12390–2, for subsequent density and compressive strength testing in accordance with BS EN 12390–7 and BS EN 12390–3 respectively.

The independent laboratory shall be accredited by UKAS as conforming to BS EN ISO/IEC and hold a current schedule of accreditation for the required tests.

8.1.2.5 Delivery tickets

Delivery ticket information shall be in accordance with BS EN 206–1: 2000, Cl. 7.3 and BS 8500–2: 2006, Cl. 11 as relevant and shall be completed and available before discharging concrete into the structure. Where the Constructor authorises the addition of extra water this shall be recorded on the delivery ticket; see NSCS Standard Specification Cl. 8.1.1.4. All delivery tickets shall be retained by the Constructor until the structure is handed over to the Employer. Where a ticket is marked 'non-conforming' a copy shall be passed to both the Constructor and the CA within 24 hours of placing the concrete.

8.1.3 Plant – ready-mixed concrete

8.1.3.1 Third-party accreditation

Ready-mixed concrete shall be supplied by a producer from a plant holding current accredited third-party certification meeting requirements of BS EN 206–1: 2000, Annex C. Provide the CA with confirmation of the producer's certification in accordance with BS EN 206–1: 2000 Annex C.3.

8.1.3.2 Information required

Details of a ready-mix concrete plant proposed for use shall be forwarded to the CA. Contingency plans shall be in place prior to commencement of work should supplies be interrupted during a pour due to a plant breakdown. Where feasible, details of a suitable backup plant/supplier should be submitted to the CA for agreement.

8.1.4 Plant – other concrete

For supplies of concrete from sources other than plants holding current third-party certification, submit information to the CA that the production and conformity control systems used are in accordance with BS EN 206-1: 2000, Cl. 8, 9 and 10.1 and also BS 8500-2: 2006, Cl. 12 to 14.

8.1.5 Supply and transport

All concrete shall be supplied and transported to the point of discharge from the mixer/agitator truck in accordance with the requirements of BS EN 206-1: 2000, Cl. 7 and BS 8500-2: 2006, Cl.14.

8.2 Concreting**8.2.1 Placing and compaction****8.2.1.1 Placing**

Concrete shall be placed and fully compacted so as to avoid cold joints, honeycombing and to minimise segregation, excessive blemishes or other defect in the hardened concrete.

8.2.1.2 Compaction

Compaction shall be carried out without causing damage or displacement of the formwork, reinforcement, tendons, ducts, anchorages, inserts etc.

8.2.1.3 Kickers

Where kickers are used, they shall be made with concrete of the same strength as that used in the wall or column, of sound construction and a minimum of 100 mm high generally and 150 mm high cast monolithically for water-resisting construction.

Where kickerless construction is used provide details of the proposed method of securing and sealing the column and wall shutters at floor joints to the CA for agreement.

8.2.1.4 Premature cessation

Suitable arrangements for premature cessation of a pour shall be agreed and in place before work starts. Should premature cessation of a pour arise, agree with the CA the extent and timing of any necessary remedial work before resumption of placing.

8.2.2 Concreting in extreme conditions**8.2.2.1 Cold weather**

For concreting in cold weather, air temperature below 5 °C, agree in advance with the CA any changes to the cement, admixtures or concrete temperature to prevent freezing of the concrete, to limit extended stiffening times and to maintain the required concrete strength development.

8.2.2.2 Hot weather

For concreting in hot weather, air temperature above 30 °C, agree in advance with the CA any changes to the cement, admixtures or concrete temperature to minimize high temperature rises and reduction in the useful working life of the fresh concrete.

8.3 Curing**8.3.1 General**

The Curing Class is 2 in accordance with BS EN 13670, unless otherwise specified in NSCS Project Specification. The surface of the concrete shall be cured to avoid premature drying out. Methods of

curing shall be agreed with the CA. Curing membranes shall be compatible with any finishes to be applied subsequently.

8.3.2 Early age thermal cracking

When concrete is to be placed in conditions or in an element where early age thermal cracking is likely, measures shall be adopted that minimise the risk of early age thermal cracking to a level acceptable to the CA. Ensure that the temperature of the concrete does not exceed 65 °C and that the temperature differential does not exceed the appropriate values given in CIRIA Report C660 (Bamforth, 2007), Table 7.1. Where a risk of thermal cracking is identified, the location of monitoring apparatus and interpretation of the values recorded shall be agreed with the CA prior to installation.

8.4 Inspection – post-concreting

8.4.1 General

At the end of the specified period of curing, the relevant work shall be inspected by the Constructor.

8.4.2 Water-resisting construction

For water-resisting construction, inspection shall be carried out jointly with the Constructor and CA before backfilling or covering up to identify defects which may lead to water penetration. Further inspection shall be jointly carried out to identify any water penetration after backfilling.

8.5 Surface cracking

8.5.1 General

Take all reasonable actions to minimise surface cracking, from all causes. Where cracking occurs that it is expected will result in corrosion of the reinforcement, unacceptable water leakage, impaired durability or reduced structural adequacy, it will be rectified as agreed with the CA.

Limits on cracking, unless specified in NSCS Project Specification, are:

- In general reinforced concrete superstructure isolated crack widths up to 0.3 mm
- In ground bearing slabs isolated crack widths up to 2.0 mm between panel joints
- In concrete slabs cast on metal deck formwork as part of a composite structure isolated crack widths up to 1.0 mm.

8.6 Surface finishes

8.6.1 Formed finishes

An Ordinary finish is to be provided unless otherwise specified in NSCS Project Specification.

8.6.1.1 Basic finish

There are no requirements for finish other than to enable adequate compaction, to provide adequate cover to reinforcement and to achieve specified tolerances.

8.6.1.2 Ordinary finish

There are no special formwork requirements for this finish. Concrete should be thoroughly compacted and the formed surface should be free from major inherent blemishes and honeycombing. There is no requirement for consistency of colour for the struck surface. Surface defects may be made good subject to agreeing a method with the CA. Steps at joints between forms to be a maximum of 5 mm.

Note: This type of finish can be seen at the CONSTRUCT regional reference panels. See NSCS Guidance CL. 8.6.1.

8.6.1.3 Plain finish

A Plain concrete finish requires the careful selection of the concrete, release agent, and the use of good quality formwork. The concrete must be thoroughly compacted and all surfaces should be true with clean arrises. Only very minor inherent surface blemishes should occur, with no discolouration from the release agent or grout runs from adjacent pours. The struck surface should be of a consistent colour from the materials used. The arrangement of formwork panels and tie-bolt holes should be in a regular pattern. Steps at joints between forms to be a maximum of 3 mm. It is expected that this finish will not require making good. Details of any sample panels required are given in NSCS Project Specification.

Note: This type of finish can be seen at the CONSTRUCT regional reference panels. See NSCS Guidance CL. 8.6.1.

8.6.1.4 Special finish

A Special finish requires the careful selection of the concrete, release agent, the use of good quality formwork and thorough compaction. Detailed requirements of the surface finish required, and any permitted further working or improvements to the as-struck finish are given in NSCS Project Specification. A sample panel will be required as described in NSCS Project Specification.

8.6.2 Unformed finishes

A Basic finish is to be provided unless otherwise specified in NSCS Project Specification.

8.6.2.1 Basic

The concrete shall be leveled by skip float, or similar process to produce a closed uniform surface. No further work shall be carried out.

8.6.2.2 Ordinary

The concrete shall be finished by floating or panning or a similar process, to produce a level, uniform surface. No further work shall be carried out.

8.6.2.3 Plain

The concrete shall be finished by trowelling, or a similar process, to produce a dense, smooth, level, uniform surface. No further work shall be carried out.

8.6.2.4 Special

To be produced by further working of a finish or other improvements as specified in NSCS Project Specification.

Section 9 Precast concrete

9.1 General

This section deals with additional considerations particular to structures partly or wholly of precast construction.

9.1.1 Details

The manufacturer shall operate an agreed quality management system to BS EN ISO 9000 unless agreed with the CA. Records of the unit mark, unit composition, date of casting, and curing regime

for each precast element shall be made by the manufacturer and kept available for inspection at the precast works.

9.1.2 Connections

Connection details are to be compatible with the design assumptions and should allow for the expected tolerances. Details are to be submitted to the CA for agreement.

9.1.3 Erection specification and work programme

An erection specification and work programme shall be prepared and agreed with the CA.

9.1.4 Identification

All marks shall be made so that they are hidden when unit is placed in position, or may be removed without marking the concrete surface.

9.2 Precast concrete products

Delivery notes are required for all products delivered to the site and must show relevant details of product conformity, as required by BS EN 13369 and the relevant product specification.

9.3 Precast concrete elements

All site-manufactured concrete elements must conform to the requirements of Sections 5, 6, 7 & 8 of NSCS Standard Specification.

9.3.1 Striking

The minimum period before removing the formwork is at the discretion of the Constructor on the basis of the assessed compressive strength of the precast element.

9.3.2 Lifting

No precast element shall be lifted from the base on which it was cast before the concrete has attained its design demoulding strength and is strong enough to prevent the precast element from being damaged, overstressed or distorted giving regard to the demoulding equipment to be used.

9.4 Handling and storage

9.4.1 General

Precast components shall be clearly marked before delivery in accordance with the erection specification to indicate their weight, location and orientation in the works in order to facilitate correct erection. Where delivery cannot be timed for direct final positioning, arrange suitable storage to ensure no deterioration or damage. Storage shall be on firm supports ensuring units are clear of the ground. Provide the CA with the storage proposals.

9.4.2 Protection

Precast component faces to be exposed in the finished construction are to be protected from mechanical damage, dirt, staining, rust marks and other disfiguration.

9.4.3 Reinforcement and fixings

The manufacturer shall determine the need for any additional reinforcement or fittings necessary for handling the precast components or other provisions required for temporary structural purposes

until the precast components are incorporated into the structure, including details for the making good of any provision made for lifting etc.

Any inserts or fixings required to be cast within the concrete and permanently exposed either externally or within the cavity of the building envelope shall be of stainless steel unless otherwise accepted by the CA. In other cases any protective treatment shall be as agreed with the CA.

9.5 Placing and adjustment

9.5.1 Temporary stability

Ensure that any precast concrete component to be incorporated into the structure shall be kept stable in its erected position until such time as the component can safely carry the construction loads without distress. The overall stability of the structure shall be maintained at all times during the erection process.

9.5.2 Bearings for precast products

Are to be level and not less than the minimum recommended by the manufacturer.

9.5.3 Cutting and drilling precast products

Submit proposals, agreed with the manufacturer, for acceptance by the CA.

9.5.4 Alignment of units

The units shall be positioned in the Frame to the tolerances given in Section 10, Geometric tolerances.

9.6 Jointing

9.6.1 General

All jointing to be as shown on the erection specification or agreed with the CA.

9.6.2 Materials

Grout material to comply with BS EN 197–1 and BS EN 13139.

Section 10 Geometric tolerances

10.1 General

The tolerances given in this section are NOT cumulative.

Carry out regular checks on the structure. If an element size or position is out of tolerance propose remedial measures for agreement with the CA.

10.1.1 Precedence

The following are the permitted tolerances for the structure as defined on the drawings. These tolerances take precedence over those given in BS EN 13670. All appropriate BS EN 13670 tolerances have been repeated for completeness of NSCS Standard Specification. The tolerances for position refer to the tolerance from the reference lines and datum given in NSCS Project Specification. Any deviation in secondary lines are included in the tolerances given.

The hierarchy of tolerance adopted in the NSCS is such that the tolerance of each level must be contained within the tolerance level of the level above where 1 is the highest level:

- First – The overall tolerance of the structure, Cl. 10.2, 10.3 and 10.4
- Second – The positional tolerance of all parts of elements of the structure within the overall tolerance, Cl. 10.5 and 10.6
- Third – The dimensional tolerance of the individual elements within their positional tolerance, Cl. 10.7, 10.11 and 10.12
- Fourth – The position tolerance of reinforcement and fixings within the individual elements dimensional tolerance, Cl. 10.8, 10.9 and 10.10

10.1.2 Tolerance class

Tolerance Class 1 is considered to be the normal tolerance as set out in BS EN 13670. Lesser deviations to meet design, fit requirements or any other reason shall be considered Class 2 and the required deviations are given in NSCS Project Specification.

Class 2 tolerances specified in NSCS Project Specification may apply to the whole structure or any part.

10.1.3 Execution class

Where Class 2 tolerances are given in NSCS Project Specification the execution will be to Execution Class 3.

10.1.4 Measurement

The tolerances given in Cl. 10.2.2, 10.6.5 & 10.6.6 below apply before the striking of the formwork. The tolerances given are before deformation caused by loading and time-dependent effects.

10.1.5 Reference grids

The location of the reference grids or primary lines and levels for the overall positioning of the Works shall be agreed by the CA and the Constructor before the structure is set out.

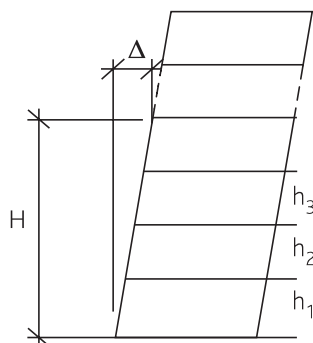
10.1.6 Box principle

The 'box principle' can be applied to the tolerances in NSCS Standard Specification. Where it is applied to the whole building the tolerances is as given by Cl. 10.2.1; where it is applied to an individual element the tolerance is ± 20 mm.

10.2 Overall structure

10.2.1 Inclination

Location of any column, wall or floor edge, at any storey level, from any vertical plane through its intended design centre at base level in a multi-storey structure.



Permitted deviation Δ = the smaller of 50 mm or $H/(200n^{1/2})$ mm

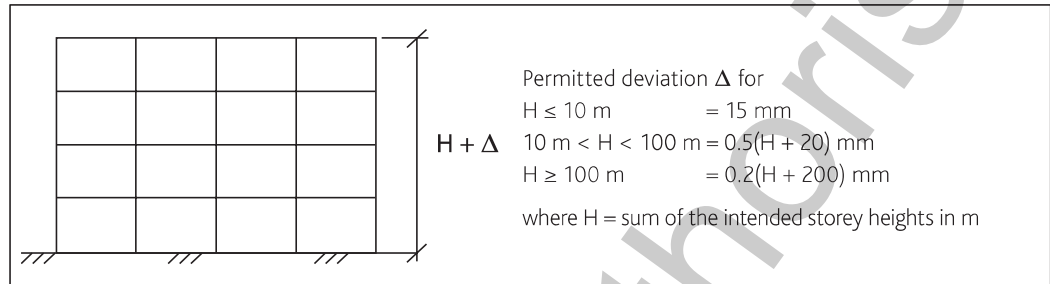
where h = free storey height in mm

H = free height at location = $\sum h_i$ in mm

n = number of storeys where $n > 1$

10.2.2 Level

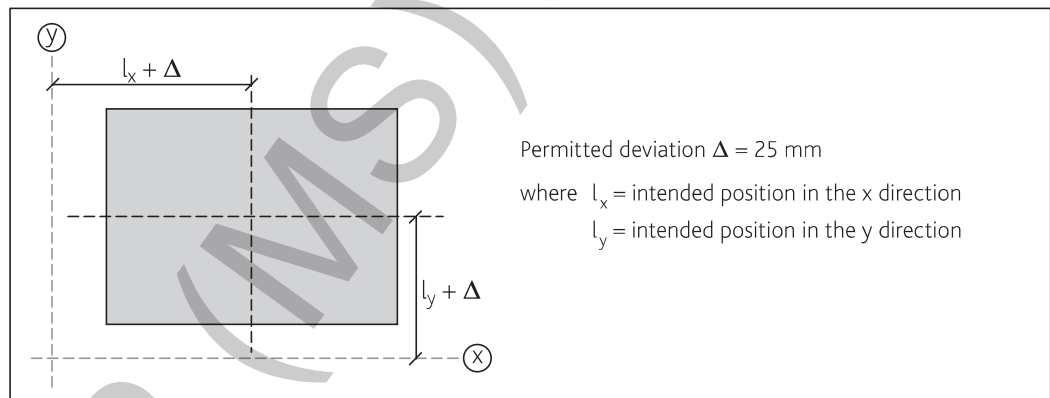
Level of floors measured relative to the intended design level at the reference level.



10.3 Base support (foundations)

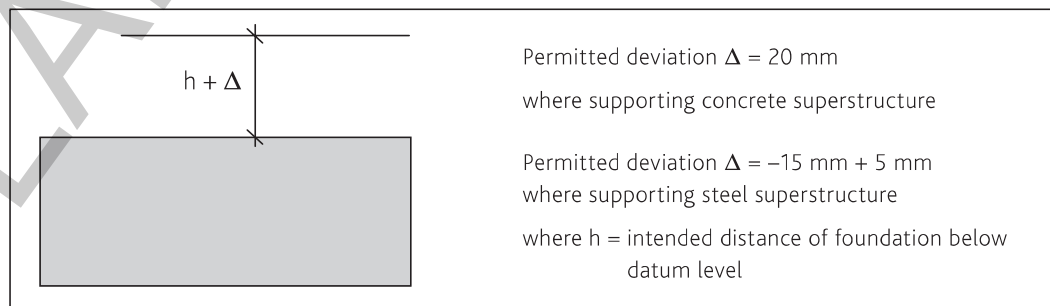
Base supports shall include direct foundations and pile caps, etc. but not deep foundations such as piles, slurry walls, diaphragms, special anchorages, etc.

10.3.1 Plan section



10.3.2 Vertical section

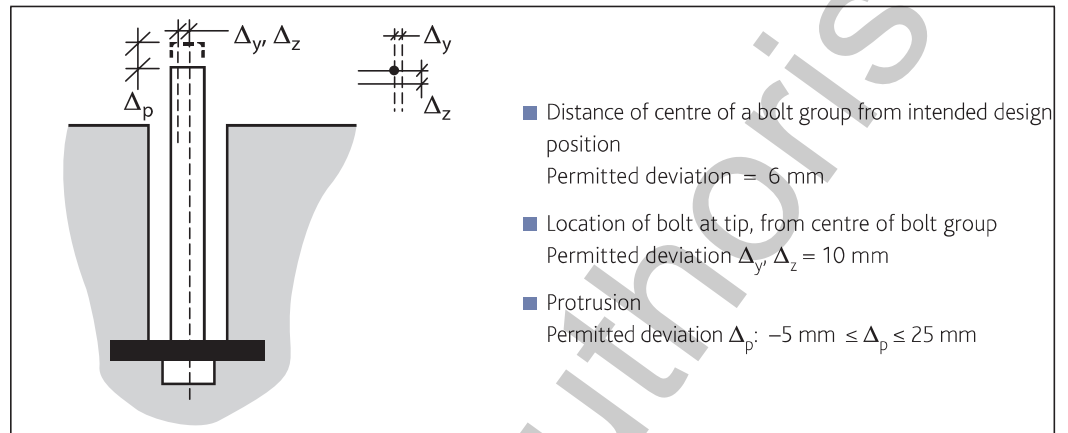
Position in the vertical direction of a base support relative to the intended design position.



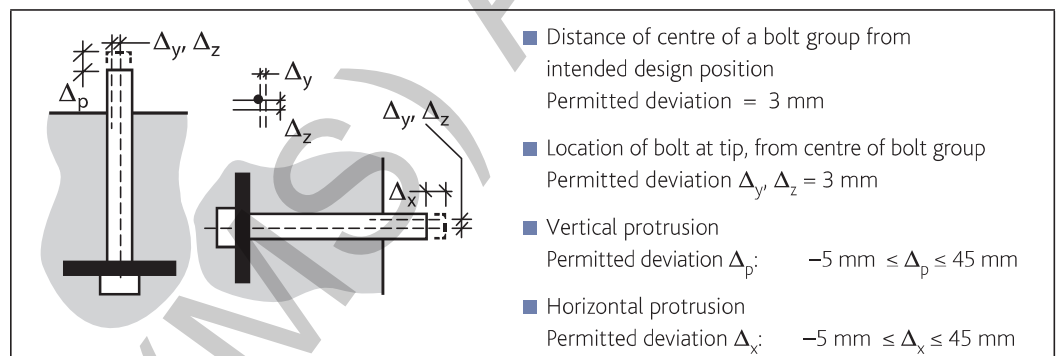
10.4 Foundation bolts and similar inserts

Note: Deviations are coordinated with BS EN 1090–2: 2008 Cl. D.2.20.

10.4.1 Preset bolt prepared for adjustment



10.4.2 Preset foundation bolt not prepared for adjustment



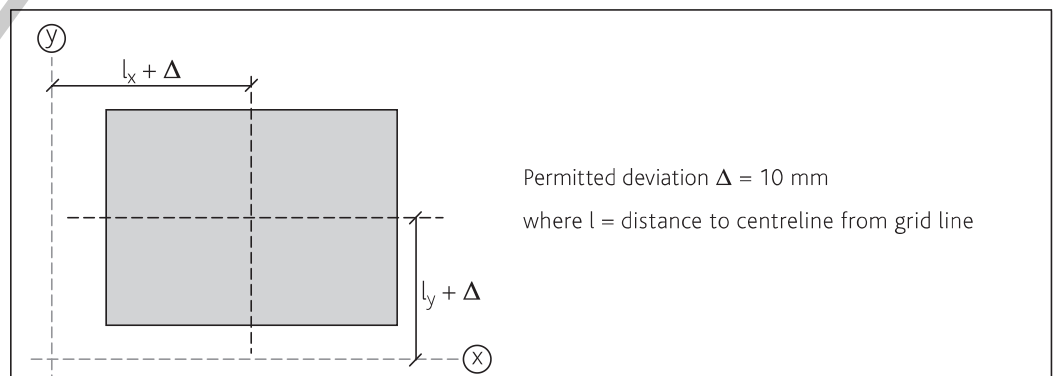
10.5 Elements – columns and walls

The deviation or sum of any deviations of any individual element must not exceed the overall building structure tolerance given in 10.2.

10.5.1 Position on plan

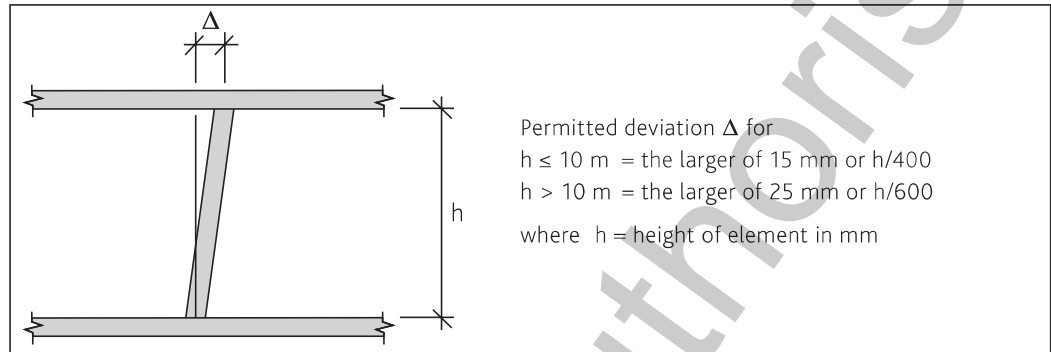
Position of the element centre line relative to:

- At base level the intended design position.
- At any upper level the actual location of the element at the level below.

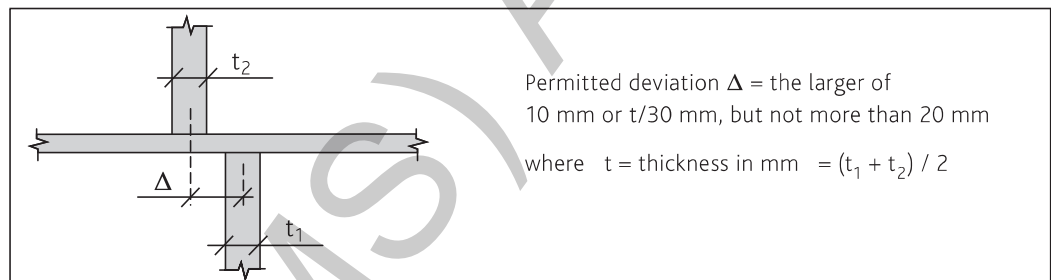


10.5.2 Verticality by storey of the structure

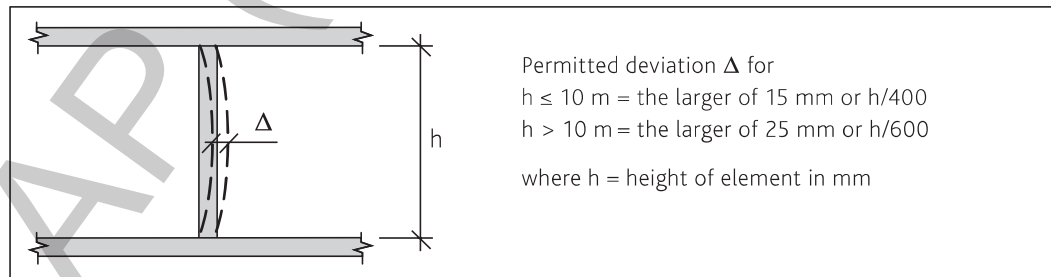
Inclination of a column or wall at any level in a single- or multi-storey building.

**10.5.3 Offset between floors**

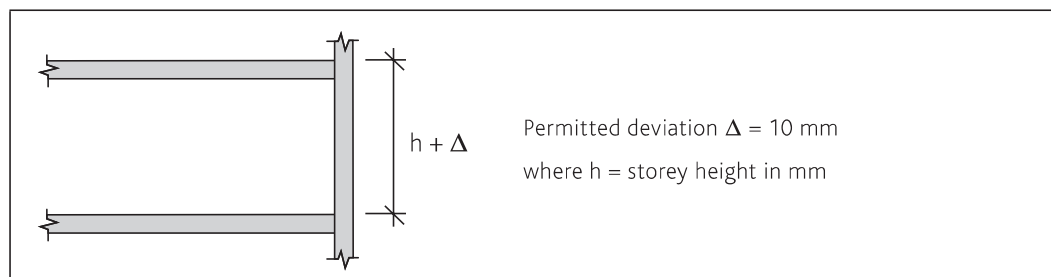
Deviation between centrelines at floor level.

**10.5.4 Curvature between adjacent floors**

Curvature of an element between adjacent storey levels.

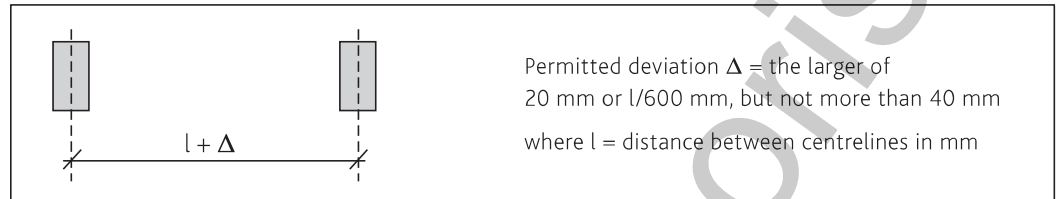
**10.5.5 Level per storey of structure**

Level of adjacent floors at supports.



10.5.6 Distance between adjacent columns and walls

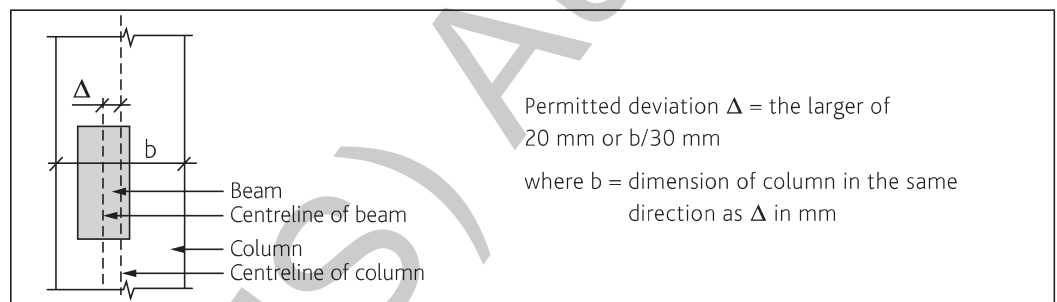
Distance between adjacent columns and walls, measured at corresponding points.



10.6 Elements – beams and slabs

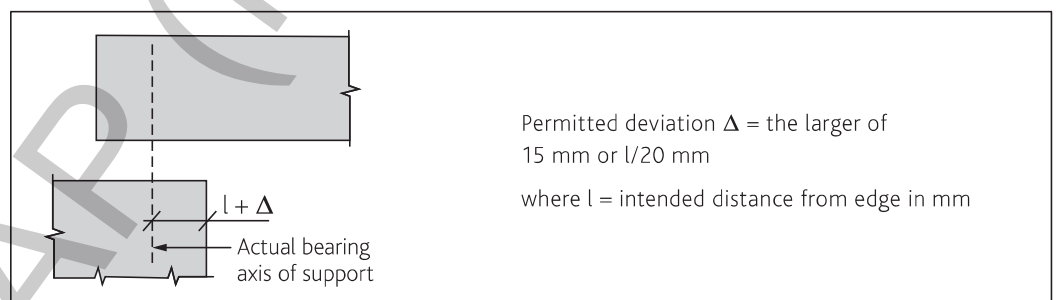
10.6.1 Location of beam to column connection

Location of a beam to column connection measured relative to the column.



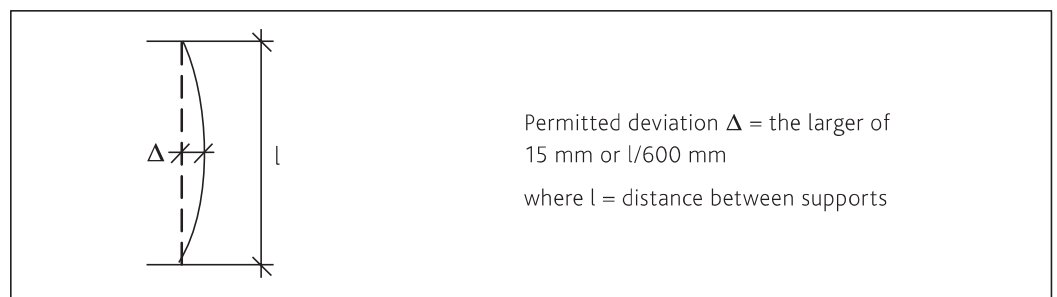
10.6.2 Position of bearing axis of support

Position of bearing axis of support when structural bearings are used.



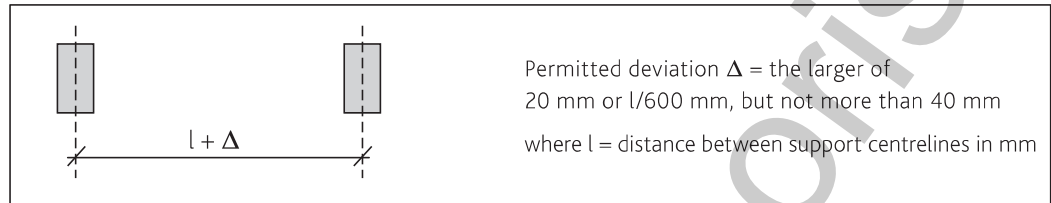
10.6.3 Straightness of beams

Horizontal straightness of beams.

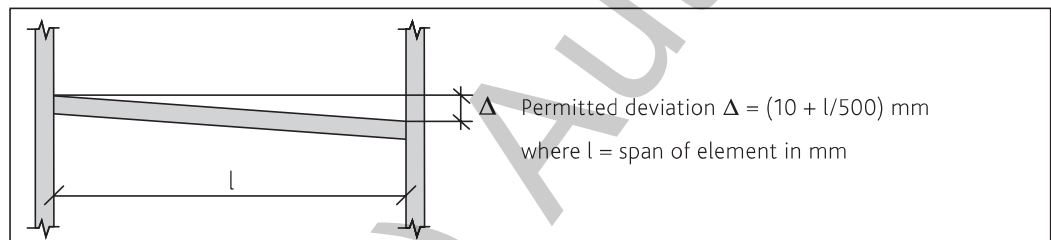


10.6.4 Distance between adjacent beams

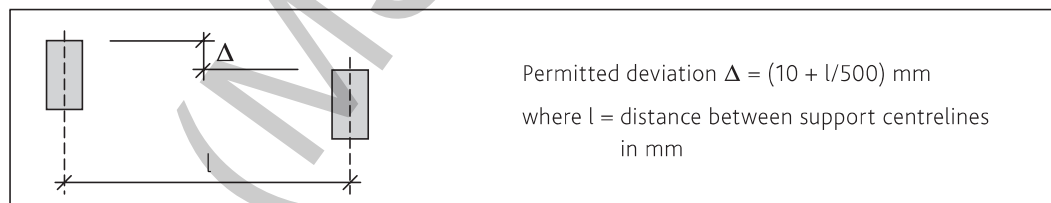
Distance between adjacent beams, measured at corresponding points.

**10.6.5 Inclination of beam or slab**

Difference in level across a beam or slab at corresponding points in any direction.

**10.6.6 Level of adjacent beams**

Level of adjacent beams, measured at corresponding points.

**10.6.7 Position of slab edge**

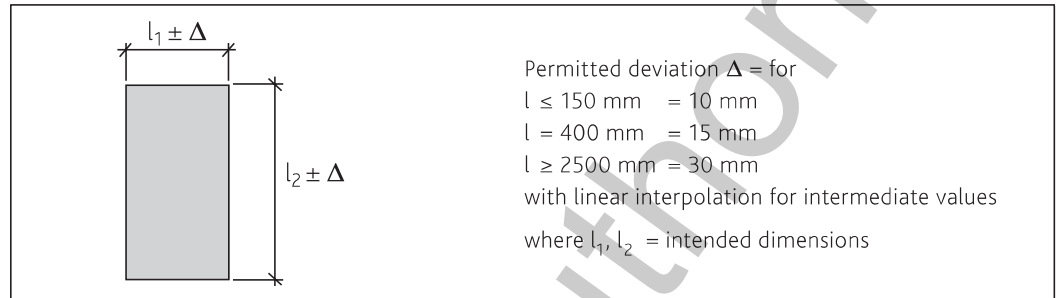
Position of slab edge relative to actual slab edge position on the floor below.



10.7 Section of elements

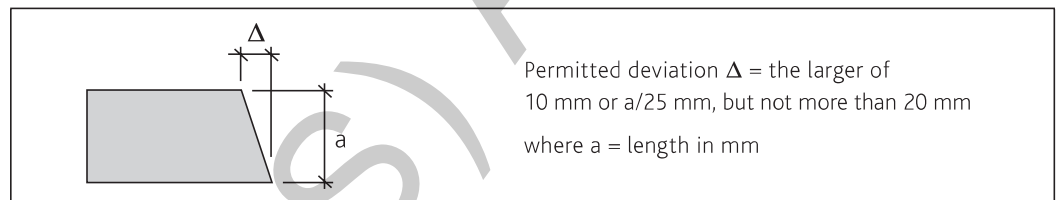
10.7.1 Cross-section dimension of elements

Applicable to beams, slabs, columns and other elements covering length, breadth and depth.



10.7.2 Squareness of element

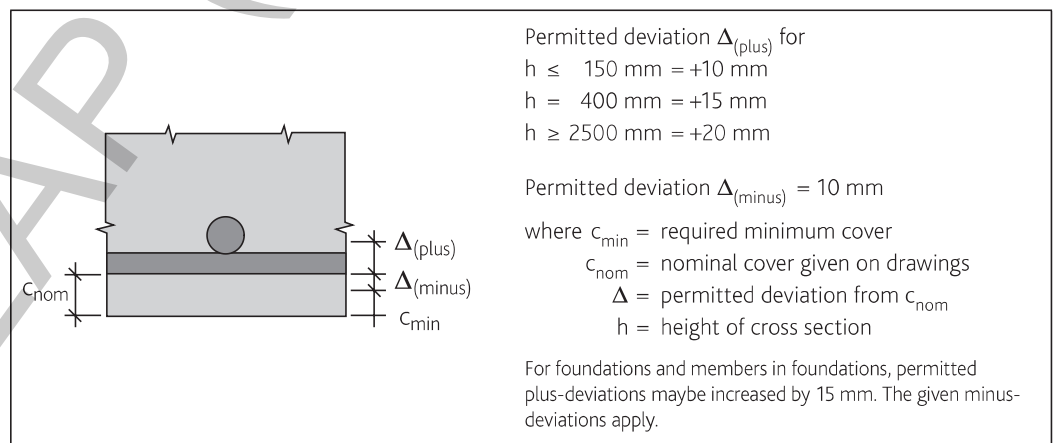
Applicable to beams, slabs, columns and other elements.



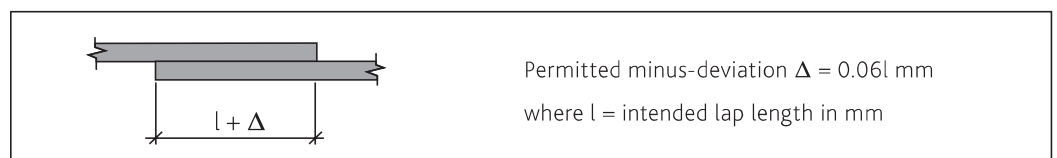
10.8 Position of reinforcement within elements

10.8.1 Location of reinforcement

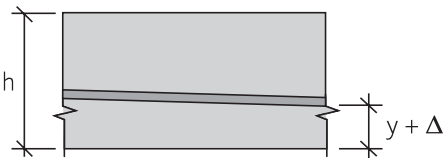
Gives the tolerance of cover to reinforcement within an element.



10.8.2 Length of reinforcement lap joints



10.8.3 Location of reinforcement and ducts in prestressed elements

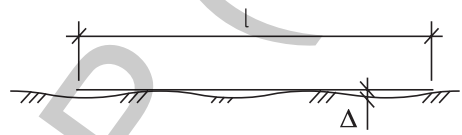


- Anchorages
Permitted location deviation Δ
= 25 mm horizontally
5 mm vertically
- Tendons
Permitted deviation Δ
Horizontally
in beams = $0.03h$ (width) $\geq 5 \text{ mm} \leq 30 \text{ mm}$
in slabs = 150 mm
Vertically
 $\Delta_{(\text{plus})}$ if $h < 200 \text{ mm}$ = $+h/40$
if $h > 200 \text{ mm}$ = +15 mm
 $\Delta_{(\text{minus})}$ all h = -10 mm
where h for vertical section = depth in mm
 h for plan section = width in mm
 y = intended location in mm

10.9 Surface straightness

10.9.1 Flatness

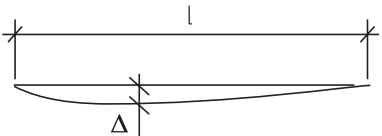
Flatness of surface of any element.



- Basic unformed surface (Cl. 8.6.2.1)
Permitted global deviation $\Delta = 12 \text{ mm}$
Permitted local deviation $\Delta = 5 \text{ mm}$
- Ordinary unformed surface (Cl. 8.6.2.2)
Permitted global deviation $\Delta = 9 \text{ mm}$
Permitted local deviation $\Delta = 3 \text{ mm}$
- Ordinary surfaces (Cl. 8.6.1.2)
Permitted global deviation $\Delta = 9 \text{ mm}$
Permitted local deviation $\Delta = 5 \text{ mm}$
- Plain surfaces (Cl. 8.6.1.3)
Permitted global deviation $\Delta = 9 \text{ mm}$
Permitted local deviation $\Delta = 3 \text{ mm}$

10.9.2 Edge straightness

Straightness of edge of floor slab or element.

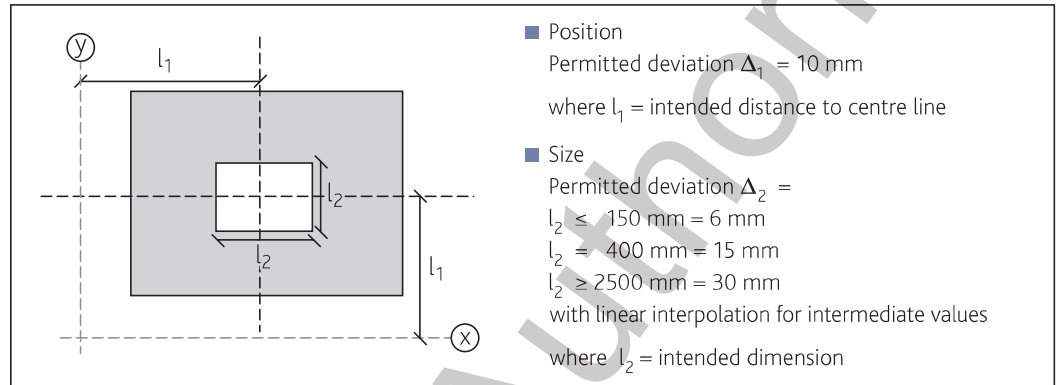


Permitted deviation Δ for
 $l < 1 \text{ m} = 8 \text{ mm}$
 $l > 1 \text{ m} = 8 \text{ mm/m}$, but no greater than 20 mm
 where l = length of edge

10.10 Holes and fixings

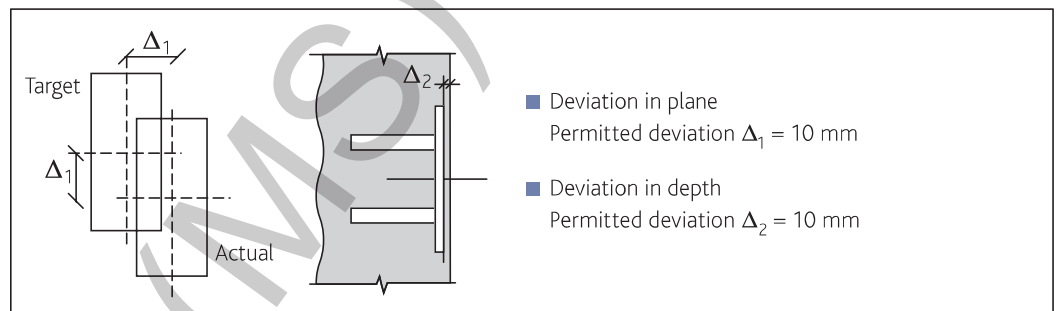
10.10.1 Holes

Size and location of hole relative to design position.



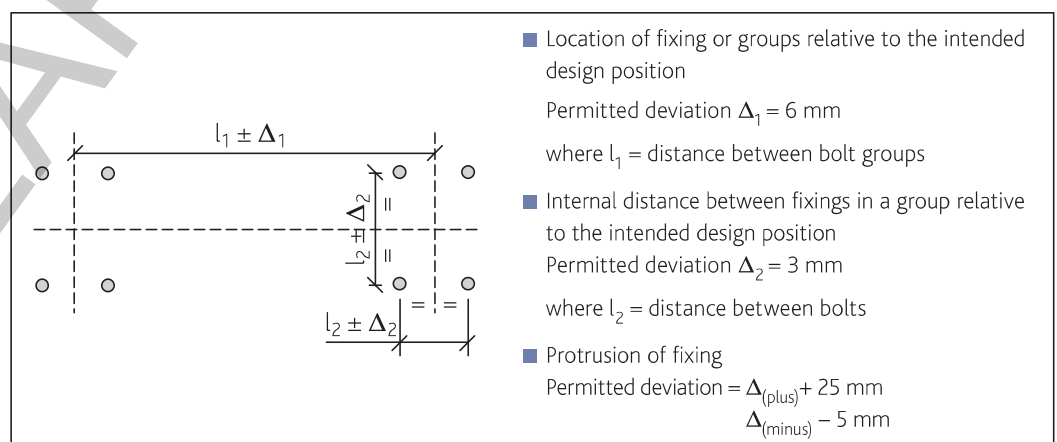
10.10.2 Cast-in fixings

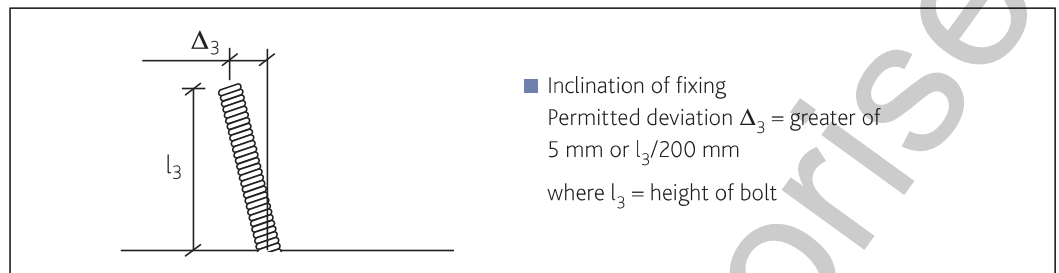
Location of fixing or groups relative to the intended design position.



10.10.3 Cast-in bolts and similar fixings

Location of fixing or groups relative to the intended design position.





10.11 Staircases

The permitted deviation in the height of any riser is 5 mm of the intended design value.
The permitted deviation in the length of any going is 5 mm of the intended design value.

10.12 Precast concrete elements

10.12.1 Standard precast products

Standard precast products shall comply with the tolerances given in the relevant product standards.

10.12.2 Project designed precast elements

Concrete elements produced for the project shall comply with the tolerances for: sections of elements; position of reinforcement within elements; surface straightness; and holes and fixings given above.

National Structural Concrete Specification

for Building Construction

Third Edition

PART 2. PROJECT SPECIFICATION

21T2034: ISH HUB

General

- i) The specification for the structure shall be the National Structural Concrete Specification for Building Construction (NSCS).
- ii) NSCS Part 2 is provided by the Employer and identifies the appropriate information specific to the structure over and above that stated in the NSCS Part 1. Some clauses in Part 1 may be modified by information in Part 2.

SECTION P1

Information to be supplied to the SCC

P1.1 PROPOSED WORKS

Project

Name: Cleator Moor ISH HUB
Address: Land off Leconfield Street, Cleator Moor, CA25 5QE

Employer

Name: Morgan Sindall
Address: Percy House, 8th Floor, Percy Street, Newcastle, NE1 4PW
Tel. no: +44 191 820 1014 E-mail: Michael.Middleton@morgansindall.com
Contact: Michael Middleton

Engineer

Name: Billingham George & Partners
Address: Wellington House, Wellington Court, Stockton-on-Tees, TS18 3TA
Tel. no: 01642 876 470 E-mail: consulting@bgp-consulting.co.uk

Contract administrator (CA)

Name: Avison Young
Address: Norfolk House, 7 Norfolk Street, Manchester M2 1DW
Tel. no: +44 07899 961 311 E-mail: Nick.Wisken@avisonyoung.com

Other named Parties to the Contract:

N/A
.....
.....
.....
.....

Description of the project works –

The development comprises a new commercial building as part of the Cleator Moor Innovation Quarter project. The proposed HUB building is intended to act as the flagship unit within the wider development, providing a flexible mix of innovation, workshop and meeting spaces designed to support business growth, collaboration and skills development within the local area. The building is of portal frame construction, with a ground and first floor level. The first-floor beams have been designed compositely with a 150mm thick Kingspan MD60 concrete metal deck. The building relies on horizontal bracing and the stiffness of the portal frames to transfer horizontal loads to the vertically braced bays and down to the foundations.

The building is supported on a piled foundation solution. This consists of piles and pilecaps which support suspended reinforced ground beams. The ground floor slab is designed as a suspended, cast in-situ, fully reinforced concrete slab.

General construction planning requirements:

N/A
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.....
.....
.....

P1.2 DESIGN

- i) Method and codes used: BS 8110, BS 6399
-
-

- ii) General loading and other design data, any relevant information is shown on the Billingham George and Partners drawings.

P1.4 MATERIALS**P1.4.1 Concrete**

Specific requirements for materials: special aggregates, cement sources, etc.

No special requirements.

P1.5 PROJECT REQUIREMENTS

- i) The following special requirements apply:

Part 1 Clause reference	Change N: new D: deleted M: modified	Description

- ii) The timings given in Part 1 apply to all approvals except as noted below. Default values are shown in []. Changes should be entered leaving the default value to show the change.

Part 1 Clause reference	Item	Requirements
1.1.4	Response by CA to approval request	[1 week]
1.3.1	Copies of test results	[3 No.]
1.3.3	Proposal and response time for work rectification	[1 week & 1 week]
3.2.1	Notice to CA for site changes to reinforcement	[1 day]
4.3.2	Duration of special protection	[Contract]
4.5.1	Notice to CA for concrete pour inspection	[1 day]

P1.7 SURFACE FINISHES

Type U1 is required except as follows;

All floor slabs and exposed concrete to have type U3 finish.

The external yard areas are to have a type U2 finish followed by light brush finish to provide an even textured finish.

Surface Regularity:

Ground-floor concrete slabs are to have a surface regularity classification SR2, and mezzanine concrete slabs are to have a surface regularity classification of SR3 in accordance with BS 8204-1:2003 + A1:2009.

P1.8 CONCRETE**P1.8.1 Designated concrete**

In accordance with BS 8500

1.	Concrete designation	RC 28/35	GEN 0	GEN 1	PAV 2
2.	Maximum aggregate Size(mm) Enter 10 or 40 if required)	20	20	20	20
3.	Consistence class – slump (mark one value) – other (enter value)	S1 S2 S3* S4	S1 * S2 S3 S4	S1 S2 S3* S4	S1 S2 S3 * S4
4.	Special restrictions on cement types (enter reference if required)	None	None	None	None
5.	Special requirements for aggregates (enter reference if required)	None	None	None	Freeze thaw resistant aggregate
6.	Use of RCA permitted Maximum mass fraction of total coarse aggregate where allowed enter a higher mass fraction of total coarse aggregate (Ref BS 8500-1 Clause 4.2.3c)	No 20%	yes 20%	No 20%	No 20%
7.	Requirements for accelerated or retarded set	None	None	None	None
8.	Special colour requirements	None	None	None	None
9.	Type and closure of fibres	None	None	None	None
10.	Chloride class (enter Cl0,20 if SRPC is specified or Cl0,10 for prestressed or heat cured concrete)	Cl0,40	Cl0,40	Cl0,40	Cl0,40
11.	Minimum air content	None	None	None	3.5%
12.	Method of placing concrete				
13.	Requirement for finishing concrete	See P.1.7	See P.1.7	See P.1.7	See P.1.7
14.	Design sulphate class	DS-3	DS-3	DS-3	DS-3

Notes

1. All sections of the specification must be completed before it is passed to the producer. The person sending the final specification to the producer must send copies of the document to all other parties (CA, Engineer, Employer) as appropriate who have contributed to the specification.
2. Where 'None' is entered in the table this is a default value to ensure that the specification is complete. All those involved in completing the specification need to check if 'None' is appropriate.
3. Guidance on specification of designated concrete can be found in BS 8500-1 section 4.2.

P1.8.1 Designated concrete

In accordance with BS 8500

1.	Concrete designation	RC 25/30	GEN 3	FND 2	RC 32/40
2.	Maximum aggregate Size(mm) Enter 10 or 40 if required)	20	20	20	20
3.	Consistence class – slump (mark one value) – other (enter value)	S1 S2 S3* S4	S1 * S2 S3 S4	S1 S2 S3* S4	S1 S2 S3 * S4
4.	Special restrictions on cement types (enter reference if required)	None	None	None	None
5.	Special requirements for aggregates (enter reference if required)	None	None	None	None
6.	Use of RCA permitted Maximum mass fraction of total coarse aggregate where allowed enter a higher mass fraction of total coarse aggregate (Ref BS 8500-1 Clause 4.2.3c)	No 20%	yes 20%	No 20%	No 20%
7.	Requirements for accelerated or retarded set	None	None	None	None
8.	Special colour requirements	None	None	None	None
9.	Type and closage of fibres	None	None	None	None
10.	Chloride class (enter Cl0,20 if SRPC is specified or Cl0,10 for prestressed or heat cured concrete)	Cl0,40	Cl0,40	Cl0,40	Cl0,40
11.	Minimum air content	None	None	None	None
12.	Method of placing concrete				
13.	Requirement for finishing concrete	See P.1.7	See P.1.7	See P.1.7	See P.1.7
14.	Design sulphate class	DS-3	DS-3	DS-4	DS-3

Notes

1. All sections of the specification must be completed before it is passed to the producer. The person sending the final specification to the producer must send copies of the document to all other parties (CA, Engineer, Employer) as appropriate who have contributed to the specification.
2. Where 'None' is entered in the table this is a default value to ensure that the specification is complete. All those involved in completing the specification need to check if 'None' is appropriate.
3. Guidance on specification of designated concrete can be found in BS 8500-1 section 4.2.

P1.8.2 Designed Concretes

In accordance with BS 8500

CONCRETE FOR EXTERNAL HARDSTANDING AREAS

1.	Concrete designation	Externals	Water Retaining Concrete	Visual Concrete
2.	Strength class	C28/35	C30/37	C28/35
3.	Maximum water-cement ratio	0.45	0.55	0.5
4.	Nominal maximum size of aggregate (mm) (enter 10 or 40 if required)	20	20	20, not more than 20% passing a 10mm sieve
5.	Minimum cement content kg/m ³	360	300	350
6.	DC-Class where appropriate	N/A	N/A	N/A
7.	a. Permitted cement types b. Cement group for sulphate resistance c. Cement group for chloride resistance	IIIB+SR	Group 5	Group 5
8.	Chloride class (enter Cl0,20 if SRPC is specified or Cl0,10 for heat cured concrete)	Cl0,40	Cl0,40	Cl0,40
9.	Target density/density class (for lightweight and heavyweight concrete)	N/A	N/A	N/A
10.	Consistence class – slump (mark one value) – other (enter value)	S3	S3	S3
11.	Method of placing concrete			
12.	Requirement for finishing concrete	See P.1.7	See P.1.7	Smooth surface, steel shutter or phenolic film facing plywood
13.	Special requirements for cements	None	None	None
14.	Special requirements for aggregates	Freeze thaw resisting	Angular aggregate, low thermal expansion	Freeze thaw resisting. Aggregate content not more than 6 times the cement content
15.	Type and dosage of fibres	None	None	None
16.	Minimum air content	3.5%	None	3.5%
17.	Special requirements for temperature of fresh concrete	None	None	None
18.	Special requirements for strength development	None	None	None
19.	Special requirements for heat development during hydration	None	None	None
20.	Special requirements for retarded stiffening	None	None	None
21.	Special requirements for resistance to water penetration	None	None	None
22.	Special requirements for resistance to abrasion	None	None	None
23.	Tensile splitting strength	Not required	Not Required	Not Required
24.	Other special technical requirements	None	None	Sane content not more than 2 times the cement content
25.	Additional requirements Maximum drying shrinkage	0.075%	0.075%	0.075%

26.	Identity testing: Identity strength testing required (If yes then details to be added into P1.10)	No	No	No
27.	Use of RA permitted If YES:- Maximum acid – soluble sulphate. Method for determination of the chloride content classification with respect to asr. Method for determination of alkali content. Any limitations on use in concrete, e.g. exposure classes, maximum mass fractions etc.	No	No	No
28.	Use RCA permitted If YES:- Maximum mass fraction of total coarse aggregate. Where allowed enter a higher mass fraction of total coarse aggregate	No	No	No

Notes

1. All sections of the specification must be completed before it is passed to the producer. The person sending the final specification to the producer must send copies of the document to all other parties (CA, Engineer, Employer) as appropriate who have contributed to the specification.
2. Where 'None' is entered in the table this is a default value to ensure that the specification is complete. All those involved in completing the specification need to check if 'None' is appropriate.
3. Guidance on specification of designed concrete can be found in BS 8500-1 Section 4.3.

P1.9 CONSTRUCTION PLANNING

Note: the information here is largely reproduced from the Contract Documents to assist the SCC in the preparation of Section P2. The SCC should notify the CA if any discrepancy is identified between the Contract Documents and the Specification.

- i) Site details:
N/A
- ii) Positions of datum level and setting-out lines, width and level of access, level of the prepared working area for site traffic, cranes and pumps, and areas available for storage and site accommodation are shown on drawing numbers:
In accordance with Ordnance Survey levels and coordinates.
- iii) Availability of site services and any pre-arranged procedures for sole or shared use:
To be agreed with main contractor.
- iv) Restrictions on dimensions and/or weights of units to be delivered to site:
N/A
- v) Factors affecting construction sequence, or which may create an unusual hazard:
Legacy ICI building basement to be removed prior to works commencing in enabling works package. Appropriate demolition and site prep pre-agreed with contractor.
- vi) Underground services, overhead cables, adjacent buildings, site obstructions or other constraints on the SCC:
As shown on the GPR drainage and utilities surveys provided.
- vii) Known working restrictions on time or special nuisance (including noise):
N/A
- viii) Requirements/restrictions at the interface between the structure and following trades:
N/A
- ix) Requirements for temporary propping:
None required
- x) Special requirements for headroom:
No known restrictions immediately surrounding the site.
- xi) A programme showing clearly any phased requirements and the earliest and the latest release dates of work to following trades or to the Employer is shown on drawing numbers:
No specific requirements – in accordance with contractor's program.
- xii) Access will be made available to the SCC on:
To be agreed with main contractor.
- xiii) Other information considered relevant to the SCC:

P1.10 FURTHER INFORMATION

Where further information is required to expand data given in Clauses P1.1 to P1.9, list here and attach as necessary, stating the clause to which it relates.

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SECTION P2**Information to be supplied by the SCC**

at tender stage unless noted with updated information issued for construction.

P2.1 GENERAL**Project**

Name:

Address:

Tel. no: E-mail:

SCC

Name:

Address:

Contact name: E-mail:

Tel. no: E-mail:

Designer's name:

Tel. no: E-mail:

Temporary works coordinator name:

Tel. no: E-mail:

Other specialist contractors to be used by SCC:

Name:

Tel. no: E-mail:

Name:

Tel. no: E-mail:

Name:

Tel. no: E-mail:

P2.2 DESIGN

Details of any SCC-designed structure:

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P2.3 DRAWINGS, CALCULATIONS and REINFORCEMENT SCHEDULES

- i) Details of any proposed variation of values in P1.3 and other specification changes:

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- ii) An information requirement schedule, based on the construction programme and this specification is to be issued to the CA within two weeks of SCC being appointed.

P2.4 MATERIALS

- i) List any alternative materials proposed by SCC:

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- ii) List materials to be provided under SCC-specified supply:

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P2.5 FALSEWORK and FORMWORK

- i) Construction joints and pour sizes
SCC to give any alternative sizes proposed.

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- ii) Water-resisting construction
If the SCC is responsible for the detailed design of water-resisting construction the following materials will be used:

Detail	Location	Waterstops	Separation membranes	Joint fillers
Manufacturer				
Material				
Type	Slabs - horizontal construction joints			
	Slabs - horizontal movement joints			
	Wall - horizontal slab/wall junction			
	Wall - vertical construction joint			
	Wall - vertical movement joint			

P2.6 REINFORCEMENT

- i) Reinforcement supplier: * / to be provided 4 weeks before first delivery*
UK CARES certificate: Yes/No*
- ii) Coupler details and supplier: * / to be provided 4 weeks before first delivery*
UK CARES certificate: Yes/No*

* Delete as appropriate

P2.7 CONCRETE and CONCRETING

- i) Accredited third party certification of proposed plant:
..... * / to be provided 4 weeks before first delivery*
* Delete as appropriate
- ii) Any proposed concrete specification variations:

.....

.....

.....

P2.8 CONSTRUCTION PLANNING

- i) A construction method statement including pour sequence for each section of work

.....

.....

.....

- ii) A detailed construction programme (to be updated during the progress of construction).

.....

.....

.....

- iii) Quality assurance certification: Yes/No*

* Delete as appropriate

P2.9 PRECAST CONCRETE

This table is included for the information to be provided for precast concrete works.

Details to be provided		At tender	Y/N	8 weeks before construction	Y/N
Production plant	Details				
	QA certification				
Lifting	Method				
	Equipment details				
	Design of lifting point/devices				
	Location of lifting devices				
Handling	Minimum age				
	Additional reinforcement				
	Storage details				
	Transport storage details				
Erection	Method statement				
	Temporary supports/details				
	Details of protection				
Connections	Details				
	Preparation				
	Grouting/packing				
	Removal of temporary shims etc.				
Concrete	Designation				
Finishes	Samples of finishes				
	Details of spacers				
	Formwork details				

P2.10 FURTHER INFORMATION

Where further information is provided to expand data given in Clauses P2.1 to P2.8, list here and attach as necessary, stating the clause to which it relates.



BGP

Wellington House, Wellington Court,
Stockton-on-Tees
TS18 3TA

Specification for

Cleator Moor ISH HUB

STRUCTURAL STEELWORK PROJECT SPECIFICATION

STRUCTURAL STEELWORK PROJECT SPECIFICATION

- 1.0 The “Specification” shall be the National Structural Steelwork Specification for Building Construction 5th Edition CE Marking Version including any additions or modification required by the Employer.
- 2.0 The development comprises a new commercial building as part of the Cleator Moor Innovation Quarter project. The proposed HUB building is intended to act as the flagship unit within the wider development, providing a flexible mix of innovation, workshop and meeting spaces designed to support business growth, collaboration and skills development within the local area. The building is of portal frame construction, with a ground and first floor level. The first-floor beams have been designed compositely with a 150mm thick Kingspan MD60 concrete metal deck. The building relies on horizontal bracing and the stiffness of the portal frames to transfer horizontal loads to the vertically braced bays and down to the foundations.
- 3.0 The design of the steel frame has been carried out by Billingham George & Partners. The Steelwork Contractor will carry out the detailing of the steelwork and the design and detailing of connections using information provided by Billingham George & Partners.
- 4.0 Refer to Billingham George & Partners drawing No. 400 Series.
- 5.0 All design fabrication and erection to be in accordance with BS5950, Parts 1 and 2.
- 6.0 All steelwork to be BS EN 10025 S355JR U.N.O. – Corus Advance
All hollow sections to be Corus Celsius structural hollow sections.
- 7.0 All bolts to be zinc plated. Unless noted otherwise
A minimum of 2 No M16 bolts to be used at each connection.
- 8.0 PAINTWORK SPECIFICATIONS
(For galvanised items see item 610)

EXTERNAL EXPOSED STEELWORK (10-20 YEARS) AXALTA COATING SYSTEMS
SPECIFICATION ED-4

Environment: Rural, moderate Urban/Coastal Polluted (ISO 12944: **C2, C3, C4**)
 Cosmetic Finish: Required
 EPA Regulations: Fully Compliant

MAIN STEELWORK

Paint System: **Epoxy Zinc Phosphate / Acrylic Urethane Finish**
 Items: Exterior exposed steelwork
 Preparation(in Shop) Blast clean to BS 7079 Part A1, Preparation Grade Sa2½, maximum profile 75 microns
 Primer (in Shop): **ViterShield 178** high build epoxy zinc phosphate
 Dry Film Thickness: **220 microns** (nominal)
 Colour: to be specified by **Architect**
 Site Preparation: Repair shop coats and clean down as specified
 Site Finish: **ViterThane PLS** acrylic urethane mid sheen
 Dry Film Thickness: **60 microns** (nominal)
 Colour: (to be specified) by **Architect**
Total DFT **280 microns** (nominal)

Life to First Maintenance:

This system is considered suitable for a 10 to 20 year life to first maintenance in most urban, industrial and mild coastal environments. In more aggressive environments, such as constant heavy industrial pollution, aggressive marine exposure or steelwork above a river, Spencer Coatings Group should be consulted.

INTERIOR STEELWORK (10-20 YEARS) AXALTA COATING SYSTEMS SPECIFICATION IF-1

Special requirement: Significant exposure expected during construction phase

Environment: Building Interiors normally dry (ISO 12944: **C1**)
 Cosmetic Finish: not required
 EPA Regulations: Compliant

MAIN STEELWORK

Paint System: **Alkyd Zinc Phosphate**
 Item: Interior hot rolled steelwork
 Preparation (in Shop): Blast clean to BS 7079 Part A1, Preparation Grade Sa2½, maximum profile 75 microns
 Primer (in Shop): **ViterPrime 035** Alkyd zinc phosphate primer
 Dry Film Thickness: **75 microns** (nominal)
 Colour: to be specified by **Architect**
 Site Preparation: Repair shop coats and clean down as specified
Total DFT **75 microns (nominal)**

CAVITY STEELWORK

Site Application

Steelwork in clear separation (>40mm) from the outer leaf will require the additional application:

Site Preparation: Repair shop coats and clean down as specified
 Site Finish: **Sealex B130** bituminous
 Dry Film Thickness: **100 microns** (nominal)
 Colour: Black

Suitable for Projects such as:

Heated buildings with clean atmospheres, e.g. offices, shops, schools, hotels. (note: some of these areas, such as hospitals, may include localised aggressive areas such as laundries and kitchens, which may require a higher degree of anti-corrosive protection). If building programme is long or delays are likely, which would lead to a significant exposure of primer, particularly in coastal or aggressive environments, Spencer Coatings Specification ID-2 should be used.

Life to First Maintenance:

This system is considered suitable for a 20+ year life to first maintenance in internal, normally dry environments, and in most cases would be expected to last the lifetime of the building.

INTERIOR STEELWORK (10-20 YEARS) AXALTA COATING SYSTEMS SPECIFICATION IF-2

Special requirement: Significant exposure expected during construction phase

Environment: Building Interiors normally dry (ISO 12944: **C2**)
 Cosmetic Finish: not required
 EPA Regulations: Compliant

MAIN STEELWORK

Paint System: **Epoxy Zinc Phosphate**
 Item: Interior hot rolled steelwork
 Preparation (in Shop): Blast clean to BS 7079 Part A1, Preparation Grade Sa2½, maximum profile 75 microns
 Primer (in Shop): **ViterShield 178** High build epoxy zinc phosphate
 Dry Film Thickness: **125 microns** (nominal)
 Colour: to be specified by **Architect**
 Site Preparation: Repair shop coats and clean down as specified
Total DFT **125 microns (nominal)**

CAVITY STEELWORK

Site Application

Steelwork in clear separation (>40mm) from the outer leaf will require the additional application:

Site Preparation: Repair shop coats and clean down as specified
 Site Finish: **Sealex B130** bituminous
 Dry Film Thickness: **100 microns** (nominal)
 Colour: Black

Suitable for Projects such as:

Unheated buildings where condensation may occur, e.g. workshops, depots, sports halls (note: some of these areas, such as hospitals, may include localised aggressive areas such as laundries and kitchens, which may require a higher degree of anti-corrosive protection). If building programme is long or delays are likely, which would lead to a significant exposure of primer, particularly in coastal or aggressive environments, Spencer Coatings Specification ID-2 should be used.

Life to First Maintenance:

This system is considered suitable for a 20+ year life to first maintenance in internal, normally dry environments, and in most cases would be expected to last the lifetime of the building.

INTERIOR STEELWORK (20+ YEARS) AXALTA COATING SYSTEMS SPECIFICATION ID-2

Special requirement: Significant exposure expected during construction phase.

Environment:	Building Interiors normally dry (ISO 12944: C1, C2)
Cosmetic finish:	Gloss or semi gloss finish
EPA Regulations:	Compliant
Meeting the performance requirements of:	Ciria – Specification I-1, I-2, I-3, I-4 ('life of building') Corus Group – System Nos. B1, B2 and B3 ('55 years') BS 5493 – SF1, SF2, SF4, SF5, SD1, SD2, SE1 (Interior of buildings normally dry- up to 10-20 years) ISO 12944 – S1.28, S2.16, S3.17 (15+ years in C2)

MAIN STEELWORK:

Paint System :	Epoxy Zinc Phosphate / Acrylic Urethane Finish
Items :	Interior steelwork
Preparation (In Shop) :	Blast clean to BS 7079 Part A1, Preparation Grade Sa2 ½, maximum profile 75 microns
Primer (In Shop) :	ViterSheild 178 series epoxy zinc phosphate primer/finish
Dry Film Thickness:	75 microns (nominal)
Colour:	To be suitable undercoat for specified Finish colour
Preparation:	Repair shop coats and clean down as specified
Shop Finish:	ViterThane PLS acrylic urethane mid sheen
Dry Film Thickness:	60 microns (nominal)
Colour :	To be specified by Architect
<u>Total DFT</u> :	<u>135 microns</u> (nominal)

CAVITY STEELWORK

Site Application

Steelwork in clear separation (>40mm) from the outer leaf (C1/C2) will require the additional application:

Site Preparation:	Repair shop coats and clean down as specified
Site Finish:	Sealex B130 bituminous
Dry Film Thickness:	100 microns (nominal)
Colour:	Black

Suitable for Projects such as:

Offices, retail outlets, warehouses, distribution centres, schools, hotels, hospitals, airport terminals, exhibition halls (note: some of these areas such as hospitals, may include localised aggressive areas such as laundries and kitchens, which may require a higher degree of anti – corrosive protection). Recommended where building programme is long or delays are likely, leading to temporary exposure of primer, and a coloured gloss or semi – gloss finish is required.

Life to First Maintenance:

This system is considered suitable for a 20+ year life to first maintenance in internal, normally dry environments, and in most cases would be expected to last the lifetime of the building (refer to accompanying notes). For purely cosmetic reasons, the finish coat may be considered as requiring re-coating before this period, 10 to 15 years being typical.

G10 STRUCTURAL STEEL FRAMING

To be read with Preliminaries/General conditions.

GENERAL REQUIREMENTS/INFORMATION

110 DESIGN

The structural steelwork shown on the drawings and described in this specification has been designed to BS 5950 where applicable, unless stated otherwise.

Complete the design and detailing of connections to BS 5950 to satisfy loading requirements specified or otherwise calculable from the information given.

115 DESIGN CONSTRAINTS

Unless required or permitted otherwise, comply with the following when completing the design and detailing of the work:

Bolts to be not less than 16mm diameter.

Not less than two bolts to be used in any connection.

All floor beams longer than 12m to be pre cambered by 75% of the value of the dead load deflection or as noted on the drawings.

Rafters of portal frames to be preset by the value of the dead load deflection or as noted on the drawings. CHECK WITH ENGINEER IF NO INFORMATION IS PROVIDED ON THE DRAWING.

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: to Steel Industry Guidance notes SN10 11/2006

Other requirements: Refer to BCSA & Galvanizing Association, Publication No 40/05, 2005

120 DRAWINGS, ETC

Before preparing detailed fabrication drawings, submit:

Calculations for all major connections.

General arrangement drawings with individual steel members clearly identified.

125 SPECIFICATION

Comply with the latest edition of the National Structural steelwork Specification (hereinafter called the NSSS) unless specified otherwise in this section.

Ensure that a copy of the NSSS is available at all time during the course of the works at the fabrication shop and on site.

After 1st July 2014 the NSSS C.E. marking version will be applicable unless noted otherwise on the drawings use EXC2 the steelwork contractor must provide:

- i. Factory Production Control Certificate
- ii. Welding Certificate

iii. Declaration of Performance

130 ERECTION METHOD STATEMENT

To be submitted at least 7 days before starting erection of steelwork, including details of (with drawings if necessary):

Method and sequence of erection.

Type of craneage.

Temporary guys and bracing proposed for use during erection.

FABRICATION GENERALLY

150 GENERAL REQUIREMENTS

Inform CA when fabrication is due to start.

Do not fabricate steelwork for which the drawings have not been checked by CA.

Before fabricating, ensure that surface condition of steel which is to be coated complies with requirements specified for cleaning.

Ensure that fabrication processes do not cause changes in properties of materials resulting in noncompliance with specified requirements.

175 PROFILED SHEET FOR FLOOR SLABS

Made from steel sheet to BS EN 10143 and BS EN 10147 with minimum total coating mass, including both sides of 275g/m².

Manufacturer and reference Kingspan MD60-V3 profile.

190 MARKING

Submit details of proposed methods of identifying and recording materials and components to ensure correct use and location in the structure.

Marks to be placed in positions which can be checked after erection.

191 MARKING

Marking of weathering steel to be on surfaces which will not be exposed to view in the completed work.

192 MARKING

Marking of steel which is to be blast cleaned, pickled, metal sprayed or galvanized to be by an approved method which cannot be obliterated.

200 FAYING SURFACES FOR HSFG JOINTS

Check faying surfaces in steel 25mm thick or more for deformities such as bowing, twist or rippling which may reduce slip factor to below design limit.

Agree remedial measures with CA.

210 END CONNECTIONS

Ensure that angle cleats, if used, project beyond ends of simply supported members.

215 HOLLOW SECTIONS

Ensure that insides of sections are dry and clear of debris before sealing ends and openings.

220 BASE PLATES

In base plates of size 700mm x 700mm or larger, 50mm diameter holes should be provided close to the centre of the plate to allow trapped air to escape and also for inspection. A hole should be provided for each 0.5m² of base area. If it is intended to be place grout through these holes the diameter should be increased to 100mm.

225 EDGE PROTECTION

All perimeter floor beams are to be provided with bolt holes or other suitable means of securing a temporary proprietary edge protection system. The steelwork contractor shall provide details for approval 14 days before commencing fabrication and shall agree the proposed system with the main contractor.

230 SHOP ASSEMBLY

Check fit, profile and camber before making connections in lattice girders and trusses which are to be assembled before delivery to site.

WELDING

255 WELDING ON SITE

Notwithstanding NSSS clause 8.7, site welding is not permitted unless shown on drawings or otherwise approved.

When permitted, ensure suitable, safe conditions.

Do not weld when ambient temperature is below 0°C or surfaces are wet.

270 ADDITIONAL WELDS

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

280 STUD SHEAR CONNECTORS

Welders to be certified by the equipment manufacturer or other recognised authority as competent for the work.

Top surface of beam flange to be free from millscale, rust, grease, oil, paint, and other substances detrimental to welding.

Ensure that flange is cleaned prior to laying decking.

Do not weld studs when the ambient temperature is below 0°C.

Trial welding:

Before starting, demonstrate suitability of materials, equipment and welding system proposed for welding of studs.

Fix not less than ten studs for testing.

During the work, at the beginning of each shift, each welder is to fix not less than two studs for testing.

Testing trial welds:

Visually inspect each trial weld is to exhibit full 360° 'flash'.

Subject each trial stud to a 30° bend test; welds must show no sign of cracking.

Production welds:

To be visually free from cracks and lack of fusion and capable of developing at least the nominal ultimate strength of the studs.

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.

BOLT ASSEMBLIES

310 GALVANIZED FINISH TO BOLT ASSEMBLIES

To BS EN 1461:1999, applied by fastening manufacturer and passivated when no additional coatings are specified. Nuts to be tapped after galvanizing.

Use/location: to be used with all galvanized steel sections.

320 ZINC PLATED FINISH TO BOLT ASSEMBLIES

Applied by fastening manufacturer, passivated when no additional coatings are specified, nuts tapped after plating, and:

To BS 3382 for threaded components up to 18mm diameter.

To BS 1706, Class A, for other components.

Use/location: all remaining bolted connections.

330 EXPANDING BOLTS AND NUTS

Manufacturer and reference: Lindapter Hollo bolts.

335 SPRING WASHERS

To BS 4464.

360 SEALED HOLLOW SECTIONS

Seal bolt holes to prevent access of moisture.

If method of sealing is not specified, submit proposals for approval.

ERECTION

410 BEFORE COMMENCING ERECTION

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 CA without delay.

The steelwork contractor shall prepare a method statement for the erection of the steelwork taking into account the advice in the following publications;

BS5531 Code of practice for safety in erecting structural frames,
BCSA publications;
Code of practice for metal decking and stud welding,
Erectors manual,
Guidance notes on the safer erection of steel framed buildings,
Health and safety guides for sites,
Safe site handover certificate,
Steel erection in windy conditions,
Task specific method statement,
SCI P-090 good practice in composite floor construction
SCI P-300 Composite slabs and beams using metal decking.
Obtain permission of CA to commence erection

420 SETTING OUT

In addition to the requirements of the NSSS, set out and erect parts of the steelwork to ensure compliance with the following permissible deviations:

Type of dimension and location: PD

423 FIXING PROFILED SHEET FOR FLOOR SLABS

To BS5950:Part 4, clauses 28 and 29 using through deck stud welding to the steel beams.

425 MODIFICATIONS

Inform CA of any defects due to detailing or fabrication errors.

Obtain approval of methods of rectification before starting modification or remedial work.

430 BOLT BOXES

Manufacturer and reference: Fabricator to provide holding down bolts for installation by main contractor. Bolt boxes to be 75 diameter.

440 COLUMN BASES

Raise or lower to correct level using sawn steel packs or folding wedges not larger than necessary for the purpose.

Position packs symmetrically around perimeter of base plate; do not use a single central pack.

Notify CA when the space beneath any column base is less than 15 mm or more than 75 mm.

Check accuracy of erection and correct all errors before grouting/casting in bases and carrying out any other adjacent work.

441 COLUMN BASES

Completely fill bolt pockets and the space beneath the base plate with Nufins Nugrout Superflow strictly in accordance with the manufacturer's recommendations. Ensure that bolt boxes and the space beneath the base plates is kept clear of debris and water before grouting.

All steelwork below finished floor level is to be encased of a minimum of 50mm designated concrete RC28/35, use D 49 wrapping fabric secured to steelwork to act as a key for the concrete.

445 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.

INSPECTION/TESTING OF STEELWORK

460 INSPECTION

Permit the CA, and/or an independent inspection authority appointed by him, to inspect the work at all reasonable times and at all places where it is being carried out.

Provide all facilities, hand tools, lighting, etc. as necessary to ensure adequate inspection.

465 TESTING

Arrange for the following testing to be carried out.

Prepare any necessary test pieces.

Submit 2 copies of all test and examination results to CA immediately they are available.

A provisional sum for other tests is included elsewhere.

Test: Submit details.

Frequency /Number: In accordance with fabricators QA procedures.

Level of Acceptability: Submit details.

Test: Submit details.

Frequency/Number: In accordance with fabricators QA procedures.

Level of acceptability: In accordance with fabricators QA procedures.

470 TESTING AUTHORITY

All tests to be carried out in house, if the fabricator is accredited for the relevant testing.

475 PRODUCTS

When requested by CA submit a copy of test certificates for steel.

480 DEFECTIVE WORK

As soon as possible after any part of the work or any materials are known or suspected to be defective, submit proposals to CA for further testing, inspection or replacement and obtain instructions.

GENERAL REQUIREMENTS FOR PROTECTIVE COATING WORK

510 SURFACES NOT REQUIRING COATING

The top surface of the top flange of all composite beams.

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 CA 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 CA of selected manufacturer at an early date.

Spencer Coatings specified on drawing, consideration will be given to equal approved.

522 COMPATIBILITY OF PRIMER WITH INTUMESCENT COATINGS

Internal exposed steelwork specified by the architect is to be overcoated with intumescent fire protection applied by others.

The proprietary brand of primer selected must be compatible with the selected proprietary brand of intumescent (see section M61), both generally and under fire conditions.

Obtain relevant recommendations and evidence from the intumescent manufacturer, including fire test data to BS 476:Part 8, 20 or 21, and submit a copy to CA before proceeding with priming.

525 PREPARATION MATERIALS AND ANCILLARIES

Types recommended by their manufacturers and the protective coating manufacturer for the surfaces being prepared.

530 GALVANIZING

All cutting, welding and drilling must be completed beforehand.

Provide all necessary vent and drain holes in approved locations and seal to approval after galvanizing.

535 INSPECTION

Permit coating manufacturers to inspect the work in progress and take samples of their products if required.

Do not comply with any directions or requests given by the coating manufacturer's representative unless and until confirmed by CA.

Notify CA of projected dates for start of surface preparation and coating.

Give CA at least 7 days notice before coated members or components leave the works.

540 HANDLING AND STORING 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 PROTECTION

Adequately protect freshly applied surface coatings from damage.

Exhibit 'Wet paint' signs and provide protective barriers where necessary.

Adequately protect surfaces adjacent to those being covered.

550 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 inclement 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 SYSTEM(S)**620 GALVANIZING**

Use/location: All steelwork within the pool environment, as noted on the steelwork drawings.

Preparation: Blast cleaning to BS 7079:Part A1, preparation grade Sa2 (for roughness) using chilled iron grit grade G24, followed by acid pickling.

Galvanizing: To BS EN 1461:2009, minimum average coating thickness 140 microns.

640 SHOP PRIMING OF STEELWORK

Use/location: All steelwork surfaces not identified in clauses 510 & 610/620.

Paint manufacturer: ViterPrime 035 specified but consideration will be given for equal approved.

Shop preparation: Blast clean as clause 720 to BS7079: Part A1, preparation grade SA 2½

Shop primer: Zinc Phosphate

Dry film thickness: 75 microns

Shop intermediate coat: N/A

Dry film thickness: N/A

Shop top coat: N/A

Dry film thickness: N/A

Colour: Submit proposed colour for agreement

Special requirements: N/A

PREPARATION FOR PAINTING

710 OFF-SITE PREPARATION AND PAINTING

To be carried out under cover in properly lit, heated and ventilated conditions.

Select sequence of working from one of the following and inform CA before starting work:

Fabricate – blast clean – prime as specified

Blast clean – fabricate – prime as specified (Immediately before priming remove flash rust with a light overall sweep blast), or

Blast clean – prime with a weldable prefabrication primer recommended by the manufacturer of the specified primer – fabricate – prime as specified (Thickness of post-fabrication priming coat may be reduced if and as recommended by manufacturer).

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.

720 BLAST CLEANING FOR PAINTING

Ensure that steel complies with BS 7079:Part A1 at time of blasting as follows:

Dry blasting: Initial rust grade A or B.

Wet blasting: Initial rust grade A, B or C.

Thoroughly degrease.

Remove millscale by chipping, grinding and/or heat treatment.

Blast clean to the specified BS 7079: Part A1 preparation grade, and control quality of preparation in accordance with BS 5493, Appendix F.

Use abrasive of suitable type and size, free from contamination by fines, water and oil.

Remove abrasive residues.

Remove all surface defects likely to be detrimental to the protective painting system, including:

Defects in the steel, including cracks, surface laminations, shelling and deep pitting as required by BS 4360.

Defects resulting from fabrication, including fins at cuts, burrs, sharp edges and weld spatter.

Apply primer as soon as practicable and while the surface is still in a condition acceptable to the primer manufacturer.

725 MANUAL CLEANING OF NEW STEELWORK

Chip, scrape, disc sand and grind surfaces to remove all fins, burrs, sharp edges, weld spatter, loose rust and loose scale to leave a clean but unpolished surface to BS 7079: Part A1, grade St2.

Thoroughly degrease and clean down.

If using water based cleaners, remove subsequent rusting back to grade St2.

Apply primer without delay.

730 PREPARATION FOR SITE WELDING OF SHOP PAINTED STEELWORK

Blast clean and mask weld areas before coating surrounding areas.

If more than one coat is applied to surrounding areas, step each 30 mm back from edge of preceding coat.

Remove masking immediately before welding.

Alternatively prepare and shop paint weld areas as specified, then grind off to bare steel immediately before welding.

735 TREATMENT OF SITE WELDED JOINTS IN PAINTED STEELWORK

After welding, and without delay, remove all scale and weld spatter from the weld areas by grinding or chipping, abrade to remove all traces of rust, wash with clean water and allow to dry.

Prime without delay and apply further coatings to the weld areas to match the surrounding painted areas.

740 BOLTED JOINTS (NONFRICTION GRIP)

Where steelwork is to be shop painted, ensure that the full shop specification is applied to joint faces.

Where steelwork is to be erected with a mill finish then site painted, prepare and prime joint faces before erection and allow to dry.

Immediately before assembling bolted joints in externally exposed steelwork, apply a further coat of primer and bring the surfaces together while still wet.

Before applying site coatings to externally exposed steelwork, seal all crevices to bolts and joint perimeters with a compatible mastic.

745 FAYING SURFACES OF FRICTION GRIP JOINTS

Blast clean and mask before coating surrounding areas.

The masking must adequately protect the faying surface from deterioration and contamination.

If more than one coat is applied to surrounding areas, step each 30 mm back from edge of preceding coat.

Remove masking immediately before bolting, check faying surfaces are free from adhesive and clean with solvent if necessary.

750 FRICTION GRIP JOINTS IN SHOP PAINTED STEELWORK

After final tightening of bolts, and without delay, thoroughly degrease and clean bare steel at joint edges and prime as specified.

Seal all crevices to bolts and joint perimeters with a compatible mastic.

Apply further coatings to surrounding areas to match adjacent shop painted areas before applying specified site coatings.

755 UNCOATED FASTENINGS

After erection, thoroughly degrease and clean and, without delay, apply coating(s) to match surrounding shop painted areas before applying specified site coating(s).

760 GALVANIZED FASTENINGS

After erection, thoroughly degrease and clean and apply a suitable etch primer before applying specified site coating(s).

765 SITE PREPARATION OF SHOP PAINTED STEELWORK

Carry out all necessary remedial work as specified.

Prepare all surfaces by abrading and/or washing down as recommended by manufacturer before applying coats.

770 SITE PREPARATION OF GALVANIZED SURFACES FOR PAINTING

Thoroughly degrease.

If metal coating is defective obtain instructions before proceeding.

Remove any white corrosion products with a stiff brush, wash off and allow to dry before applying specified etching wash or primer.

PAINTING

810 SUITABILITY OF 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 APPLYING COATINGS

Adjacent 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.

820 FILM THICKNESS

Check the thickness of each coat during application using a wet film thickness wheel or comb in accordance with BS 3900:Part C5.

After each coat has dried measure the total accumulated dry film thickness using a magnetic or electromagnetic meter, checked against standard shims and recalibrated regularly against a smooth steel reference plate, the number and position of measurements to be as directed by CA.

Carry out all measurements in the presence of the CA unless otherwise directed.

Over any square metre of coating the average accumulated dry film thickness must equal or exceed the specified thickness, with no reading less than 75% of the specified thickness.

If at any stage the accumulated dry film thickness is deficient, the CA may require application of additional coats(s) at no extra cost.

The dry film thickness of the top coat must be sufficient to give an even, solid, opaque appearance to approval.

825 STRIPE COATS

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

830 COLOUR OF TOP COAT

To be selected by CA (unless already specified).

Colour of preceding coat to be as recommended by the paint manufacturer to suit the top coat colour.

850 JUNCTIONS WITH CONCRETE

Where exposed steelwork is partially embedded or encased in concrete, apply two coats of an approved bituminous coating locally to the steel/concrete junction as instructed by CA.

G12 ISOLATED STRUCTURAL METAL MEMBERS

To be read with Preliminaries/General conditions.

110 FABRICATION OF MEMBERS

Steel sections:

To BS 4 or BS 4848 as appropriate, made from steel to BS EN 10025, grade S355 JR.

Do not use sections which are heavily pitted or rusted.

Make cuts and holes neatly and accurately. Remove burrs, sharp edges and dross caused by flame cutting.

Welding:

Metal arc method to BS 5135 to form fully fused joints with mechanical properties not less than those of the parent metal.

Do not weld on site.

150 SHOP PRIMING FOR LOOSE ISOLATED MEMBERS

Cleaning:

Chip, scrape, disc sand and grind surfaces to remove all fins, burrs, sharp edges, weld spatter, loose rust and loose scale.

Clean out all crevices.

Thoroughly degrease using emulsion cleaners followed by thorough rinsing with water. Apply primer when surface is dry and on the same day as cleaning.

Primer:

One full coat of zinc phosphate modified alkyd brush applied to all surfaces, free from runs and sags.

310 INSTALLATION

Position members accurately, using steel packs of adequate area as necessary to achieve a true line and level.

Fix securely using washers under bolt heads and nuts.

Use suitably tapered, correctly aligned washers under bolt heads and nuts which bear on sloping surfaces.

Bolts to be not less than 16mm diameter and be grade 8.8.



BGP

Wellington House, Wellington Court,
Stockton-on-Tees
TS18 3TA

Specification for

PILING

D30 PILING

To be read with Preliminaries/ General conditions.

GENERAL REQUIREMENTS

110 PILING SPECIFICATION

Standard: Comply with the current edition of the 'Specification for piling and embedded retaining walls' (SPERW).

Relevant sections: Part A (inc Appendix 1 – 4), B1, B3, B4, B10, B13, B15, B16 & B19.

Correction of SPERW: In the penultimate line of table 1.2 substitute 4.10 for 4.8.

References to the Engineer in the SPERW: For the purpose of this contract, interpret such references as being to the person named in section A10 as administering the contract on behalf of the Employer.

120 INFORMATION TO BE PROVIDED WITH TENDER

Submit: Confirmation of pile type, piling rigs and anticipated diameters.

Information listed in SPERW, table 1.1.

126 DESIGN

Requirement: Construct piles in accordance with SPERW, clause 1.4 option 2.

The design: Confirm acceptance as appropriate for the particular ground conditions or submit alternative design proposals, accepting full responsibility for them.

130 METHOD STATEMENT

Requirement: Submit proposed method of installation to achieve the design parameters including:

Details of equipment.

Program showing sequence and resources.

Confirmation that load settlement behaviour of piles will better than required in clause 140.

135 PERFORMANCE CRITERIA FOR STRUCTURE TO BE SUPPORTED ON THE PILES

To support the pile vertical and horizontal shear loads as specified on BGP piling drawing.

140 PERFORMANCE CRITERIA FOR PILES UNDER TEST

Permitted types: B3 & B4.

Pile reference: All piles.

Specified working load (SWL): 1000kN (maximum working load).

Pile designation: Refer to Piling Schedule

Design verification load (DVL): 1000kN

Load factor: 2.5

Permitted settlement at DVL: 10mm

Permitted settlement at DVL + $\frac{1}{2}$ SWL: 15mm

Minimum pile length from cut-off to toe: circa 30 – 35m.

Minimum pile diameter or dimensions of cross-section: 500mm pile diameter – TBC by pile designer.

145 PERFORMANCE OF WORKING PILES

Substandard performance: Give notice if the performance of any pile will be less than that of a similar pile whose test behaviour has been accepted.

150 SPECIFIED WORKING LOADS FOR PILES

1000kN maximum.

155 DAMAGE TO ADJACENT STRUCTURES/ SERVICES

Permissible damage criteria: None permitted.

160 GROUND INVESTIGATION

See Solmek's Phase 2 Site Investigation ref. S220502

162 ADDITIONAL GROUND INVESTIGATION

Information required: None required.

165 SETTING OUT

Site datum: Site is referenced to Ordnance Datum – refer topographical survey. Site grid:

All piles have been individually coordinated on the BGP pile drawing.

167 COMMENCING SURFACE

Level: 15.93 AOD (TBC by Contractor on site)

171 CONCRETE GENERALLY

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

175 REINFORCEMENT GENERALLY

Steel reinforcement: To BS 4449.

Cutting and bending: To BS 8666.

Suppliers: Firms holding a valid certificate of approval issued under a product certification scheme operated by a third party certification body with appropriate Category 2 accreditation from the United Kingdom Accreditation Service (UKAS).

BORED CAST-IN-PLACE PILES**305 DESIGNATED CONCRETE**

Designated concrete: To suit AC-4 ground conditions.

Aggregates:

Size (maximum): 20mm.

Recycled coarse aggregates: Not permitted.

Other requirements: To suit piling contractor's design.

Other requirements for cement and combinations: Recommend cement replacement with either GGBS or PFA.

Consistence class: To suit piling contractor's design.

Chloride class: Contractor to confirm.

Other requirements for admixtures: Piling contractor's choice.

318 METHOD OF TESTING CONCRETE WORKABILITY

Test: To BS 8500-1, Annex B.

Workability: To SPERW table 3.1.

Test method:

Slump testing for mixes with workability type A as SPERW table 3.1.

Flow testing for higher workability mixes unless agreed otherwise.

320 PLACING CONCRETE IN DRY BORINGS

Requirements additional to SPERW clause 3.8.4:

Height of lower end of delivery tube above bottom of reinforcement cage (max): 10 m.

Free fall of concrete (maximum): 10 m.

325 PLAIN BAR REINFORCEMENT

Standard: To BS 4449, grade 250.

326 RIBBED BAR REINFORCEMENT

Standard: To BS 4449, grade 460B.

330 COVER TO REINFORCEMENT

Cover (nominal): 50mm minimum.

Method of ensuring correct cover: Submit details.

340 SUPPORT FLUID

Use: subject to review should excavation sides not be self-supporting.

355 PILE DIMENSIONS

Pile diameter (minimum): contractor's design – 500mm..

385 INSPECTION

Manned descent: Not required.

390 EXCAVATED MATERIAL

Disposal: Agree with main contractor for its disposal offsite to contractor's tip.

392 TESTING EXCAVATED MATERIAL

Contamination tests: Undertake at following rates:

Made up ground: In accordance with Solmek Remediation Strategy report S220/REM

Other soil types: In accordance with Solmek Remediation Strategy report S220/REM

BORED PILES CONSTRUCTED USING CONTINUOUS FLIGHT AUGERS AND CONCRETE OR GROUT INJECTION THROUGH HOLLOW AUGER STEMS

405 DESIGNATED CONCRETE

Designated concrete: To suit AC-4 ground conditions.

Aggregates:

Size (maximum): 20mm.

Recycled coarse aggregates: Not permitted.

Other requirements: To suit piling contractor's design

Other requirements for cement and combinations: Recommend cement replacement with GGBS or PFA.

Consistence class: To suit piling contractor's design.

Chloride class: Piling contractor to confirm.

Other requirements for admixtures: Piling contractors choice.

420 METHOD OF TESTING CONCRETE WORKABILITY

Test: To BS 8500-1, Annex B.

Workability: To SPERW clause 4.8.1.

Test method: Flow.

425 PLAIN BAR REINFORCEMENT

Standard: To BS 4449, grade 250.

426 RIBBED BAR REINFORCEMENT

Standard: To BS 4449, grade 460B.

430 COVER TO REINFORCEMENT

Cover (nominal): 50mm minimum.

Method of ensuring correct cover: Submit details.

455 PILE DIMENSIONS

Pile diameter (minimum): to contractor's design – 450/600mm.

490 EXCAVATED MATERIAL

Disposal: agree with main contractor for its disposal offsite to contractors.

492 TESTING EXCAVATED MATERIAL

Contamination tests: Undertake at following rates:

Made up ground: In accordance with Solmek Remediation Strategy report S220/REM

Other soil types: In accordance with Solmek Remediation Strategy report S220/REM

495 ADDITIONAL MONITORING REQUIREMENTS

Requirements additional to SPERW, clause 4.10:

Monitor the following and record with pile records: No requirement.

496 INSTRUMENT FAILURE

Manual monitoring: Use a stop watch.

INTEGRITY TESTING OF PILES

810 GENERAL

Method: Sonic / ultra-sonic .

Satisfactory evidence in support of proposals: Submit.

Period between casting and testing (minimum): 7 days minimum.

Piles to be tested: 100% of piles.

Number: All.

Type: CFA / augered.

Locations: All load-bearing piles.

Program: to suit main contractor's program.

830 PERIODS FOR SUBMISSION OF TEST RESULTS

Initial test results: Submit after each test within 3 working days.

Full report: Submit after completion of each phase of testing within 14 days.

845 PREPARATION OF PILE HEADS FOR TESTING

Preparation: To suit test method.

Inconsistencies which could inhibit execution or interpretation of test: Submit report.

DYNAMIC TESTING OF PILES (Not Applicable)

STATIC LOAD TESTING OF PILES

915 PROOF TESTING WORKING PILES

Pile diameter: To suit contractor's design

Number of tests: Two working piles to be tested.

Procedure: submit details for review by design team.

Test load (maximum): $SWL + 50\% DWL = 1500kN$ (150 Tonnes)

925 CONSTRUCTION REQUIREMENTS FOR TEST PILES

Two piles with locations to suit main contractors construction program.

930 PILE TESTING EQUIPMENT AND ARRANGEMENT

Tension piles installed by piling contractor or kentledge – piling contractor's choice.

935 PILE INSTALLATION CRITERIA

Working piles not to be used for reaction piles working in tension.

940 TIMING OF PILE TESTING

Period between installation and load testing (minimum): 14 days.

945 REMOVAL OF TEMPORARY WORKS

Piling contractor to remove temporary works on completion of piling works.

950 LATERAL LOAD

Special requirements for application of a lateral load to a pile, detailed in accordance with expected conditions of loading: lateral load testing not required.

955 WORK TO PILE HEADS AFTER TESTING

Cut down to required finished level avoiding damage to pile head.

INSTRUMENTATION FOR PILES (Not required)



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