GENERAL SPECIFICATION FOR CIVIL ENGINEERING WORKS

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AMENDMENT NO. 1/2010 (February)

VOLUME 1

SECTION 8 PILING WORKS

(a) Clause 8.13 **Amend the title from "Barrette" to "Barrette and Diaphragm Walls"**

(b) Clause 8.13 **Re-number Clause 8.13 as Clause 8.13(1)**

(c) New Clause 8.13(2) **Add the following new Clause 8.13(2):**

A diaphragm wall is a continuous wall consisting of a series of abutting reinforced concrete panels constructed in a trench temporarily supported by a thixotropic suspension of bentonite or other agent. It may be used as a temporary wall for supporting deep excavation, or used as the permanent wall for a basement structure, and may be used as a foundation system for supporting vertical loads.

(d) Clause 8.14(1) **Replace Clause 8.14(1) with following:**

A large-diameter bored pile is a bored pile, the diameter of which is larger than 750 mm and determined by the Contract Drawings and/or proposed by the Contractor to the Engineer's approval.

(e) New Clause 8.40(3) **Add the following new Clause 8.40(3):**

For a load-bearing diaphragm wall, predrill holes shall be sunk at 4 m centres along the diaphragm wall to establish founding level or one predrill hole per panel, whichever spacing is larger, but not greater than 10 m in any circumstance. For non-load bearing diaphragm wall, at least one predrill hole shall be sunk per 10m in spacing.

(f) New Clause 8.56(4) **Add the following new Clause 8.56(4):**

Diaphragm wall panels and barrettes shall not be excavated within a distance of 6m or equivalent to 3 times the smallest dimension of the panel or pile section (max. 8.4 m), from other deep foundation works which have been cast within 12 hrs and/or which contain workable or partially set concrete, unless they are separated by other deep concrete foundations completed for over 14 days or when their concrete has achieved 70% of the design strength, whichever is earlier.

(g) Clause 8.62 **Replace Clause 8.62 with the following:**

Bentonite slurry that will not be reused shall be disposed of from the Site directly or mixed with sufficient decomposed rock or similar material before disposal to approved Public Fills as soon as practicable, in accordance with the requirements under the Construction Waste Disposal Charging Scheme and other relevant documents issued by the Civil Engineering and Development Department or Environmental Protection Department.

(h) Clause 8.86(1) **Replace Clause 8.86(1) with the following:**

The frequency of coring shall be 10% for barrettes and 5% for diaphragm wall panels, with minimum of 2 numbers or as instructed by the Engineer. The positions from which the cores are taken shall be as instructed by the Engineer.

(i) Clause 8.94(1) **Replace the first sentence of Clause 8.94(1) with following:**

Before concreting, the Contractor shall install 4 nos. (which may be reduced to 3 nos. if the pile shaft is too congested to accommodate 4 nos.) watertight steel tubes of thickness not less than 2.5 mm and internal diameter not less than 42 mm and without internal projections over the full depth of each of the bored cast-in-situ piles.

(j) New Clause 8.94(10) **Add the following new Clause 8.94(10):**

3 sonic pipes are required if each diaphragm wall or barrette of dimension is less than 3 m long and a minimum of 6 sonic pipes is required if each diaphragm wall or barrette of dimension of more than or around 5.6 m. Sonic logging test shall be carried out for all barrettes and loading panels of diaphragm wall. The frequency of testing shall be minimum 10% for non-loading panels.

(k) Clause 8.96(1) **Replace Clause 8.96(1) with following:**

Each sample of bentonite slurry shall be tested to determine the properties as stated in Tables 8.2A, 8.2B, 8.2C and 8.2D.

(l) Clause 8.98 **Replace Clause 8.98 with the following:**

If the results of tests for density, viscosity, filter cake, sand content or fluid loss do not comply with the specified requirements, or if the results of tests for shear strength or pH value do not indicate a consistent working pattern, the bentonite slurry shall be deemed unsuitable for the work and concrete shall not be placed in the slurry. The slurry shall be replaced or its composition adjusted before concrete is placed.

(m) Appendix 8.6 **Add the term "Filter Cake (mm)" in the Table**

(n) Table 8.2 **Replace Table 8.2 with following 4 tables :**

Table 8.2(A) Fresh Bentonite

Property	Test Results	Method of Testing
Density	＞1.015 g/mL	Mud density balance
Fluid loss	≤25 mL	Refer to API Recommended Practice: RP13B-1
Viscosity	≤35 s	Marsh cone method
pH value	8.5-10.5	pH indicator paper strips or electrical pH meter
Filter cake	≤1 mm	Refer to API Recommended Practice: RP13B-1

Table 8.2(B) Bentonite during excavation

Property	Test Results	Method of Testing
Density	1.08-1.15 g/mL	Mud density balance
Fluid loss	＜45 mL	Refer to API Recommended Practice: RP13B-1
pH value	8-11	pH indicator paper strips or electrical pH meter
Filter cake	≤5 mm	Refer to API Recommended Practice: RP13B-1

Table 8.2(C)Bentonite prior to concreting

Property	Test Results	Method of Testing
Density	≤1.15 g/mL	Mud density balance
Fluid loss	≤40 mL	Refer to API Recommended Practice: RP13B-1
Viscosity	≤40 s	Marsh cone method
pH value	8-11	pH indicator paper strips or electrical pH meter
Filter cake	≤5 mm	Refer to API Recommended Practice: RP13B-1
Sand content	≤3%	Refer to API Recommended Practice: RP13B-1

Table 8.2(D) Bentonite prior to re-use

Property	Test Results	Method of Testing
Density	≤1.3 g/mL	Mud density balance
Fluid loss	≤50 mL	Refer to API Recommended Practice: RP13B-1
Viscosity	≤50 s	Marsh cone method
pH value	7.5-11.5	pH indicator paper strips or electrical pH meter
Filter cake	≤ 5 mm	Refer to API Recommended Practice: RP13B-1

(Note1: API = The American Petroleum Institute)

VOLUME 2

SECTION 17 PRESTRESSING

(o) New Clause 17.06(4)

Add the following new Clause 17.06(4):

Grease for unbonded strand shall contain a corrosion inhibitor.

(p) Clause 17.08(4)

Amend the title to "Sheath and Deviator Pipes" and **add the following new Clauses:**

(3) For the sheath made of steel, the sheath shall be hot-dip galvanized to BS EN ISO 1461 for corrosion protection purpose.

(4) For the sheath made of material other than steel, the sheath shall be non-metallic type.

(5) Sheaths for external prestressing shall be continuous between anchorages and shall be airtight and watertight under the working conditions.

(6) Results of tests on duct friction during tendon stressing shall be supplied to the Engineer. It shall be demonstrated that at least 2 mm thickness of sheath will remain on completion of the stressing operation.

(7) If the deviator pipes for external prestressing sheaths is made of steel, the deviator pipes shall be hot-dip galvanized to BS EN ISO 1461. Additional protection in the form of Paint System "E" to Clause 18.63 shall be applied to all surfaces of the deviator pipes.

(q) Clause 17.09 **Add the following sentence after Clause 17.09**:

All vents and vent connections shall have an internal diameter no less than 25 mm and shall be clearly identified by labeling.

(r) Clause 17.10 **Add the following new Clauses:**

(7) Where admixture is permitted by the Engineer, grout shall be non-shrink mix and comply with the following requirements:

(a) The free expansion of the grout shall be within a range from 0% to +5%.

(b) Admixtures shall not contain chlorides, thiocyanides, nitrates, formats, sulphates or other ingredients which may cause the grout to promote corrosion of the prestressing steel by rusting, pitting or stress corrosion.

(c) The admixtures shall not segregate and shall be uniform in colour.

(d) Admixtures shall comply with BS EN 934 Part 2 or Part 4 but full account shall be taken of their effects on the finished product.

(e) The dosage shall be within the range recommended by the supplier and shall not exceed 5% of the weight of the cement.

(s) Clause 17.11(1)(f) **Replace Clause 17.11(1)(f) with following:**

Details of corrosion protection required for the prestressing system, including type of grease for unbonded strand and the type of corrosion inhibitor to be adopted, and

(t) Clause 17.15(2) **Replace Clause 17.15 (2) with following:**

The trial mixes shall be completed at least 35 days before the grout mix is used in the permanent works.

(u) Clause 17.19(2) **Replace Clause 17.19 (2) with following:**

Grouting trials shall be completed at least 21 days before installation of the prestressing components in the permanent works.

(v) New Clause 17.19(7) **Add the following new Clause 17.19(7):**

The grouting trial shall incorporate all relevant parts and components as if these will be used in the actual prestressing system.

(w) Clause 17.20 **Add the following sentences after Clause 17.20:**

Each of the three cut sections shall be 300 mm long in length. The external sheath from the cut sections shall be removed for inspection.

(x) Clause 17.36 **Add the following sentence after Clause 17.36:**

Use of joints shall be kept to a minimum where practicable. Joints shall be formed using sleeve connectors and adequately sealed against ingress of any material.

(y) Clause 17.37(1)(a) **Replace Clause 17.37(1)(a) with following:**

All crests of the prestressing tendon profile and 400 mm on each side of each crest,

(z) Clause 17.38(6) **Add the following sentence after Clause 17.38(6):**

The calibration certificate shall be obtained from an approved testing laboratory once every 6 months.

(aa) Clause 17.38 **Add the following new Clauses:**

(8) The capacity of pressure gauges, when used together with the load cell as a load indicator, shall be sufficient in capacity such that the working pressure lies within the central half of the range of the gauge.

(9) The time for transfer will be determined by the successful testing of a batch of minimum 3 test cubes. If the initial batch of any individual cube tested indicate that the concrete has not attained the required strength, a further batch of cubes shall be tested at a later date. This process shall be repeated until a batch of cubes successfully passes the strength test.

(bb) Clause 17.39 **Add the following new Clauses:**

(5) The tendons shall be covered with sleeves of PVC or other approved material where these materials are specified as debonded from the concrete. Tape ends of the sleeves to the tendon shall prevent the ingress of grout.

(6) When the temperature of the pretensioning steel is below 10^{o}C at the time of tensioning, steel elongation computations shall allow for the increase in temperature of the steel between the time of tensioning and the time when the concrete takes its initial set.

(7) The tendons shall be trimmed to flush with the face of the concrete and apply the specified protection to their ends.

(8) The precast prestressed members shall be indelibly marked to show the specific information related to its manufacturer.

(cc) New Clause 17.44(5) **Add the following new Clause 17.44(5):**

Grout pumps shall be fitted with a safety valve to prevent pressure from rising above 2 MPa at any point within the grouting system including the sheaths.

SECTION 20 BRIDGEWORKS

(dd) Clause 20.24(1)(b) **Replace Clause 20.24 (1)(b) with following:**

Design calculations, including (i) calculations of bearing stresses above and below the bearings, (ii) calculations for bursting or other necessary additional or revised reinforcement, and (iii) calculations to show that the bearings comply with the requirements of BS5400: Part 9,

Quality Management & Standards Unit
Civil Engineering and Development Department
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