LECM
澳門土木工程實驗室
LABORATÓRIO DE ENGENHARIA CIVIL DE MACAU
Civil Engineering Laboratory of Macau
澳門氹仔偉龍馬路185號 Av. Wai Long nº185, Taipa, MACAU
電話 tel: (853) 8294 4488 傳真 fax: (853) 8294 4848

Approval & Reception Procedure

DG – Geotechnical Department		
Bored Piles	Document no.	**ARP/DG/18**
	Date:	**2010/07/01**
	Page no.	**1 of 4**

1. Reference standard

Regulamento de Fundações, Guia de Dimensionamento de Fundações, Norma de Betões, REBAP, EN 1536:1999, ARP/DEE/001, ARP/DG/11, ARP/DG/13, ARP/DG/14, Code of Practice for Foundations – Buildings Dept. of the Government of the Hong Kong SAR, Geo Publication No. 1/2006: Foundation Design and Construction, Civil Engineering and Development Dept. of the Government of the Hong Kong SAR.

This ARP/DG/18 is based primarily on the European Standard EN 1536:1999. This standard should be followed in what concerns the design and construction of bored piles..

2. Information to be submitted

- Drilled shaft characteristics (type and dimensions);
- Site investigation results;
- Record of descriptions of the soil and rock identified versus depth in shaft excavations;
- Shaft excavation records (location, contractor, equipment, vertical alignment ,level and depth);
- If slurry is used, record of sampling and testing results;
- Design load of foundation;
- Design founding level.

3. Reception procedure

3.1 General

When the equipment arrives on site, to verify that the equipment brought on-site matches the equipment listed in the approved drilled shaft installation plan. During the shaft excavation process, verifying the shaft is located in the proper place, checking the vertical alignment, verifying the shaft meets the cleanliness requirements upon completion of excavation, verify that the cages are fabricated, lifted and positioned properly and are within the allowable tolerances for “top of cage elevation” after positioning. To perform Cross-hole Sonic Logging Test, access tubes, which permit lowering of instrumentation down into the shaft, must be installed on the cage prior to placing the cage in the hole; details should follow Approval & Reception Procedure ARP/DG/11 “Cross-hole Sonic Logging Test”.

澳門氹仔偉龍馬路185號 Av. Wai Long nº185, Taipa, MACAU
電話 tel: (853) 8294 4488 傳真 fax: (853) 8294 4848

Approval & Reception Procedure

DG – Geotechnical Department		
Bored Piles	Document no.	**ARP/DG/18**
	Date:	**2010/07/01**
	Page no.	**2 of 4**

Concreting of the shaft should follow reverent specification and Approval & Reception Procedures. Design assumptions and soil/rock parameters shall be verified during construction. The designer shall nominate what supervision, including verification of soil/rock parameters, will be undertaken during the construction period.

Approval & Reception Procedure

DG – Geotechnical Department		
Bored Piles	Document no.	**ARP/DG/18**
	Date:	**2010/07/01**
	Page no.	**3 of 4**

3.2 Field Tests

To verify the quality of construction, the following field tests shall be performed:

Slurry testing ----------Viscosity test, Mud balance test, pH test and Sand content test should be tested for each 1000m^2 or part thereof.

Ultrasonic test ---------- checking the verticality and dimension of the shaft for each of the drill shafts.

Cross-hole Sonic Logging Test --- details should follow Approval & Reception Procedure ARP/DG/11 “Cross-hole Sonic Logging Test”.

Verification of depth and cleaning--- uses a weight tape and takes “soundings” at numerous locations (normally 5) around and in the centre of the shaft.

Interface core drilling ----------to ascertain the soundness of the interface, core drilling should be carried out at the concrete/rock interface for each of the drill shafts, the core drilling should cover at least 1 m above and below the interface.

Mechanical core test ----------10% of constructed piles shall be tested, the core-drilling should be taken through the full depth of the pile and carried down to a distance of at least half a diameter of the pile base, or 600 mm, whichever is larger, into the ground which the pile is founded.

Static load test ---------- details should follow Approval & Reception Procedure ARP/DG/13 “Pile Static Loading Test”. Instrumented axial loading test includes the distribution of load and movement, development of shaft resistance and end-bearing resistance with displacement can be used, shaft load cells, rod extensometers, and strain gauges can be instrumented.

For quality control of concrete, sampling rate and testing methods should comply with the Macau Concrete Standard.

澳門氹仔偉龍馬路185號 Av. Wai Long nº185, Taipa, MACAU
電話 tel: (853) 8294 4488 傳真 fax: (853) 8294 4848

Approval & Reception Procedure

DG – Geotechnical Department		
Bored Piles	Document no.	**ARP/DG/18**
	Date:	**2010/07/01**
	Page no.	**4 of 4**

4. Acceptance criteria

Viscosity test: flow time of slurry shall be between 32 and 50 sec.

Mud balance test: specific gravity shall between 1.10 and 1.15.

pH test: the pH value shall be between 7 and 11.

Sand content test: sand content should not exceed 4%.

Verification of depth and cleaning--- The bottom is considered clean if a minimum of 50% of the bottom area has less than 13 mm of sediment and no portion of the bottom area has more than 38 mm of sediment .

Interface core drilling ---------- the cores should also be examined to confirm the adequacy of the interface between the concrete and rock; ; any rock core obtained should be visually examined to conform with the required rock material specified in the design.

Mechanical core test ---------- the concrete cores should not show evidence of honeycombing or segregation of individual constituent materials; any rock core obtained should be visually examined to conform with the required rock material specified in the design.