

Approval & Reception Procedure

DG – Geotechnical Department	
Pile Integrity Verification Procedure C Cross-hole Sonic Logging Test	Document no. ARP/DG/11
	Date: 2010/07/01
	Page no. 1 of 2

1. Reference standard

Regulamento de Fundações Artº 99, ASTM D6760-02, critério CCRC

2. Information to be submitted

- Pile characteristics - bored pile, caisson (type, diameter and verticality)
- Pile installation records (location, contractor, top level, length and embedded length)
- Concrete design strength
- Site investigation results
- Access tubes (number, diameter, location, material, connection)

3. Preparation before test

- Number of access tubes is given by the designer, usually 3 tubes for pile diameter 0.7m ~ 0.9 m, 4 tubes for pile diameter more than 0.9m;
- The access tubes must be equidistant; vertical and parallel to one another as much as possible along the length of the pile.
- The generally accepted practice is to extend access tubes 0.6m ~ 1.5m above the design level of concrete or ground surface;
- The recommended access tubes are nominal 38 to 50 mm inside diameter with standard weight 40 of steel tubes, and tubes may be extended with mechanical couplings;
- Fit the tubes with a watertight shoe on the bottom and a removable cap on the top;
- Fill access tubes with clean fresh water as soon as possible but within at the latest one hour of concrete placement;
- Suitable time for testing is between 2 days and 10 days after placement of concrete;
- After the sonic test, remove all water from access tube thus sealing them completely with approved grout.

4. Sampling amount

The percentage between 50% to 100% of cast-in piles must be decided considering the importance of the work. The selection of the testing pile is carried out randomly between concrete piles at the same site. In general a percentage of 100% is considered.

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Pile Integrity Verification Procedure C Cross-hole Sonic Logging Test	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Document no.</td> <td style="text-align: right; padding: 2px;">ARP/DG/11</td> </tr> <tr> <td style="padding: 2px;">Date:</td> <td style="text-align: right; padding: 2px;">2010/07/01</td> </tr> <tr> <td style="padding: 2px;">Page no.</td> <td style="text-align: right; padding: 2px;">2 of 2</td> </tr> </table>	Document no.	ARP/DG/11	Date:	2010/07/01	Page no.	2 of 2
Document no.	ARP/DG/11						
Date:	2010/07/01						
Page no.	2 of 2						

5. Acceptance criteria

The acceptance criteria are mainly based on Concrete Conditions Rating Criteria (CCRC) PSP North Carolina USA, considering the results of sonic transversal test registered along the pile.

- If all the test result complies with what is specified in CCRC (precisely the classification G or Q of CCRC), the piles are considered acceptable;
- If the test pile is not in accordance to that specified, the pile must be repaired or rejected. Mechanical drilling can be made on the cores at the irregular part of the pile before a final decision is taken.

Concrete Condition Rating Criteria (CCRC)			
CCRC	Rating Symbol	Velocity Reduction	Indicative Results
Good	G	$\leq 10\%$	Good quality concrete
Questionable Defect	Q	$>10\% \text{ \& } < 20\%$	Minor concrete contamination or intrusion. Questionable quality concrete.
Poor	P/D	$\geq 20\%$	Defects exist, possible water/slurry contamination, soil intrusion and/or poor quality concrete.
No Signal	NS	No Signal received	Soil intrusion or other severe defect absorbed the signal (assumes good bond of the tube-concrete interface).
Water	W	V = 4750 fps (1450 mps) to 5000 fps (1525 mps)	Water intrusion or water filled gravel intrusion with few or no fines present.

The following are a few examples of types and causes of defects:

- Necking or arching of the concrete on withdrawal of the temporary casing.
- Necking or contamination of the concrete due to collapse of the side walls.
- Soft toe due to incomplete cleaning or collapse of the side walls.
- Horizontal lenses of silt\mud\slurry due to the tremie pipe rising above the concrete.
- Voids due to the use of low-slump concrete.
- Honeycombing due to washout of fines.
- Trapping of contaminants due to pumping concrete too fast.