

# Cementation

## SKANSKA

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## CFA-TC® & CFA-PL®

### Two Continuous Flight Auger Piling Techniques

#### Application

Well suited to soft and/or water bearing ground where there is a high risk of bore instability during construction.

CFA-TC® particularly suitable close to structures which may be affected by standard CFA, because of loose soil over hard strata.

CFA-PL® particularly suitable to prevent negative skin friction, and/or provide protection to concrete in hard environments.

Diameters generally within the range of 600mm to 1200mm with maximum depths normally up to 27.5 metres.

Used for bearing piles and contiguous, interlocking and secant piled walls.

Particularly suitable for basement construction where bearing piles are required to terminate below ground.

#### Advantages

- Quietest known form of piling
- Virtually vibration free
- All rigs fully instrumented
- Quick and economical

#### Patents

UK Patent No. 2303868  
UK (Div) Patent No. 2328700  
UK Patent No. 2362665  
UK Patent No. 2358211  
UK Patent No. 2355750  
UK Patent No. 2362912  
UK Patent No. 2356659  
USA Patent No. 6116819  
Europe Patent No. 0842329  
(France, Spain, Germany, Ireland, Italy)

#### Trademarks

AUTO-CFA®  
CFA-TC®  
CFA-PL®  
CFA-LC®  
CCFA®  
CEM®



#### CFA-TC® & CFA-PL® Two CFA Techniques

Cementation Skanska developed two techniques which extend the range of CFA application. The techniques have been assigned the designations CFA-TC® and CFA-PL®.

Both techniques are patented and both make use of a unique casing installation system. This allows a non-rotating casing to be inserted into the ground at the same time as the auger is advanced.

#### CFA-TC®

This refers to the use of a temporary casing during CFA pile construction, and virtually eliminates settlement of the surrounding soil.

A well-known problem, sometimes called 'fighting' can occur when the upper strata is relatively loose or soft compared with the underlying founding strata. In these conditions the rate of advance of the auger (per revolution) can be much less in the underlying strata than in the 'softer' overlying

strata. The auger, which acts as a vertical conveyor, tends to draw soil from the sides of the bore. This phenomenon can cause damage to adjacent structures, whether above or below ground.

The CFA-TC® technique installs a casing, to a suitable depth, during the advance of the flight auger and this prevents the auger from fighting the softer overlying strata.

The CFA rig installs the casing, completes the bore to founding depth and then removes the casing at the end of the concreting phase. It then moves to another pile position. There is no need for an attendant service crane to handle the temporary casing.

The effectiveness of the new CFA-TC® technique is demonstrated overleaf, showing the measured settlement of the ground surrounding CFA piles, at two sites with similar ground conditions, in Glasgow.

Where no casing was used, settlement at a distance of 1m from the piles was 13.8mm. Settlement decreased further away from the piles, but could still be detected up to a distance of approximately 14 metres.

In contrast, when a casing was installed by the CFA-TC® technique, settlement was measured at four points each a distance of 1m behind a piled wall giving an average of 1mm, over a period of eight days of piling.

Further advantage of the CFA-TC® technique is the ability to position piles more accurately than without casing. At the Glasgow contract the average plan deviation at ground level, of the 75 wall piles installed, was 24mm from true position. Verticality was also better than for uncased piles.

### CFA-PL®

This technique refers to the installation of a permanent liner during the construction of a CFA pile.

Permanent liners may be required for one of several reasons, e.g.:

- to protect the concrete in aggressive ground conditions
- to avoid the effects of 'downdrag' caused by ground settlement.
- to avoid loading adjacent structures and services, often below ground.

The wall thickness of the permanent liner will be determined by the specific site conditions.

The use of a steel liner coated with a bituminous layer, often called a 'slip layer', can prevent all three of the above problems.

Alternatively a plastic liner can be used in place of the coated steel liner.

With the CFA-PL® technique these permanent liners can be installed by the CFA rig during pile construction. The casing drive system (referred to earlier) requires little modification to be used for installation of permanent liners. Because the liners are installed at the same time as the pile is bored, there is no annular gap around the liner, i.e. it is in intimate contact with the soil.

