Micro Piles

Part 2: Solid Bar Systems
Technical Data and Bar Sizes for CTS Solid Bar Micro Piles, see section

Solid Bar Anchor Systems and Anchor Sleeves in this Catalog
Solid Bar Micro Pile System

Definition

This type of pile is drilled open hole and grouted with relative small drill hole diameter. Its main supporting elements are single or multiple bars, which are embedded in cement grout or concrete.

The force (compression and/or tension) is transferred to the load bearing ground strata due to friction (bond between grout and ground). At the upper end the bars are connected to the footing by means of bond and/or bearing plates secured by hex-Nuts.

For difficult ground conditions i.e. drill hole does not stay open, see our CTS/TITAN IBO Micro Pile information in the front of this section.

The supporting Element

In case of seismic loads and code requirements only ductile (i.e. over 7% elongation) steel shall be used. The tendency of most design authorities is to specify materials which offer over 12% elongation. Con-Tech Systems has developed high strength, but also ductile bars (Mukusol Bars) and couplers, which meet all these requirements. Con-Tech Systems has also developed Mini-Piles and Soil Anchors utilizing standard reinforcing steels.

One of the most common materials is grade 75 or grade 95 rebar in sizes #8 and #28 (25 mm and 85 mm) ASTM A-615.

Rebars have excellent bond characteristics with the cement grout.

Tensile loads are entirely supported by the steel cross-sectional area. Compressive loads are supported by the cement grout or concrete and the steel cross sectional area.

Pile Cap or Anchor Head

There are several details available to connect the pile to the footing:

1. Bond-Load transfer by appropriate bond length.
2. Bearing plate and hex nuts - for bars with or without bursting reinforcement.

Corrosion Protection

There is no guaranty that open drill holes do not partially collapse creating voids in the grout column and expose the steel.

For that reason, the steel tendons should be double corrosion protected, i.e. encapsulated with cement grout inside a corrugated HDPE (High Density Polyethylene) or Hard-PVC sheath. The internal cement grout has to be shop applied. The corrugated sheath shall continue for at least 6 inches into the footing to seal the steel from possible ground waters.

If the soils are aggressive, double corrosion protection as indicated above, shall be applied. To achieve proper cover and centricity of the steel elements, centralizers shall be installed. This will also reduce the danger of buckling.

Post Grouting

To increase bond and load transfer in cohesive soils, post grouting becomes necessary (see CTS-Grouting System in the Strand Anchor Section, pages St-25 – ST-28).

Drilling and Installation

In cohesive soils, drilling can be conducted using standard open hole methods.

In non-cohesive soils, casing may be required. Alternatively CTS/TITAN hollow bars can be used.

The Figure on Page MP-10 illustrates the installation sequence.
Micro-Pile Installation Sequence

1. **Drill Hole**
2. **Insert Pre-Grutted Bar Micro-Pile**
3. **Install Lenton Coupler and Heat Shrink Sleeve**
4. **Post Grout Valve**
5. **Post Grout Line**
6. **Grout Micro Pile**
7. **Place Footing**
8. **Anchor Nut**
9. **Centralizer (Corrugated)**
10. **Solid Bar**
11. **Post Grout Valve**
12. **Post Grout Line**
13. **Solid Bar**
14. **Pre-Grutted Bar Micro-Pile**
15. **PE or PVC Sheathing (Corrugated)**

Solid Bar System

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