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TUBEX & TUBEX GROUT INJECTION PILE SERIES

The Tubex Grout Injection Pile (TGIP) consists of a steel pipe casing attached to a patented displacement drill tip. The casing is used as both structural support, as well as a permanent lining for placement of concrete after installation. The displacement drill tip serves as an installation aid and provides the means through which grout is injected to produce a soil-cement mixture around the pile through installation.

Advantages of TUBEX Grout Injection Piles:

The TGIP consists of steel pipe casing, a displacement drill tip outfitted with grout ports, and a soil-cement mixture surrounding the pipe. The patented design of the pile tip produces a soil-cement mixture when grout is injected under high pressure and mixes with the surrounding soils. The use of high pressure during grouting prevents the soils from obtaining "at rest" conditions, which in turn produces a high capacity pile when compared to traditional installation procedures. Additionally, the grouting process increases the effective diameter of the pile equal to the outer diameter of the displacement drill tip.

- **Vibration Free:** TGIP do not generate vibration during installation and drastically reduce risks associated with working in close proximity to adjacent structures, new construction, or sensitive equipment.
- **Noise Reduction:** TGIP installation equipment typically operates at around 85 db, which significantly reduces impact on surrounding entities (i.e. residential units, hospitals, businesses, etc.).
- **Soil Displacement:** TGIP displace soils during installation, which can greatly increase ultimate pile capacities through end bearing. Also, because the TGIP displace soil, there are little to no drill spoils that need to be off-hauled and disposed after installation.
- **Full Length Steel Pipe Casing:** TGIP consist of a full-length permanent casing. This full-length casing ensures that TGIP maintain a uniform section even in loose sands, poor soils and site profiles with a high water table. The full-length casing also permits inspection for the presence of water or deleterious material prior to placement of concrete infill.
- **Increased Lateral and Tension Capacities:** TGIP are capable of withstanding high lateral and tension loading conditions based on the permanent steel pipe casing. These casings are offered in a multitude of diameters and wall thicknesses that can accommodate significant lateral and tension loading.
- **Low Overhead / Limited Access:** TGIP can be installed in existing structures with minimum overhead clearances as low as 15' overall. TGIP equipment is capable of installing 26" diameter deep foundations with an overall footprint of approximately 12' wide x 28' long x 12' tall. Our specialized equipment provides an avenue for deep foundations.

Clear Channel Sign Foundation 30" TGIP-San Francisco, CA

- **Corrosive Environments:** TGIP soil-cement mixture surrounding steel pipe casing serves as protection in corrosive soil environments.

TUBEX GROUT INJECTED PILE ADVANTAGES:

- *NO PILE DRIVING NOISE OR VIBRATION*
- *SOIL DISPLACEMENT (NO DRILL SPOILS GENERATED)*
- *COMPOSITE PIPE PILE SECTION WITH HIGH CAPACITY*
- *LOW OVERHEAD PILE INSTALLATION CAPABILITIES*
- *DOT / CALTRANS PRE-APPROVED*
- *UNAFFECTED BY HIGH WATER TABLE, LOOSE SANDS, OR POOR SOILS*

TUBEX Grout Injection Pile Dimensions:

Standard dimensions of TGI Piles shown as inches (mm)*

Pipe Outer Diameter	Drill Tip / Shaft Diameter
Ø 8-5/8 in (220 mm)	Ø 12 in (300 mm)
Ø 12-3/4 in (324 mm)	Ø 18 in (450 mm)
Ø 14 in (355 mm)	Ø 22 in (560 mm)
Ø 16 in (406 mm)	Ø 22 in (560 mm)
Ø 18 in (457 mm)	Ø 26 in (670 mm)
Ø 20 in (508 mm)	Ø 26 in (670 mm)
Ø 30 in (762 mm)	Ø 36 in (915 mm)

***Standard dimensions only, additional sizes are available if required.*

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Installation Methods:

Step 1

A steel pipe casing of the appropriate diameter, wall thickness, and length is placed into the rotary head / drill table. The length of this section is dependent on site constraints and equipment selected for the project.

Step 2

The patented displacement drill tip is welded onto the bottom of the steel pipe casing providing a watertight connection.

Step 3

The drill table begins to force the TGIP into the ground by means of constant vertical load combined with rotary torque. If site access permits, TGIP will typically be installed in one full length piece to design depth. When overhead clearance is limited (i.e. seismic retrofits) the first section is installed until sufficient headroom is created. A second section of steel pipe casing is then spliced onto the previously installed piece prior to further advancement. Depending on overall pile length, this process is repeated until the required depth is achieved.

Step 4

Upon reaching the required design depth, grout is injected under high pressure through the tip via an injection pipe into the surrounding soil. The rotation of the TGIP in conjunction with the patented displacement drill tip produces a soil-cement mixture around the casing.

Step 5

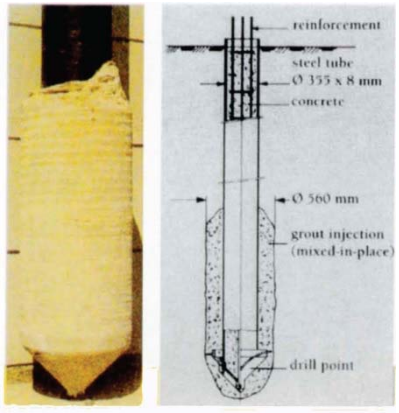
After TGIP have been installed and the grouting process is completed, pile cap connection devices / reinforcing steel is placed as required per the approved design and the pile is filled with concrete.

Sample Tip Installation Method Jeffery Road-Irvine, CA

Arcata Substation 20" TGIP-Arcata, CA

TUBEX Grout Injection Applications:

- Structural improvement of existing foundation structures during expansion and/or renovation.
- Seismic Retrofitting infrastructure and other structures.
- Installation of piles in refineries or chemical plants where deep foundations are required in hazardous areas or projects are located above contaminated soils.
- Within existing structures with low overhead clearances (i.e. hospitals, parking garages, high rise buildings, etc.)
- Structures situated above very unstable or liquefiable soil conditions.
- Projects which require deep foundations in or near existing structures where noise, overhead clearance and vibration are of paramount concern.
- Projects that require significant tension, compression and lateral loading.
- Projects located above poor and/or liquefiable soil profiles with caving soils.
- Projects where contaminated soils are of concern.



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