



tie-backs micropiles

A new concept for a new future.

piles

I believe.

geothermics

submerged anchors

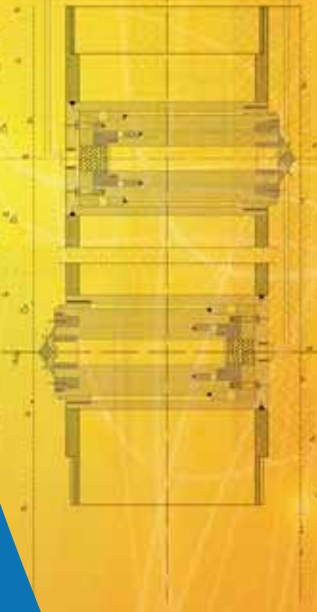
JobSoil
INNOVATION & RESEARCH



Render of the opened TFEg system



Render of the closed TFEg system



The **tfeg** Technology

The TFEg[®] system (acronym for Thriving Friction by Extruded Gear) is the result of the Italian research in the geotechnical field. It consists in placing along the shaft of piles, micropiles and tie - backs, some large and thick steel sockets, connected to the reinforcement bar and then extruded into the soil.

This allows an exponential increase of the boundary surface between foundation frame and soil and, consequently, also an exponential increase of the bearing capacity.



tie-backs

micropiles

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tfeg 

field applications



tie-backs

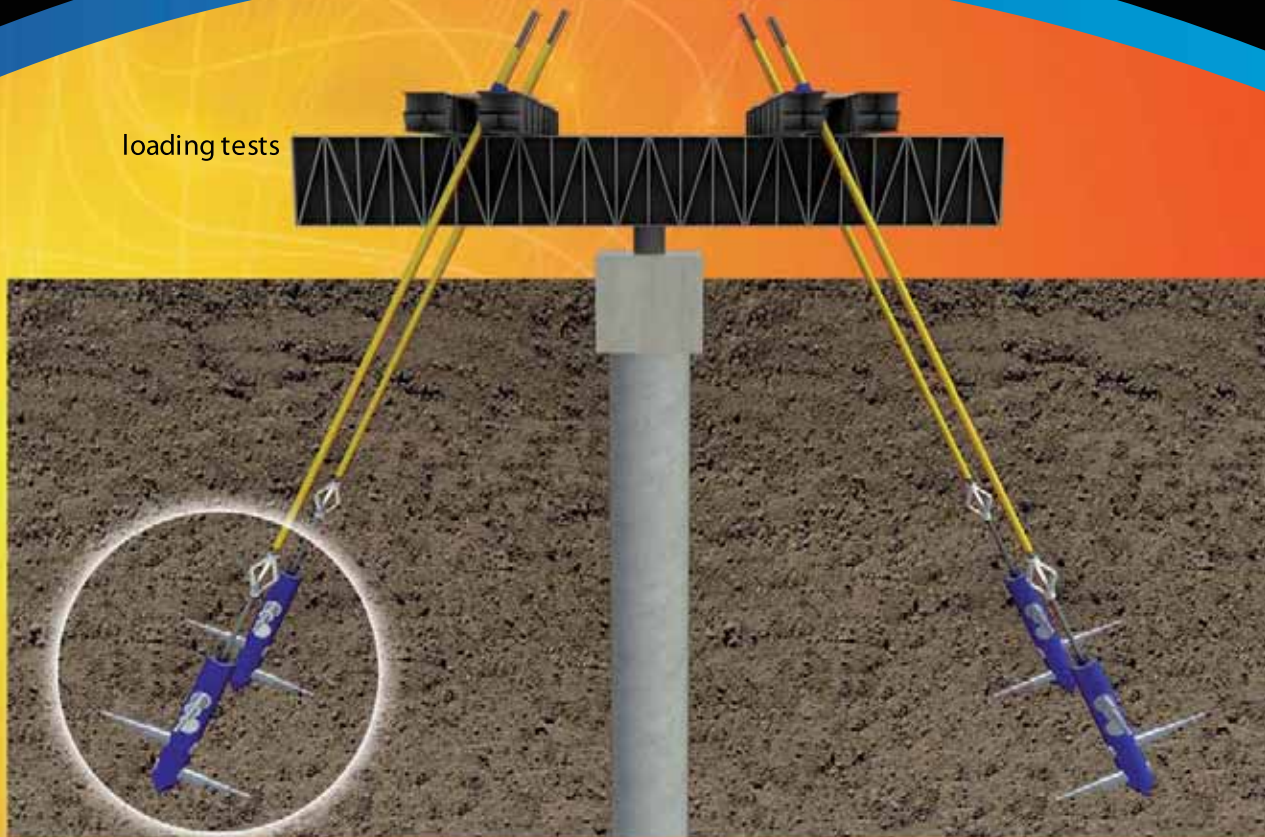
The insertion of TFEG® device, both in anchors and tie-backs, allows transferring very considerable strengths to the soil, and lowers the risk of accidental unthreading.

Operational performance parameters (capabilities and characteristics), required for the proposed system, are simple and meet any kind of standard equipment requirements. A specified handbook and a trained technical support staff make the tfeg system easy to install.

tie-backs equipped
with **tfeg** system

tie-backs equipped with tfeg[®] system

loading tests



Using the TFEG[®] system, it is possible to perform loading test growing down the execution time and saving costs. It's possible to perform tests also on large diameter piles reaching loads up to 7000 kN.

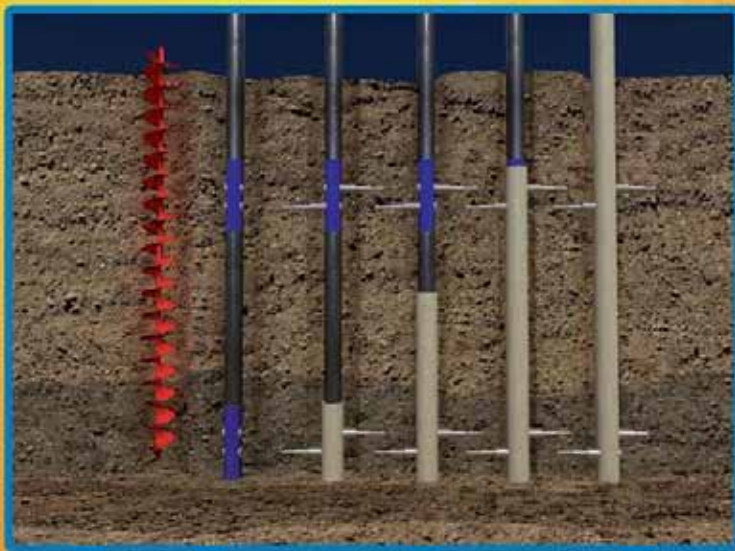
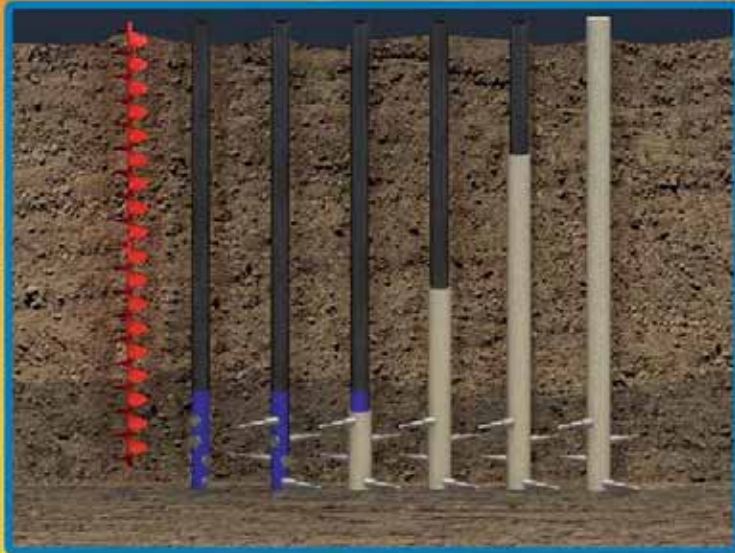
The use of the TFEG[®] system allows to save execution time:

it's possible to reduce tie-back length (bounded length is reduced to 3-5 m).

It is possible to avoid the use of injection valves.



micropiles

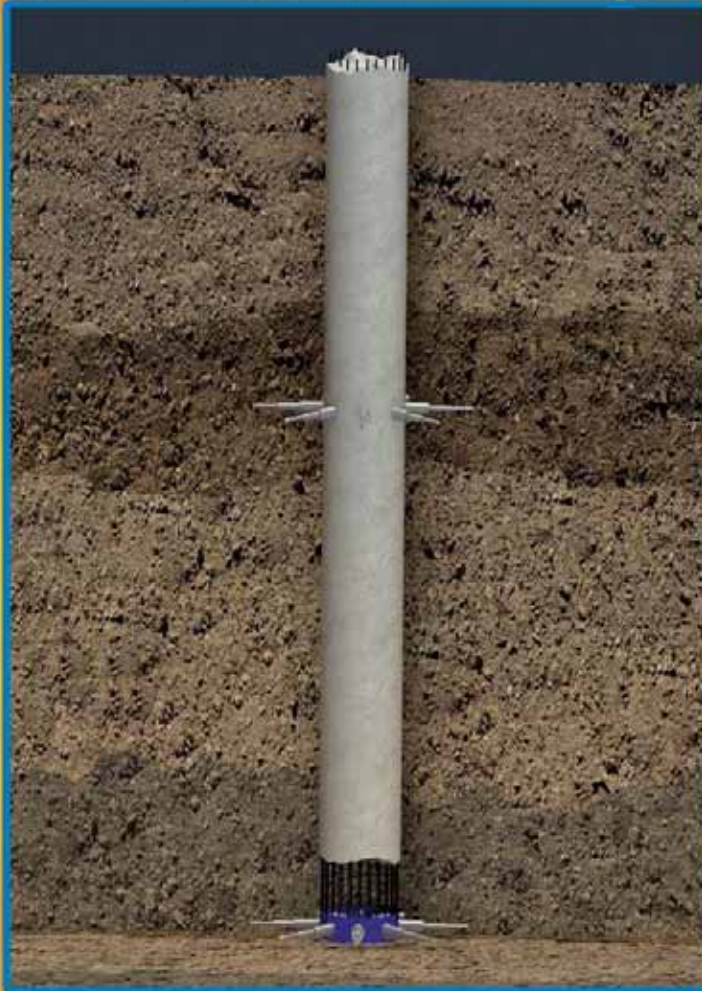


The TFEG[®] system inserted in threaded steel sockets, can be placed both along the shaft (shaft TFEG[®]) and at the base of a pile (base TFEG[®]). The TFEG[®] system is strong enough to allow a very efficient load transfer to stiffer layers supporting cyclic and dynamic condition (horizontal and vertical load). The steel sockets insertion avoids the execution of the pressured injection bulbs. The TFEG[®] device can be employed in every kind of soil (reachable pressure of elongation pipe equal to 400 bar).

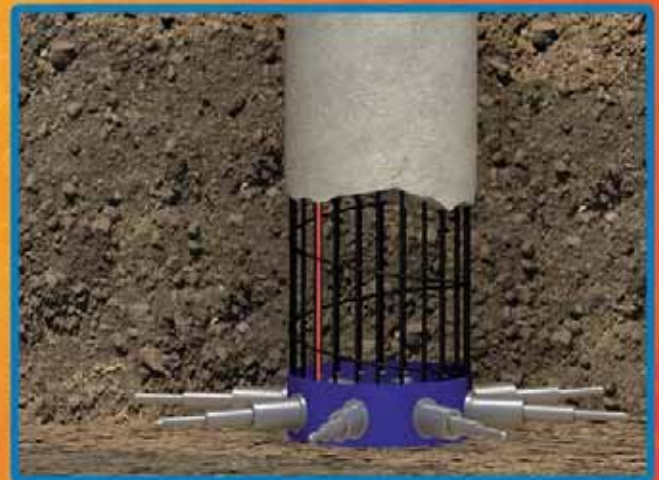


micropiles equipped
with **tfeg** system

piles

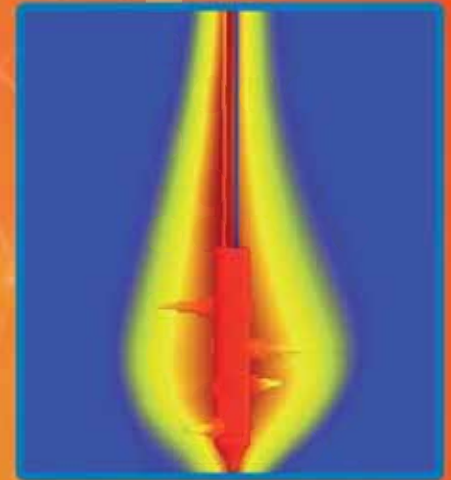
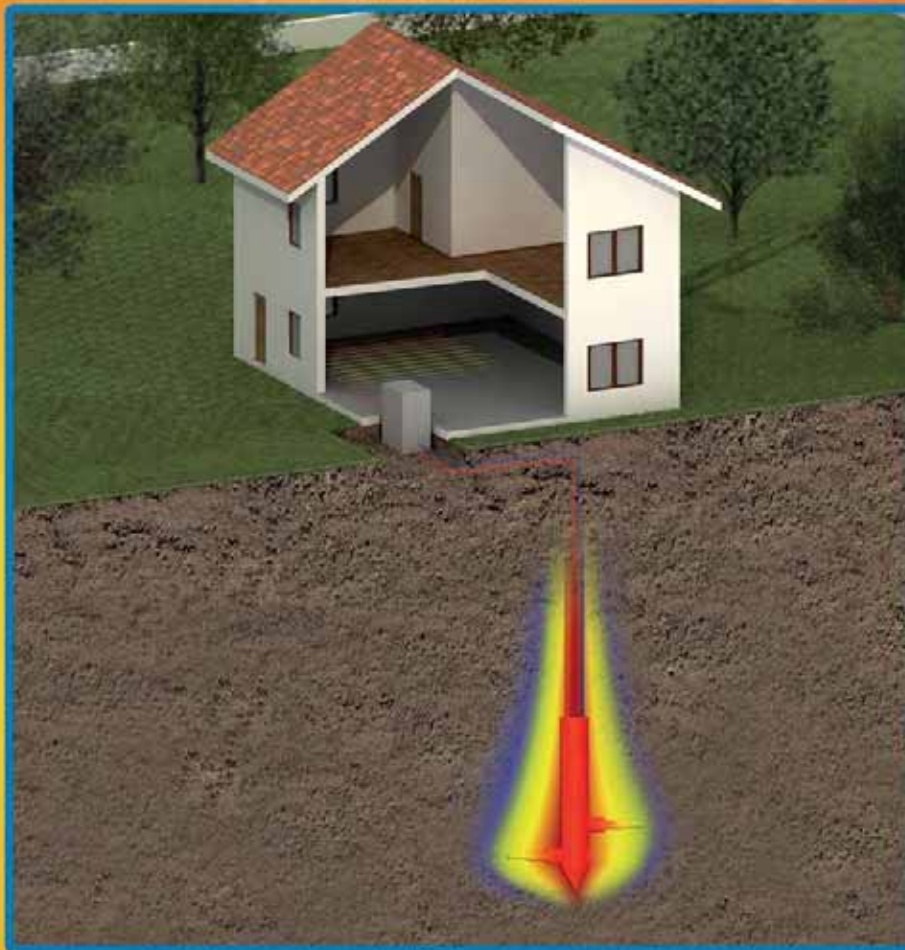


The TFEG® system can be placed along the pile shaft, both in large and medium diameter pile. The flexibility of the TFEG® system allows its application to every kind of deep foundations, both to drilled piles, to the ones with partial soil removal (CFA Piles) and to the ones statically (Silent Piles) or dynamically (Driven Piles) fixed. The steel sockets, placed in Ø 800 mm pile diameter, reach a maximum elongation up to 2500 mm.



piles equipped
with **tfeg** system

geothermics

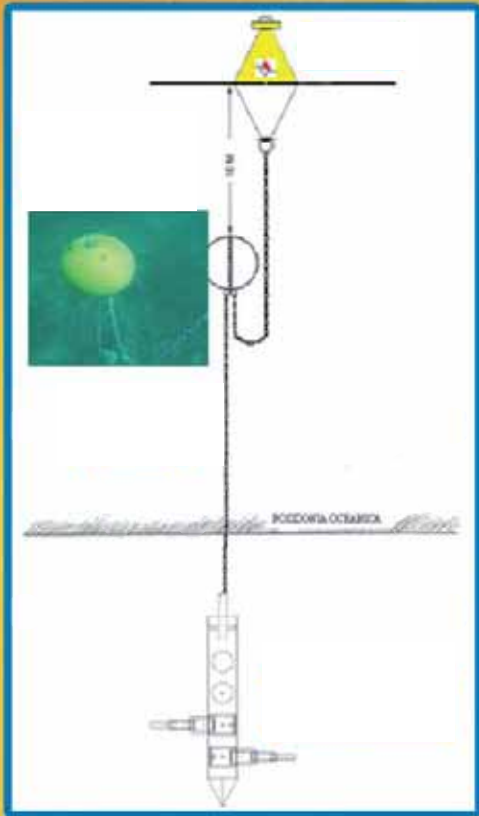


infrared image

In the Geothermic field, the use of the TFEG® system allows to increase the heat transferring surface between the interface soil/device. The aluminium sockets increase the heat transfer comparing to the traditional systems. Moreover the TFEG® device involves in the heat transferring a volume of soil much more large than the traditional systems growing up both the geothermic performance (up to 300%) and the efficiency/functionality.

the tfeg® technology
and the geothermics

submerged anchors



In order to overcome the problems related to the off-shore construction foundations (large diameter piles, large length anchors), the TFEG® system provides a powerful solution; it allows to reduce the drilling diameters, to use smaller equipment and to decrease the anchors length. Moreover the TFEG system can replace the dead-man anchors leaving unchanged the insitu seabed.



submerged anchors
equipped with **tfeg** system

safety

The extrusion of the TFEG® system is conceptually comparable to the advancing of a Begemann tip during a CPT (Cone Penetration Test). Therefore there is the possibility, for every single pile, to identify possible geotechnical anomalies when the difference between the expected pressure values and the ones recorded during the TFEG® extrusion is detected.

> 110 bar

< 30 bar

When the telescopic sockets are fully extruded in the surrounding soil, a sudden pressure decrease is recorded by the injection manometer, thus indicating a complete extrusion of the TFEG® sockets.

The sockets extrusion is very easy and is carried out with a hand-working pump and appropriate elongation pipes.

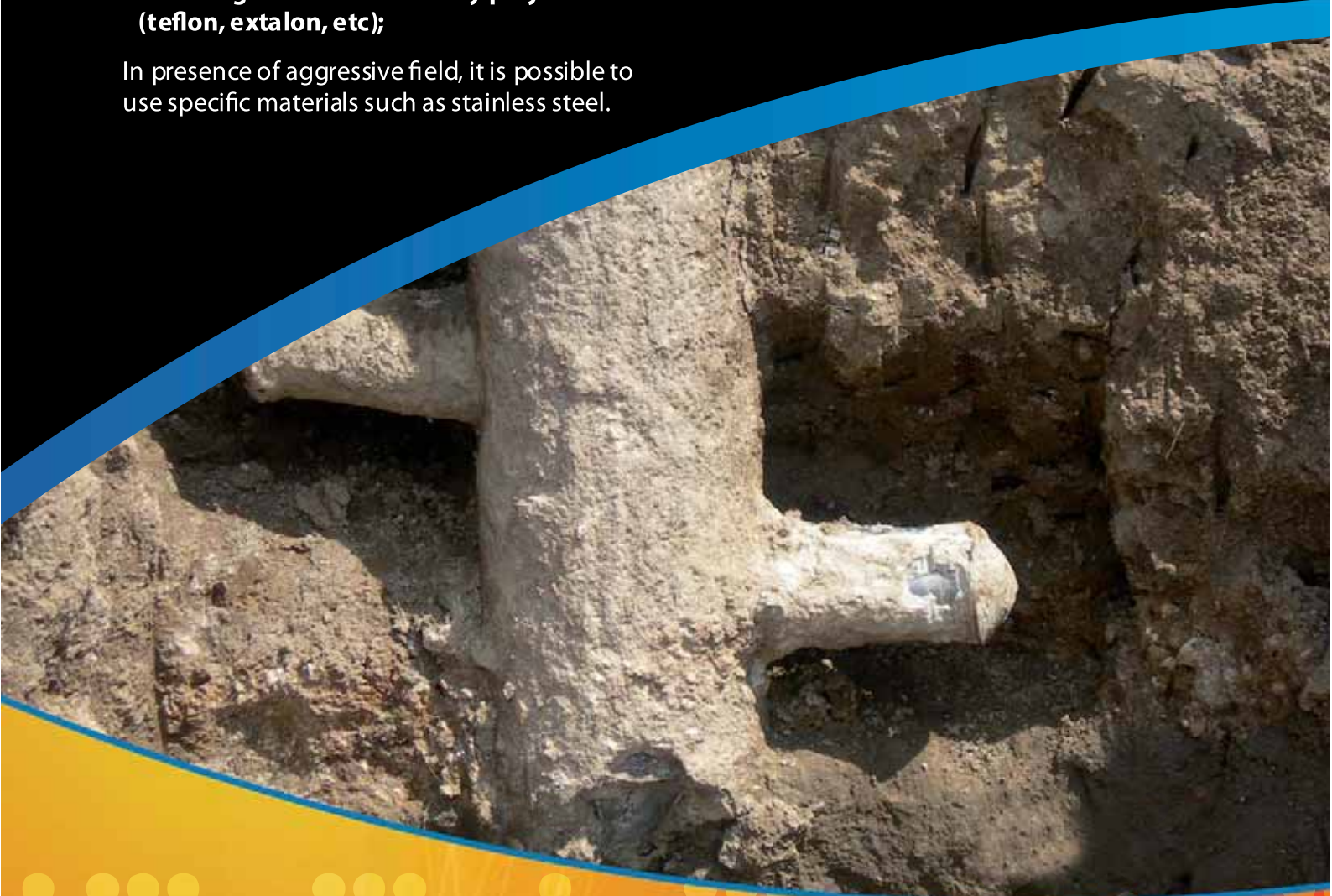


The Corrosion is limited by:

- the concrete film covering the TFEF system;
- Zincification of steel parts;
- Covering the steel sockets by polymers (teflon, extalon, etc);

In presence of aggressive field, it is possible to use specific materials such as stainless steel.

corrosion



STANDARD SPECIFICATIONS

MICROPILES	∅ drilling hole	components	∅ Tube framework	sockets
McrTFEG 140-2-88,9-2/4	140 mm	2	88,9 mm	2/4
McrTFEG 160-2-139,7-2/4	160 mm	2	139,7 mm	2/4
McrTFEG 160-3-139,7-2/4	160 mm	3	139,7 mm	2/4
McrTFEG 200-3-168,0-2/4	200 mm	3	168,0 mm	2/4
McrTFEG 240-3-220,0-2/4	240 mm	3	220,0 mm	2/4
PILES	∅ drilling hole	components	∅ cage framework	sockets
PLTFEG 400-3-370,3-4	400 mm	3	370,3 mm	4
PLTFEG 600-2-570,3-4	600 mm	2	570,3 mm	4
PLTFEG 600-3-570,3-6	600 mm	3	570,3 mm	6
PLTFEG 800-2-770,0-6	800 mm	2	770,0 mm	6
PLTFEG 800-2-770,0-8	800 mm	2	770,0 mm	8
PLTFEG 1000-2-970,3-6	1000 mm	2	970,3 mm	6
PLTFEG 1000-2-970,3-8	1000 mm	2	970,3 mm	8
PLTFEG 1200-2-1170,0-6	1200 mm	2	1170,0 mm	6
PLTFEG 1200-2-1170,0-8	1200 mm	2	1170,0 mm	8
PLTFEG 1500-2-1470,0-6	1500 mm	2	1470,0 mm	6
PLTFEG 1500-2-1470,0-8	1500 mm	2	1470,0 mm	8
TIE-BACKS	∅ drilling hole	components	∅ sockets	sockets
TirTFEG 120-2-88,9-2/4	120 mm	2	88,9 mm	2/4
TirTFEG 150-2-88,9-2/4	150 mm	2	88,9 mm	2/4
TirTFEG 150-3-88,9-2/4	150 mm	3	88,9 mm	2/4
TirTFEG 160-2-139,7-2/4	160 mm	2	139,7 mm	2/4
TirTFEG 160-3-139,7-2/4	160 mm	3	139,7 mm	2/4

The TFEG® system installation does not require any particular device nor a specialized technical qualification. It's designed to be placed with standard devices.

The opening of the steel sockets can be performed by an hydraulic automatic or manual pump since just 1lt of water for a piston is required. The extrusion pressure, obviously linked to the geotechnical properties of the soil, can reach a value of 400 bar pressure. Once the sockets extrusion have been done, it's possible to use the elongation pipes for the concrete injection.

1



2



3



4



5



1- TFEG® jointing/elongation pipes;

2 - TFEG® jointing/tube framework;

3 - Tube framework advancing;

4 - Extrusion of the steel sockets by the hydraulic pump (5- 10min);

5 - Concrete Injection.

5
0
7
0
7
4

Attività scientifiche

University of Naples - Federico II
Department of Earth Science
Department of Engineering

University of Rome - La Sapienza
Department of Engineering

University of Cassino
Department of Engineering I

University of Rome - Roma 3
Department of Engineering

University of the Sannio
Department of Earth Science

Ingegneria Ferroviaria Magazine
Tie-backs equipped with TFEG system

Experimental fields

S. Giovanni a Teduccio - Napoli
Underground car park - Salerno
New Palasport - Salerno
New Meeting Centre - Fuksass' Cloud
Chattanooga - Tennessee - USA
Lagonegro - Potenza
S. Giuliano di Puglia - Campobasso
Mercatello - Salerno
Teano - Caserta
Science Bridge - Rome

activities in progress

Enlargement of thermoelectric power station - Abrantes - Portugal
Landslide stabilization - Via Giulia - Caserta
Stabilization of the Vaieto Monticello Stream - Lagonegro - Potenza
Municipal underground car park - Caiazzo - Caserta
Deep piles of Alvignano - Piedimonte M. Viaduct - Caserta
School Enlargement - Via Argine - Napoli
Building up of the New Palasport - Salerno
Industrial Enlargement Prysmian Cables Spa - Arco Felice
New Meting Centre - Roma - la Nuvola di Fuksass
Building up of underground car park - Mercatello - Salerno
Highway Tunnel in San Giuliano di Puglia - Campobasso
New Department of Medicine Federico II - Naples Scampia
Underground car park Via Pio VI - Rome
Municipal underground car park - Chieti
Underground car park - Salerno

meetings

Teano (CE) 2005 "1° giornata di studio sul sistema TFEG®"
Bonefro (AV) 2006 "Nuove Fondazioni - evoluzione e stato dell'arte"
Bari Fiera del Levante 2006 "Fondazioni Profonde: evoluzione e innovazione"
Roma - Assirco - "Consolidamento di strutture con il sistema TFEG®"
Piacenza - Geofluid 2006 "Fondazioni Speciali: Stato dell'arte Evoluzione e Ricerca"
XXIII Convegno Nazionale di Geotecnica di Padova - Abano Terme (16-18 maggio 2007)
Barcelona Construmat 2007 "Fondazioni Profonde Attrezzate con TFEG®"
Ordine degli Ingegneri provincia di Campobasso
Ordine degli Ingegneri provincia di Latina
Ordine dei Geologi regione Campania Silent Pile - 2008
Ordine dei Geologi regione Calabria Opere di rinforzo strutturale - 2008
Bari Fiera del Levante "Elementi Tesi" - 2008
Piacenza Geofluid 2008 "Fondazioni speciali tra innovazione e ricerca
Keller - Innsbruck - Austria: Incontro sul TFEG® - 2009
Orlando Florida USA - ADSC - International Foundation Congress - 2009
Atlanta - Georgia USA - ADSC - "Drilling and Soil Nails" - 2009
Geotech Roma - "Nuovi scenari per le Fondazioni Profonde" - 2009
Londra - Ecobuild "The System Tfeq"



coupling the foundation efficiency with money saving



for a given load bearing capacity, reducing the pile diameter



remarkable reduction of the amount of drilled soil and related transport-more safety in the yard



for a better distribution of heavy loads, by positioning the tfeg just in correspondence of a thin but strong layers



preventing an accidental unthreading of tie-backs



Avoiding the slicing risk for piles with high ratio values length/diameter



optimizing the costs and time requirement





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