

HELICRETE

product information



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HELICRETE product information

Helicrete imports a range of ABC Anchors helical anchors, as well as manufacturing helical piles in Australia. Autoguide Equipment designs, develops and manufactures screw anchor and screw pile installation equipment with capacities from 1-300KNm (30 tonne metres) torque.

Alexander Mitchell (a blind brick-maker) invented the screw pile in the 1830s and used them for marine structures (Maplin Sands Lighthouse in 1838) some of which are still in use. We manufacture and install piles in a similar way as Mitchell, the only change being the use of hydraulic equipment to provide (and measure) the applied torque instead of a team of men turning a capstan.

AB Chance developed the use of helical anchors for stay wires on utility poles and extensive testing allowed Hoyt and Clemence to develop the simple formula which connects installation torque to pile capacity. This relationship has been tested both practically and theoretically, and shown to be a consistently reliable and accurate method. Success in pile installation depends on selection of the correct piles plus use of the extensive range of torque heads manufactured by Autoguide Equipment. In many situations the higher initial cost of a screw pile is more than offset by much faster installation, no concrete (or very little) and no spoil disposal. To fully utilise the time savings it is essential that the installation equipment is easy to use, fast in operation, reliable and, when used correctly, safe. Autoguide's experience in developing new methods of torque head mounting and innovative combinations of motors and gearboxes gives pile installers the best possible solutions.

Helicrete Product Range

All production or distribution is based on current products in the ABC Anchors range.

Screw Pile advantages

- 1) Speed of installation – often 10 minutes per pile up to 6 metres long.
- 2) No wet trades – concrete is not used except for form ground beams or grout piles into existing foundations
- 3) Piles can accept full load immediately after installation
- 4) Monitoring of installation torque accurately indicates capacity – problems will show up on installation.
- 5) As screw piles can be removed very easily they are well suited to temporary uses.
- 6) Anchors can be supplied galvanised or fitted with cathodic protection for aggressive soil or marine applications.
- 7) Screw anchors can be installed at any angle to suit the load.
- 8) A wide range of terminations is available to suit tension compression and combination loads.



Soil Classification

Class	Common Soil-Type	Geological soil classification	Probe Values Nm	Typical Blow-Count "N" per ASTM-D1586
0	Sound hard rock - unweathered	Granite, Basalt, Massive Limestone	N/A	N/A
1	Very dense and/or cemented sands; coarse gravel & cobbles	Caliche (Nitrate-bearing gravel/rock)	85-181	60-100+
2	Dense fine sands; very hard silts and clays (may be preloaded)	Basal till; boulder clay; caliche; weathered laminated rock	68-85	45-60
3	Dense sands and gravel; hard silts & clays	Glacial till; weathered shales; schist; gneiss & siltstone	56-68	35-50
4	Medium dense sand gravel; very stiff to hard silts & clays	Glacial till; hardpan; marls	45-56	24-40
5	Medium dense coarse sands & sandy gravels; stiff to very stiff silts & clays	Saprolites, residual soils	34-45	14-25
6	Loose to medium dense fine to coarse sands to stiff clays and silts	Dense hydraulic fill; compacted fill; residual soils	23-34	7-14
7	Loose fine sands; alluvium; loess; medium - stiff and varied clays; fill **	Flood plain soils; lake clays; abode; gumbo, fill	11-23	4-8
8	Peat, organic silts; inundated silts, fly ash very loose sands, very soft to soft clays **	Miscellaneous fill, swamp marsh	0-11	0-5

Class 1 soils are difficult to probe consistently and the ASTM blow count may be of questionable value

**** It is advisable to install anchors deep enough, by the use of extensions, to penetrate a Class 5 or 6, underlying the Class 7&8 soils.**

The column 'probe values', refers to torques measured using the Soil test probe available from Helicrete. This kit enables a single operator to perform a practical test to help determine anchor configurations and performance.

In general, standard anchors can be used in soils from Class 8 up to Class 4. Rock anchors will give excellent results in Class 1 & 2 soils. However when subjected to tension loads care must be taken to ensure adequate depth of soil over the highest helix.

It is essential that regular testing of installed anchors is used as a back up to torque monitoring. This is the only way to ensure that installers and specifiers maintain confidence in the system. Helicrete can supply test equipment for quality control and insist on its use by qualified installers.



Soil Test Probe



The portable Soil Test Probe provides a new dimension. This instrument, portable and operable by one person, will provide reproducible numerical data related to resistance of the soil to flow under load. It may be used in soils up to the consistency of hard pan, to any depth below the surface and without the need to make an excavation or otherwise disturb the soil.

The probe shown consists of a head on a square shaft with a number of extensions, all of which may be coupled together. A ratchet wrench with a torque measuring handle is used to install, remove or take readings. Corner marks at set intervals provide means to determine the depth below the surface when a reading is taken.

The hub of the probe head is forced into the ground by application of torque acting on the blade of the probe. Thus the torque required to turn the probe is proportional to the resistance of the soil to penetration of the hub. It is this property of soil which is of interest in making an anchor selection in determining the bearing strength – especially for end bearing screw foundations or footings.

Probe readings can be related back to the general soil classifications to determine anchor holding capacities (see Soil Classification data above).

For end bearing foundation work, the bearing strength of the soil may be calculated directly from the probe reading.

This heavy duty probe will withstand torque to 200Nm on the scale, so it will not penetrate packed gravel, shale or rock. Thus, for foundation work, other means such as augering will be required to determine the thickness of the hard strata. When the hard strata is penetrated, the probe can be used to evaluate the quality of an underlying softer soil.

As is the case with any instrument, the value of the data taken with the probe will be no better than the care used in conducting the tests. It is best to average the results of several tests in the same area for, even within a few feet, some variances will be found.

The main requirement during probe testing is to ensure the probe advances a full pitch before readings are taken. This is accomplished by application of heavier down pressure on one handle of the wrench while the probe is being screwed into the ground. When extensive probing is to be done, speed can be increased by using ½", heavy duty drill motor with reversing switch to install and to remove the probe. Readings are taken while the motor is at rest by engaging the shaft with a crow's foot wrench on the torque handle.



Installation Torque vs. Anchor Capacity

Holding strength related to installing torque

The idea that the amount of torsional force required to install a foundation anchor relates to the ultimate capacity of the foundation in tension or compression has long been promoted by A.B. Chance. Precise definition of the relationship for all possible variables remains to be achieved. However, simple empirical relationships have been used for a number of years.

Recommended reading on

the subject is in the paper "Uplift Capacity of Helical Anchors in Soil" by R.M. Hoyt and S.P. Clemence (Bulletin 2-9001). It gives the formula for the torque/anchor capacity as:

$$Q_u = K_t \times T$$

where

Q_u = ultimate uplift capacity [lb. (kN)]

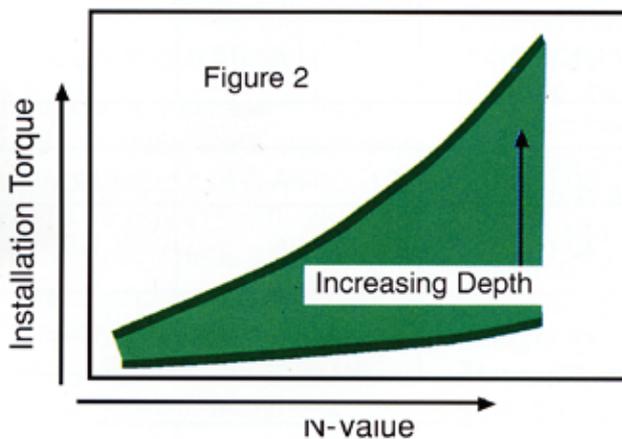
K_t = empirical torque factor [ft.⁻¹ (m⁻¹)]

T = average installation torque [ft.-lb. (kN-m)]

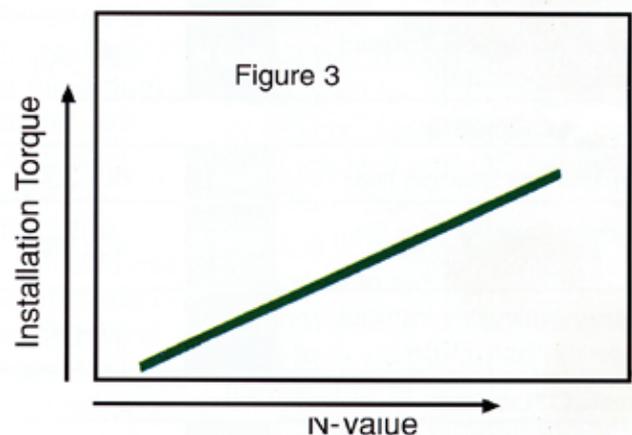
The value of K_t may range from 3 to 20 ft.⁻¹ (10 to

66 m⁻¹), depending on soil conditions and anchor design (principally the shaft size). For Type SS foundation anchors, it typically ranges from 10 to 12 (33 to 39) with 10 (33) being the recommended default value. For Type HS foundation anchors, the recommended default value is 7 (23). The same values of K_t are used for both tension and compression loading. Torque monitoring tools are available from Chance. Their use provides a good method of production control during installation.

**Type SS HELICAL PIER® Foundation Systems
Installation Torque vs. N-Value
in Sand**



**Type SS HELICAL PIER® Foundation Systems
Installation Torque vs. N-Value
in Clay**



Figures 2 and 3 show graphs depicting how installation torque varies with respect to SPT results (N-values per ASTM D-1586) indicating the in-situ soil strength.

Figure 2 shows the relationship between installation torque and N-values for sands. The envelope of curves depicts increasing torque for a given N value with increasing depth. Water table position directly affects installation torque and ultimate capacity by causing a reduction in the effective unit weight of the soil below the table. This in turn will cause a reduction in installation torque and ultimate capacity.

For cohesive soil (Figure 3), a straight-line relationship is provided as soil strength or cohesion is the only factor affecting installation torque and ultimate capacity.



Soil Corrosion and Helical Piling

Unless dependable field measurement and analysis data is available for each and every installation site, the prediction of corrosion rates of carbon steel helical piles in soil can ever only be estimated. However, as a guide, the baseline steel loss due to corrosion usually ranges from 0.015mm to 0.050mm per exposed side per year. Corrosion rates can be reduced if additional corrosion protection measures are applied to the piles.

The rate of corrosion is almost entirely dependent on the corrosivity of the local ground conditions and, as would be expected, corrosion is more severe in disturbed, wet or acidic and hence low resistivity soils, and less problematic in undisturbed, dry and neutral soils.

To counteract corrosion; sacrificial thickness, organic and inorganic coatings, zinc galvanising and other surface measures can be applied to the piling design and construction. For very corrosive soils, which generally have an electrical resistivity of 10 Ohm-m or less, cathodic protection and pile material selection can be used. Corrosion control measures need to be considered on a 'case by case' basis.

The table provides guidance on the estimated service life of the piling with and without supplementary corrosion protection measures. It is assumed that a minimum operational life of 50 -100 years or more is required for the piles.

Pile types: Diameter (mm) (kN)	Ground resistivity (Ohm-m)	Pile wall thickness	Corrosion rate based on Uhlig data mm/yr	Estimated life without corrosion protection (years)	Corrosion protection methods for buried areas of piles		Estimated life with additional corrosion protection* (years)
					Top 2m Section of Pile	Remainder of Pile	
60R (6kN)	Less than 5	Nominal 6.35mm after 40% loss 3.8mm	0.1 - 0.2	12 - 25	<ul style="list-style-type: none"> • Minimum 6.35mm wall thickness. • Zinc rich coating • 2 x 20kg galvanic zinc bracelet anode fixed to top section 	Minimum 6.35mm wall thickness Galvanised steel finish	100
	5 - 10		0.033	75	<ul style="list-style-type: none"> • Minimum 6.35mm wall thickness. • Zinc rich coating • 1 x 20kg galvanic zinc bracelet anode fixed to top section 	Minimum 6.35mm wall thickness	100
	10 - 50		0.025	100	<ul style="list-style-type: none"> • Minimum 6.35mm wall thickness. • Zinc rich coating 	Minimum 6.35mm wall thickness	100+
	50 - 100		0.018	100	<ul style="list-style-type: none"> • Minimum 6.35mm wall thickness. • Zinc rich coating 	Minimum 6.35mm wall thickness	100+
	Greater than 100		0.014	100	<ul style="list-style-type: none"> • Minimum 6.35mm wall thickness. • Zinc rich coating 	Minimum 6.35mm wall thickness	100+

In practice, soils are often found to have electrical resistivities in the range of 30-90 Ohm-m and so most piles will not require the installation of cathodic protection and simpler counter corrosion measures included as a sacrificial corrosion allowance may be sufficient to achieve the design life. See our full corrosion report for more details on soil corrosion along with tables for our other product ranges.



ABC Anchor Product Range

	60RL	60R	76RL	76R	89R	89RHD
Max Torque	2.5	4.5	8	16	18	25
Ultimate Strength	80	155	250	480	450	700
Torque Limited	70	140	240	240	450	560
Working Compression load with 2.5:1 FOS	28	56	96	192	180	225
Ultimate Strength Single Helix	45	90	140	160	170	220
Kt m-1	30	30	28	28	25	25

TORQUE This is the maximum torque which can be applied to each pile shaft. The value may depend on the type of connection as well as the actual limit on the tube.

ULTIMATE STRENGTH This value must exceed the maximum load which the pile can support.

TORQUE LIMITED The ability of the pile to transmit torque is always the limiting factor. This is therefore the ultimate practical pile capacity.

ULTIMATE STRENGTH PER HELIX This figure shows the load which can be supported by a single helix- most piles use multiple helices, but if a single one has to support more load, although non standard, this can be accommodated.

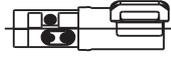
Kt m-1 This is the “Empirical Torque Factor” expressed in metric units when torque is measured in kNm and force in kN. Its value decreases as pile diameter and helix plate thickness increases. This is due to a combination of skin friction and the energy needed to displace the soil.

The values of Kt were originally developed for tension applications and can be up to 25% higher for compression loads, however, as displacement is more critical for compression piles, it is convenient to use the same values. Field tests, which are easily accomplished using quickly installed (and removed) tension piles, can establish site specific values for Kt and will allow the selection of an appropriate factor of safety which usually reduces the cost of the installation.

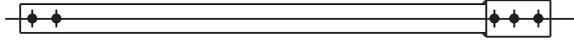
60 Round Light Anchor Range



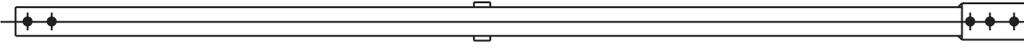
CAPPING ASSEMBLY LARGE
35513



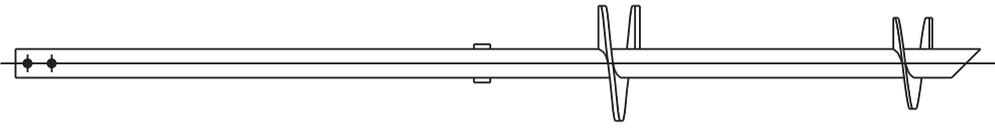
HEX DRIVER
36061



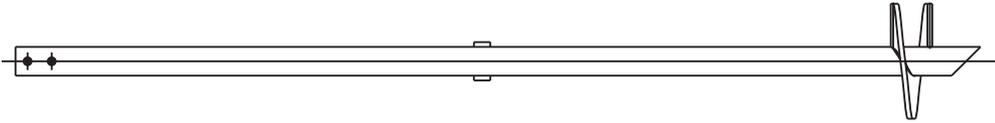
EXTENSION
36720
1m



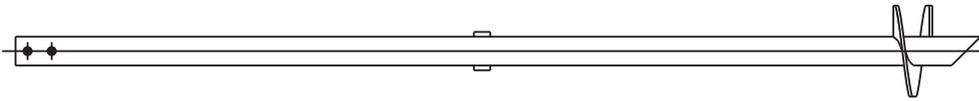
EXTENSION
36722
2m



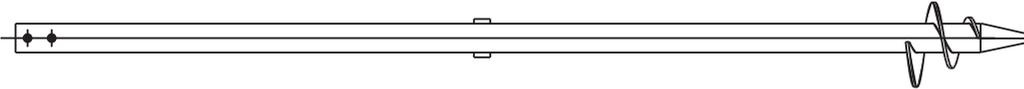
8" / 10" LEAD SECTION
36692
2m



10" LEAD SECTION
36691
2m



8" LEAD SECTION
36690
3m



8" MOLE LEAD SECTION
36685
2m



ANCHOR TERMINATION
32617

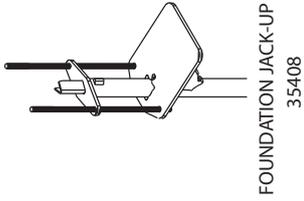


ANCHOR TERMINATION
35868

AUTOGUIDE EQUIPMENT © 02/11/11 LWW PROJECT 9077

60R LIGHT ANCHOR RANGE DRILLED 36687

60 Round Anchor Range



FOUNDATION JACK-UP
35408



CAPPING ASSEMBLY STD
35345



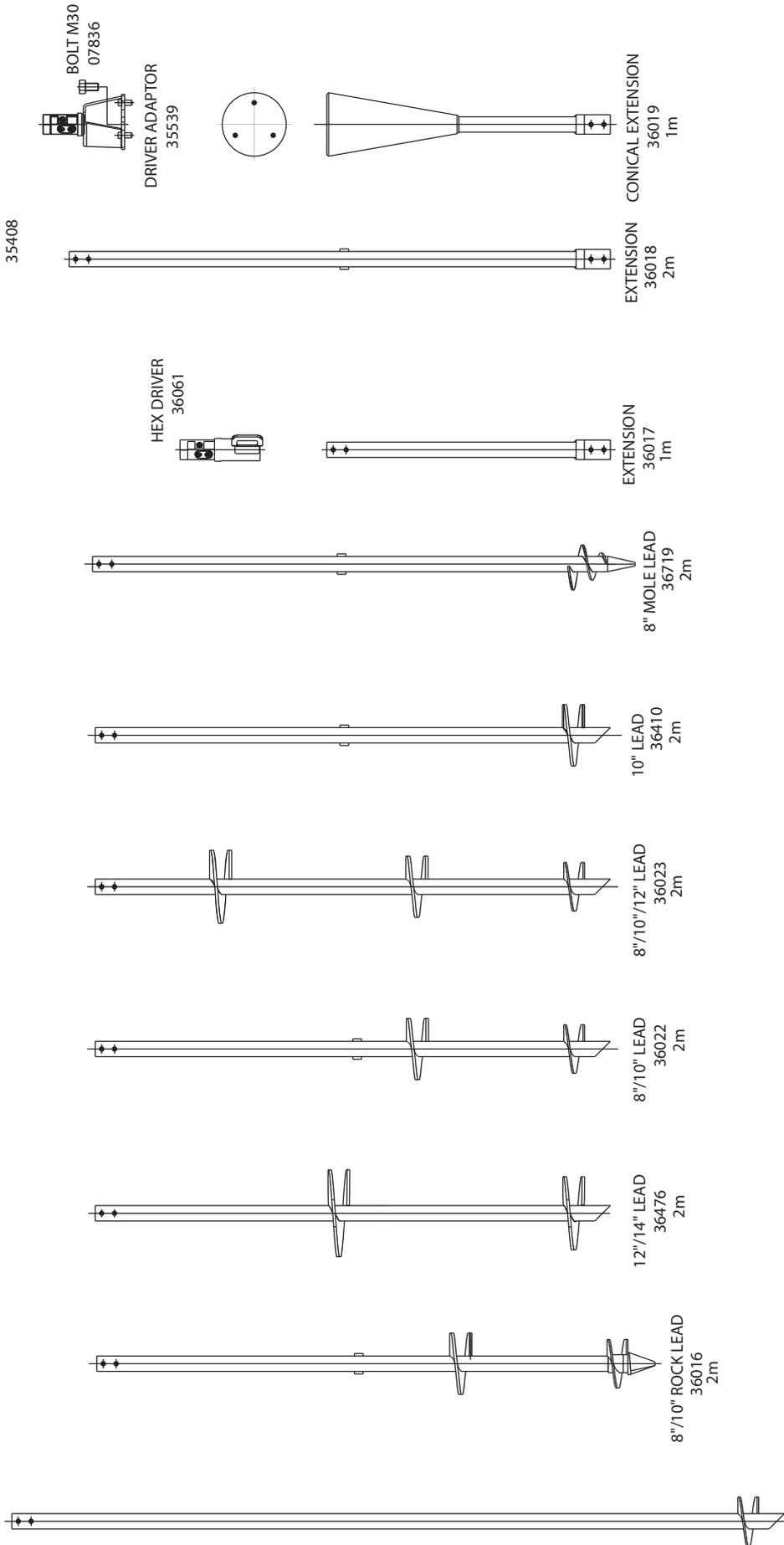
CAPPING ASSEMBLY LARGE
35513



ANCHOR TERMINATION
32617



ANCHOR TERMINATION
35868



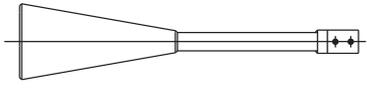
8" LEAD SECTION
36485
3m



BOLT M30
07836

DRIVER ADAPTOR
35539

HEX DRIVER
36061



CONICAL EXTENSION
36019
1m

EXTENSION
36018
2m

EXTENSION
36017
1m

8" MOLE LEAD
36719
2m

10" LEAD
36410
2m

8"10"/12" LEAD
36023
2m

8"10" LEAD
36022
2m

12"/14" LEAD
36476
2m

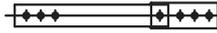
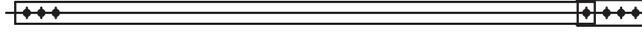
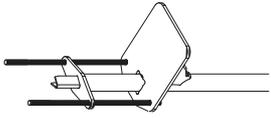
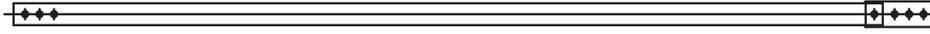
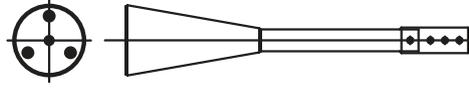
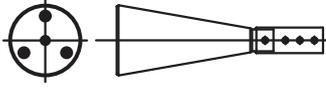
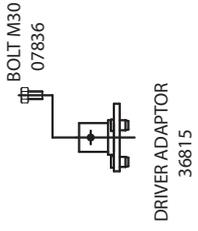
8"10" ROCK LEAD
36016
2m

AUTOGUIDE EQUIPMENT © 02/11/11 LWW PROJECT 9077

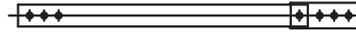
60R ANCHOR RANGE COMPLETE DRILLED **36686**

M16 x 90 BOLT 06049
M16 PLAIN NUT 02537

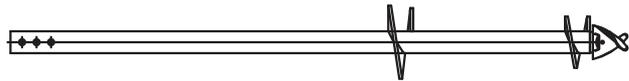
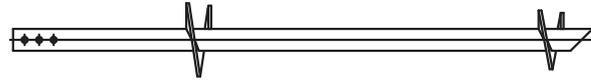
76 Round Anchor Range



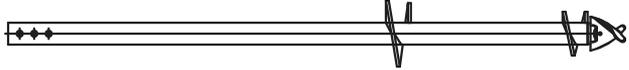
EXTENSION
37960
0.5m



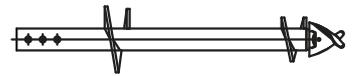
EXTENSION
37905
2m



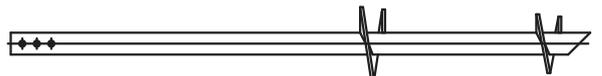
ROCK 7" / 10" LEAD
37895
2m



ROCK 6" / 8" LEAD
37930
2m



ROCK 6" / 8" LEAD
37961
1m



8" / 10" LEAD
37924
2m

AUTOGUIDE EQUIPMENT 04/04/13 MCR



76R ANCHOR RANGE COMPLETE DRILLED

37902

89 Round Anchor Range

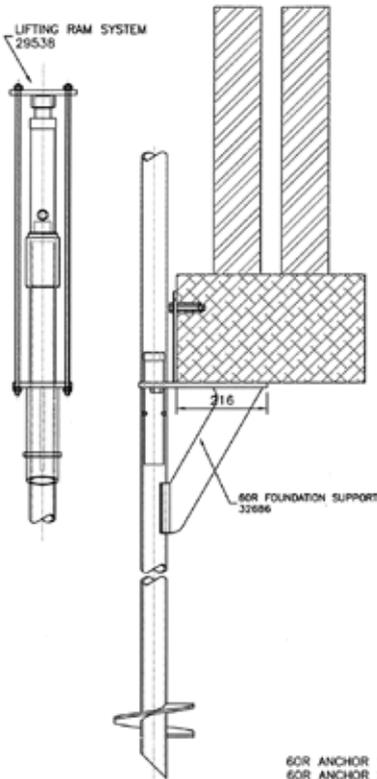


	CONICAL ANCHOR 36202 1.72M	
	CONICAL ANCHOR 33934 2.5M	
	EXTENSION 1M C/W END CAP 33184	ANCHOR DRIVER FEM 65 HEX 31049
	EXTENSION 2M 36649	ANCHOR TERMINATION 34354
	EXTENSION 3M 33075	8 BOLT FLANGE ANCHOR DRIVER 33072
	8" / 10" / 12" ROCK ANCHOR 34907 2M	REBAR TERMINATION 34691
	8" / 10" / 12" LEAD SECTION 36651 2M	THREADED TERMINATION M36 36117
	10" / 12" LEAD SECTION 36062 2M	THREADED TERMINATION 33692
	10" / 12" / 14" / 14" LEAD SECTION 32973 3M	FOUNDATION JACK 35761
	8" / 10" / 12" / 14" LEAD SECTION 36653 3M	



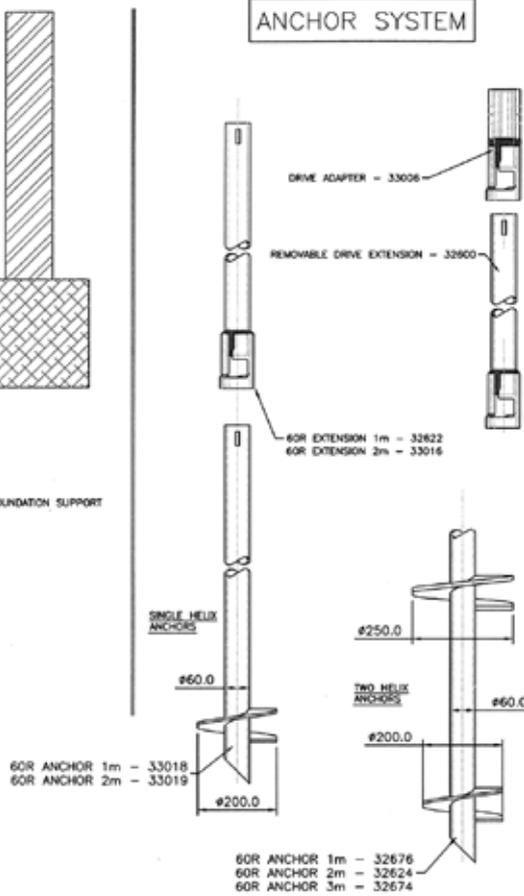
Anchor Installation

EXISTING FOUNDATIONS

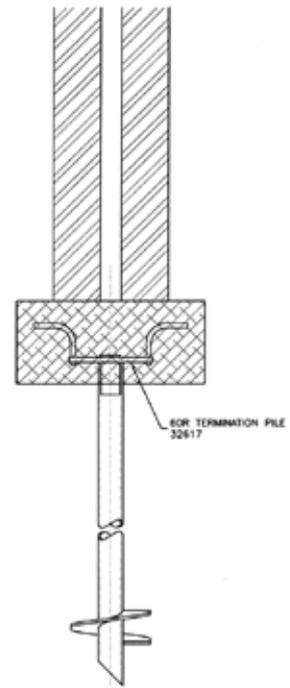


THIRD ANGLE PROJECTION

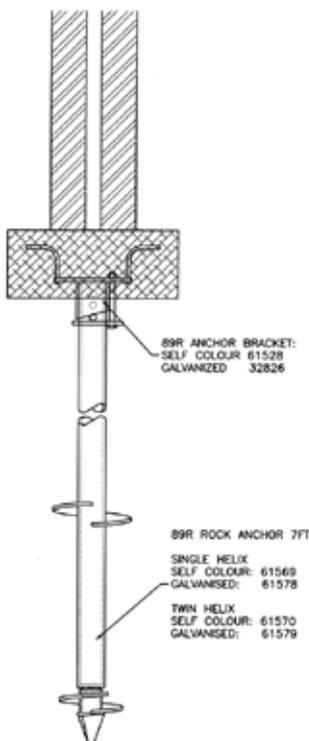
ANCHOR SYSTEM



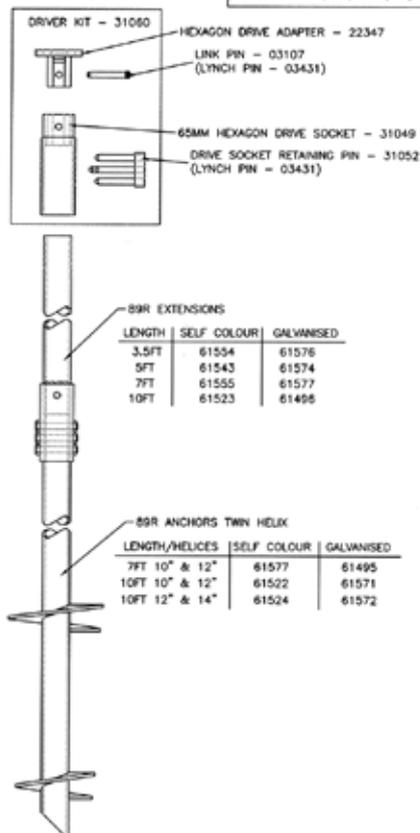
NEW FOUNDATIONS



ROCK ANCHOR SYSTEM



SOIL ANCHOR SYSTEM



AUTOGUIDE EQUIPMENT © HELICRETE 89R PROJECT: 9077
60R PILING SYSTEM 29523

UPDATED AUGUST 2006

AUTOGUIDE EQUIPMENT © HELICRETE 89R PROJECT: 9077
89R PILING SYSTEM 32541



Torque Heads

1. Determine whether there is site access for an excavator – and how big.
2. If hand installation is the only possible solution then the piles may only be 60RL, 60R and 76RL. The 60R family can be installed with 400H and 76RL with the 650H.
3. The pile torque limit will determine the size of torque head and also minimum excavator size. The torque output of a head is dependent on the hydraulic pressure available, which will be 200 bar for most small machines up to about 3 tonnes.

The principal advantage of larger machines is the greater flow available- this means more speed, but please consult us first!

	Max Torque	400H	650H	500X/XG	900X	1900X	2500X/XG
60RL	2.5	70	-	60	-	-	-
60R	4.5	140*	75	200*	-	-	-
76RL	8	-	140	-	180	90	-
76R	16	-	-	-	-	180	130
89R	18	-	-	-	-	200*	150
89RHD	25	-	-	-	-	-	200*

The numbers represent the pressure at which the heads produce the required torque. Unless marked * pressures will be lower than the maximum relief valve setting and either a lower valve setting or careful observations will be required!



Portable Anchor Installation Equipment

400H



The ABC 400H handheld hydraulic anchor driver utilises a separate power-pack, allowing the product to be used in confined spaces or areas of limited access such as inside buildings

Hydraulic power permits continuous operation.

- Installation Torque up to 4,000Nm
- Ideal For AB Chance 38mm or 60mm screw piles - max capacity 120KN
- Through Head allows user to install long piles in one piece
- Instant Torque readout from calibrated gauge
- Quiet operation - powerpack can be away from the operation area and idles when not driving anchor



www.helicrete.com.au



Portable Anchor Installation Equipment

650H

The 650H is the next generation in hand held hydraulic screw pile installation heads. Following on from the very successful 400H, the 650H is capable of delivering 6,500Nm of torque.

Piles can be installed that have an ultimate capacity of up to 240kN.

Using the 650H is a 2 man operation and runs off a standard 140BAR/30ltr/min hydraulic power pack.

Due to the 'through head' design, the 650H is never more than 1m from the ground which makes it safer and easy to use.

(using ABC Anchors designed piles)



Features

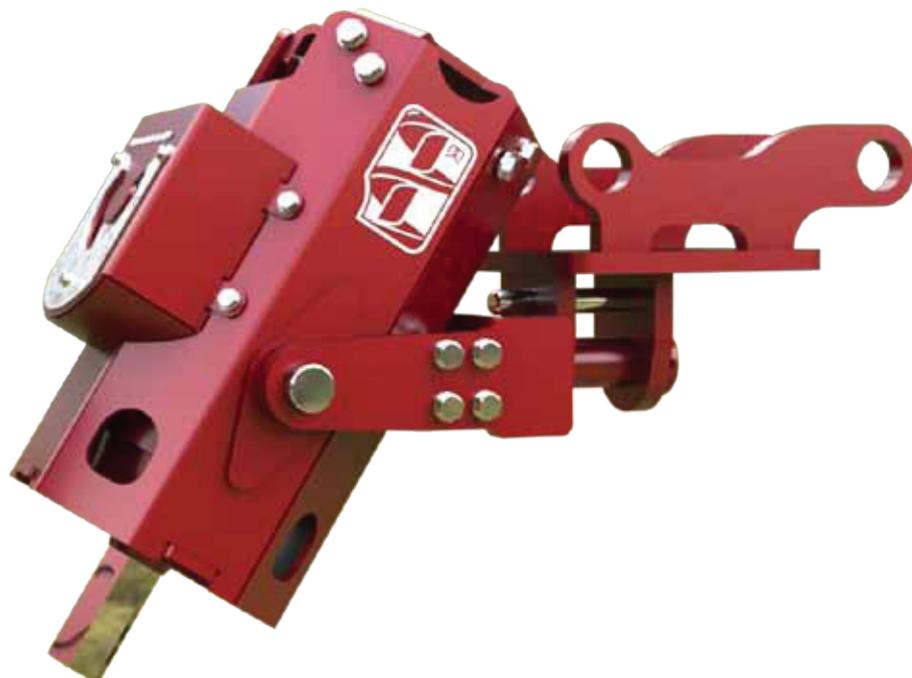
- ▶ Unique 'Through Head' pile driving system allows installation of long piles in one piece. This creates a safer working height for the installation team
- ▶ Instant torque readout from calibrated gauge
- ▶ Quiet operation - powerpack can be remote from operation
- ▶ Compact design allows installation close to existing foundation
- ▶ Especially useful in difficult to access sites
- ▶ High torque reversible motor
- ▶ Telescopic torque arm is lightweight for ease of use
- ▶ Fast set up
- ▶ Suitable for:





500X Torque Head

500X



The 500X Torque Head is the head of choice for installing ABC 60R Screw Piles.

Choice of mounting brackets allows the 500X to be fitted to excavators from 1.5 to 6 tonnes, and allows anchor installation at a wide range of angles.

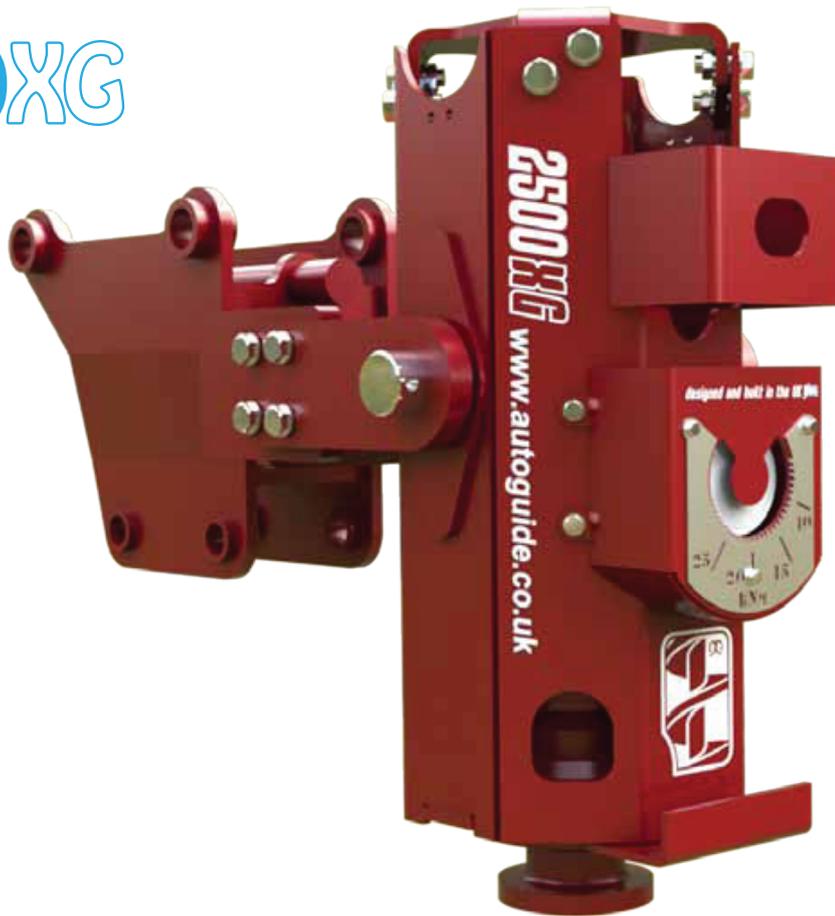
- Fixed speed unit tailored for excavators
- Widely used throughout the industry
- Choice of boom or Gimbal mounting
- Approved by all leading machine manufacturers
- Installation torque of up to 5,000Nm
- Gimbal mount improves operator safety by allowing horizontal loading of piles





2500X Torque Head

2500XG



The 2500X Torque Head is the head of choice for installing 76R and 89R Screw Piles. Choice of mounting brackets allows the 2500X to be fitted to excavators from 4 to 10 tonnes, and allows anchor installation at a wide range of angles.

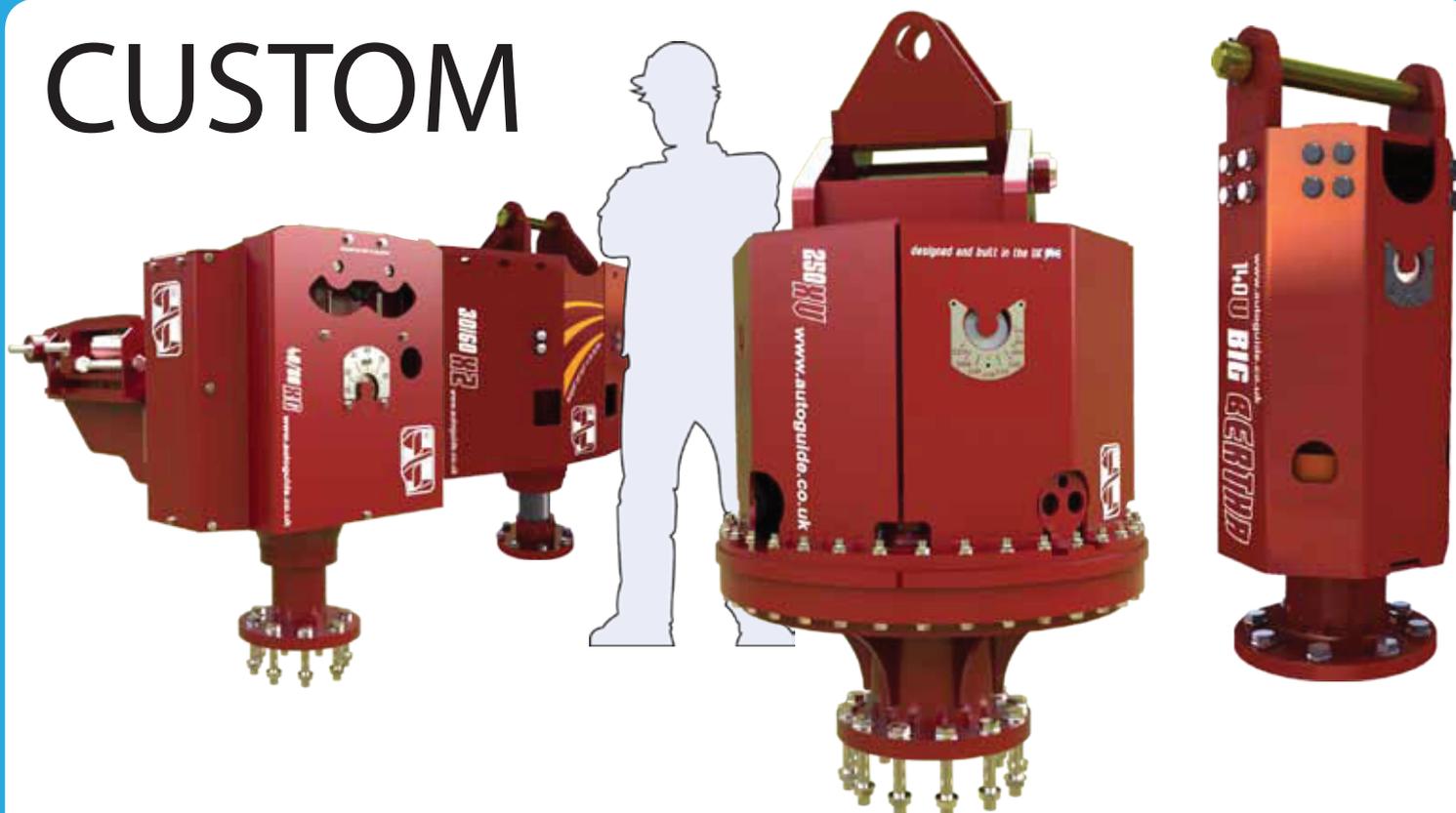
- Fixed speed unit tailored for excavators
- Widely used throughout the industry
- Gimbal mounted
- Approved by all leading machine manufacturers
- Installation torque of up to 25,000Nm





Client Specific Torque Heads

CUSTOM



Whether for use with ground anchors or screw pile foundations, from torque heads to mounting brackets, Autoguide's highly experienced team can quickly design and produce unique units to suit specific customer needs.



Single speed torque heads incorporate Parker motors with high pressure shaft seals to eliminate the need for a drain line



Double speed torque heads use 2 or 4 motors with manual changeover valves to select the torque



Gimbal mounted



Variable speed units are used on both large machines and also small machines where access is limited. The variable speed enables smaller machines to install high capacity piles. For example, a 3.5 Tonne mini excavator can produce 25kNm to install 500kN piles



Anchor specific torque heads

Whatever your requirements, from 4,000Nm to 250,000Nm - custom models can range from job specific modifications of existing products to completely new designs.





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- ▶ Wall Restraint and Stabilisation
- ▶ Masonry Arch Repairs
- ▶ Expansion Joint Creation
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- ▶ Crack Stitching and Creation of Load Bearing Beams
- ▶ Heritage Restoration
- ▶ Brickwork Re-Pointing
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Equipment

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- ▶ Handheld Screw Pile Equipment
- ▶ Hydraulic Post Drivers
- ▶ Screw Piles and Underpinning Brackets

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