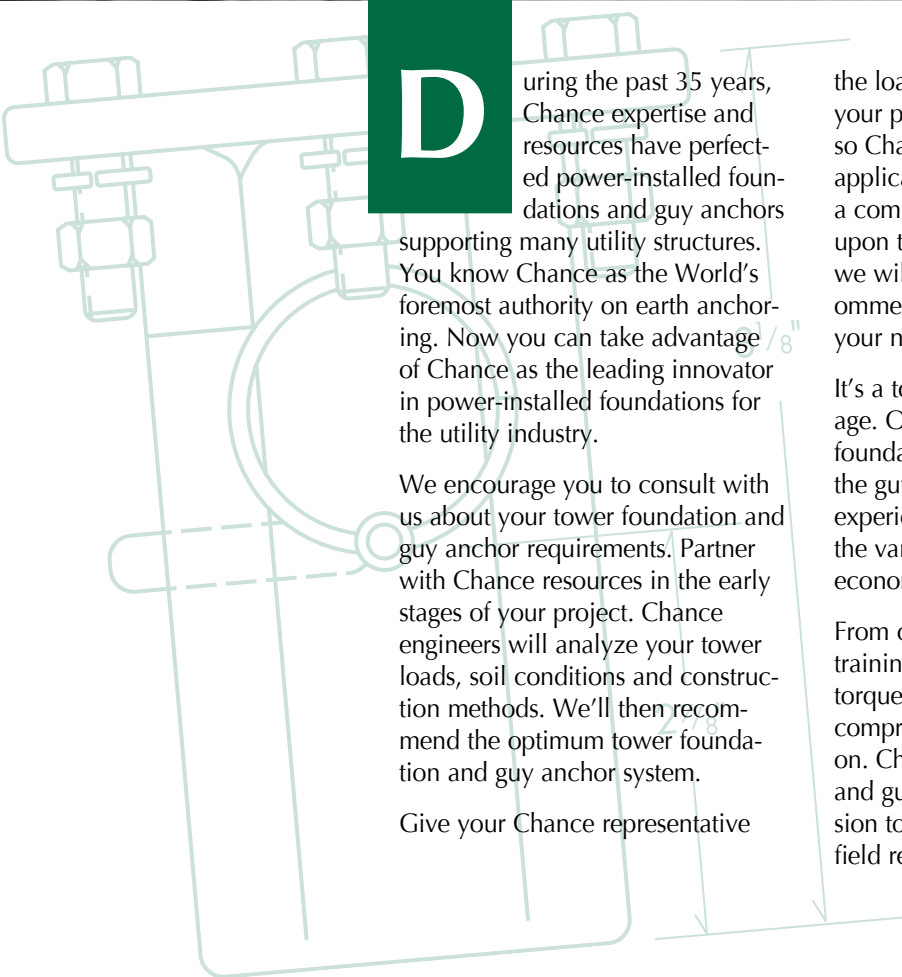




POWER-INSTALLED
FOUNDATIONS,
GUY-ANCHORS AND
INSTALLING EQUIPMENT





D

uring the past 35 years, Chance expertise and resources have perfected power-installed foundations and guy anchors supporting many utility structures. You know Chance as the World's foremost authority on earth anchoring. Now you can take advantage of Chance as the leading innovator in power-installed foundations for the utility industry.

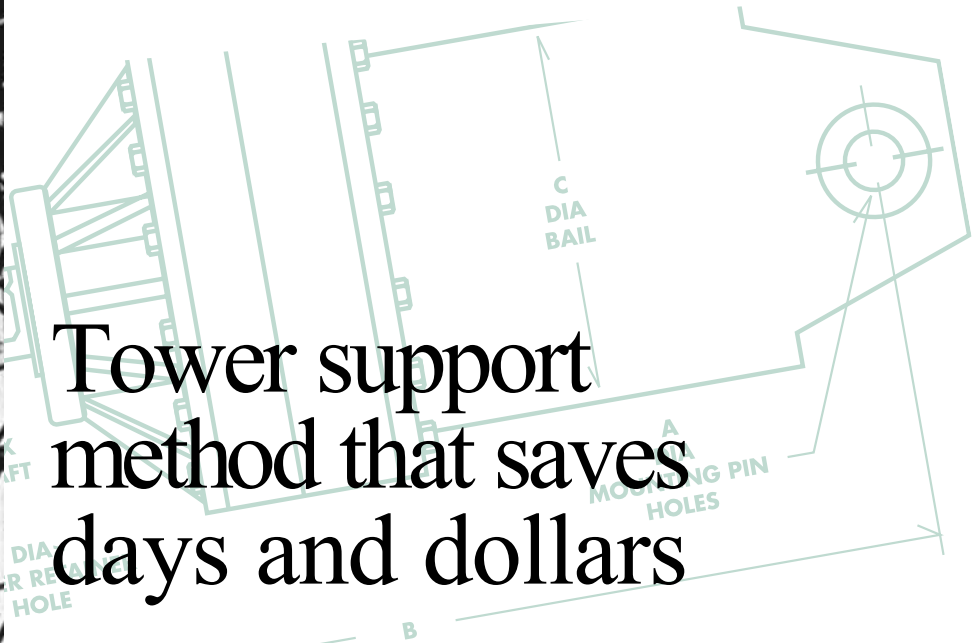
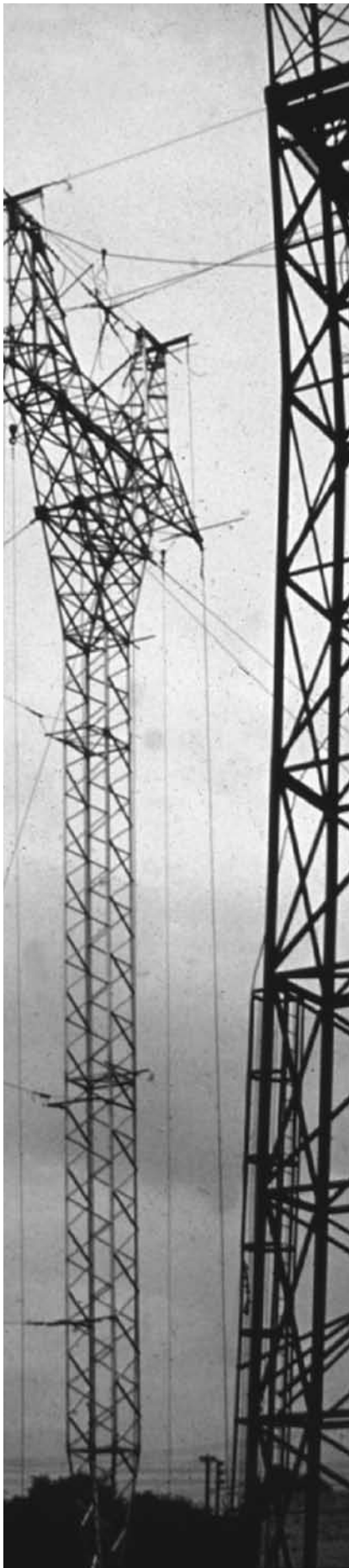
We encourage you to consult with us about your tower foundation and guy anchor requirements. Partner with Chance resources in the early stages of your project. Chance engineers will analyze your tower loads, soil conditions and construction methods. We'll then recommend the optimum tower foundation and guy anchor system.

Give your Chance representative

the load and soil information for your proposed transmission project so Chance foundation and anchor application engineers can conduct a comprehensive evaluation. Based upon the information provided, we will conduct a study and recommend the system best suited to your needs.

It's a total civil construction package. Our service includes the foundations, the guy anchors and the guy grips...not to mention the experience and expertise to match the various parameters to the most economical system type.

From choice of material to crew training, installing technique and torque requirements, Chance has a comprehensive plan you can count on. Choose Chance foundations and guy anchors for your transmission towers. They're field proven, field respected.



Tower support method that saves days and dollars

Compared to traditional ways of constructing transmission tower foundations, the Chance power-installed, screw-type foundation system offers attractive benefits in the conservation of labor, materials and equipment. And, most importantly, it saves time.

Chance tower foundations for lattice steel, self-supporting structures usually install at the rate of two to three towers per crew day. Single-element foundations for guyed towers generally install at five or six per crew day, including guy anchor installation.

If your rotary digging equipment provides adequate torque and down pressure, you can install Chance foundations. The only additional elements necessary are Chance Kelly-Bar adapters, torque indicator and drive tool.

Chance foundations and guy anchors are installed in the same manner. You will save on labor costs because smaller work and fewer crafts are involved. Unlike concrete, Chance foundations and anchors can be scheduled throughout the

year. Weather seldom stops construction. There is no waiting for concrete to cure, no excavation and no spoils removal. Towers can be erected immediately, so you save time and eliminate returns to the site.

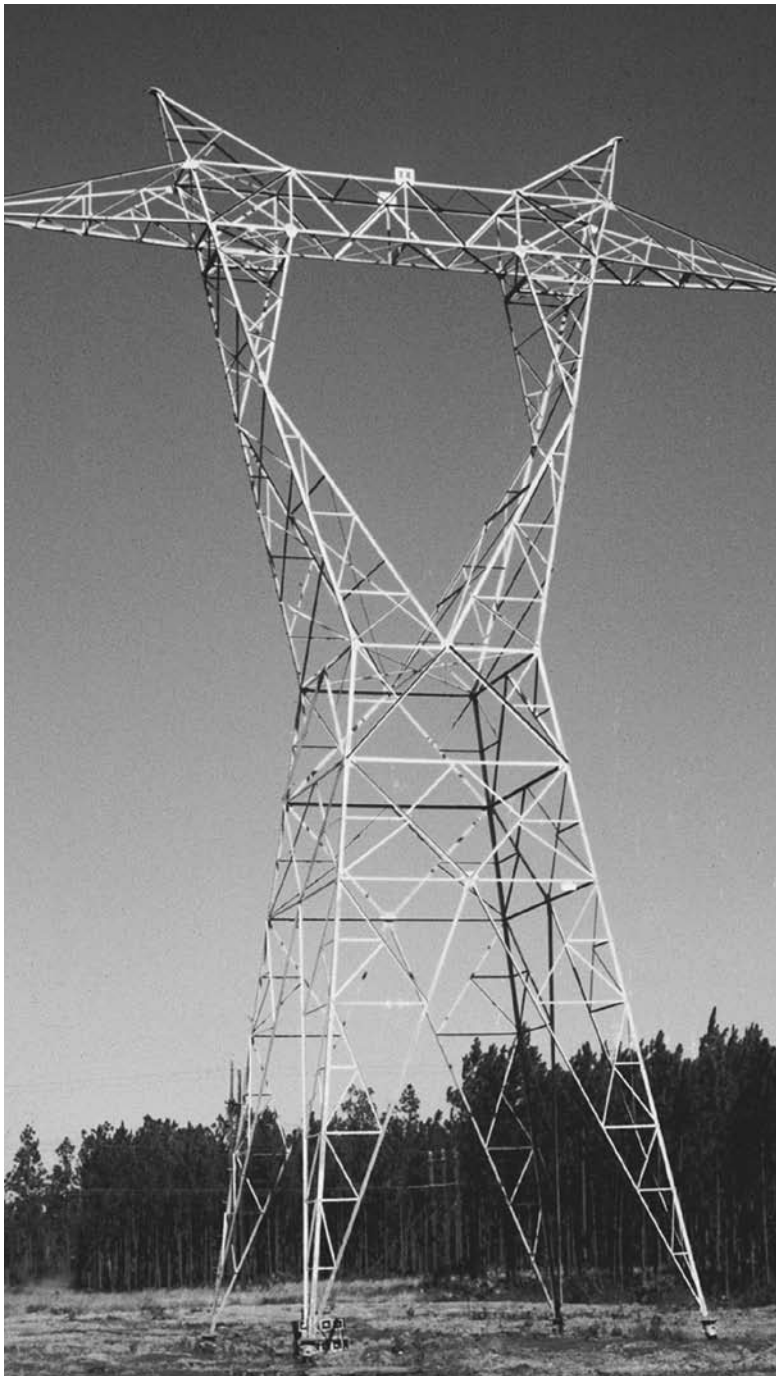


Chance foundations and anchors are ideal in areas inaccessible for conventional construction, or when weather limits construction time. They are valuable for rapidly restoring service in emergencies.

You can install Chance foundations and anchors in almost any type of terrain, including steep inclines, flood plains, glacial till, sand, swamps and bogs. Once the foundations are in place, you can erect

the tower using traditional construction practices. Weather will not delay your construction timetable. You can install Chance foundations in wet and freezing conditions as well as ideal weather.

The design of Chance foundation systems adapt to site conditions. Your crews have many options available, should they encounter unusual or peculiar installation situations.



Designed for adaptability

Simplicity of design is one of the greatest advantages of the Chance foundation and anchor systems. The basic foundation and anchor element consists of a multi-helix lead section designed to withstand specific load torque. Extension sections can be added which help permit the lead section to be driven to the necessary depth.

More than 35 years of research, engineering, product development and testing by Chance have brought the art of power-installed foundations and anchors to its mature state. Size and weight are no longer criteria for rating reliability. Advanced design, strength of steel and the science of soil mechanics combine to establish foundation and anchor dependability.

Our foundations are designed to withstand the stress of torsion, bending and shear. High-strength steel helix plates distribute the up-lift and compression forces. The pipe shaft transfers horizontal shear, torsion and bending to surrounding soils. Guy anchors are designed to withstand the tensile loads of guyed towers.

Soil data for your tower sites is entered into our geotechnical anchor data bank. Using proprietary software programs, Chance engineers then job-match each tower foundation and anchor to your specific soil condition to achieve predictable holding strength. You can rely upon Chance foundations and anchors to perform as designed.

Based upon our years of combined experience serving the utility industry, we know how to get the materials you need on-site, on time and ready to use.

SOIL CLASSIFICATIONS

Class	Common Soil-Type Description	Geological Soil Classification	Probe Values in -lbs. (Nm)	Typical Blow Count "N" per ASTM-D1586
0	Solid hard rock, unweathered	Granite, Basalt, Massive Limestone	N.A.	N.A.
1	Very dense and/or cemented sands; coarse gravel and cobbles	Caliche, (Nitrate-bearing gravel/rock)	750-1600 (90-208)	60-100+
2	Dense fine sand; very hard silts and clays (may be preloaded)	Basil till; boulder clay; caliche; weathered laminated rock	600-750 (78-98)	45-60
3	Dense clays, sands and gravel; hard silts and clays	Glacial till; weathered shales, schist, gneiss and siltstone	500-600 (65-78)	35-50
4	Medium dense sandy gravel; very stiff to hard silts and clays	Glacial till; hardpan; marls	400-500 (52-65)	24-40
5	Medium dense coarse sand and sandy gravels; stiff to very stiff silts and clays	Saprolites, residual soils	300-400 (39-52)	14-25
6	Loose to medium dense fine to coarse sand; firm to stiff clays and silts	Dense hydraulic fill; compacted fill; residual soils	200-300 (26-39)	7-14
**7	Loose fine sand; Alluvium; loess; soft-firm clays; varied clays; fill	Flood plain soils; lake clays; adobe; gumbo, fill	100-200 (13-26)	4-8
**8	Peat, organic silts; inundated silts, fly ash	Miscellaneous fill, swamp marsh	less than 100	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 to 6, underlying the Class 7 or 8 soils.*

SOIL TYPES

The simplest way to classify soils is cohesive and non-cohesive. Fine grained soils such as clay are considered cohesive, while sand and other coarse grained soils are non-cohesive.

The general headings of cohesive and non-cohesive soils may be further subdivided by several other characteristics such as origin, method of deposition and structure. Soil structure may be classified as deposited or residual. Deposited soils have been transported from their place of formation to anchor location. Residual soils are formed by physical and/or chemical forces breaking down parent rocks or soil to a more finely divided structure. Residual soils are sometimes referred to as weathered.

Soil structure properties can be categorized into loose, dense honeycombed, flocculated, dispersed or composite. Unfortunately, these soils do not necessarily retain consistency at various depths. Often, they are in layers of different thickness of unlike soils.

Anchoring problems are more complicated when a soft soil layer is sandwiched between two hard or dense layers. Under such circumstances, the relative position of an anchor helix in the soil matrix becomes critical. In these cases, assuming the helix remains rigid and the soil fails, the anchor begins to

creep. If the soil fails near the helix, it begins to "flow" around it. Successful, trouble-free anchoring demands the careful evaluation of local soil conditions and anchor types. Without proper soil/anchor planning, maximum anchor performance can never be assured.

FROST, WATER AND SOIL

Armed with knowledge of soil type or class, the potential effects of frost and water on soil and anchors can be evaluated.

If an anchor helix is in a zone of deep frost penetration, frozen soil will behave as a stiffer soil and will generally yield greater holding capacity. However, when spring thaws begin, soil in the overlying zone will be water-saturated while the layer "housing" the helix will remain frozen. This condition is analogous to a hard layer under a soft layer, and may result in sudden anchor failure. Sometimes anchor "jacking" or movement out of the ground occurs during these conditions.

In areas with permafrost, the helix should be at least three to five feet below the permafrost line, and provisions made to prevent solar energy from being conducted down the anchor.

Anchor holding capacity decreases as moisture content increases. If a helix is installed at the water table level,

anchor capacity should be determined based on the water table above the helix. Such a condition can reduce helix capacity by as much as 50 percent in granular soil. (A water table is usually defined as the elevation at which the water will stabilize in an open hole 24 hours after the hole is drilled.)

Water, draining from fine grain soil under load, will permit creep. This is similar to the consolidation phenomenon under a foundation. Rapidly applied loads due to wind or ground tremors have little effect on creep so long as they do not exceed soil shear strength. However, line angle structures producing high normal loading can cause clay pore water to slowly drain off. Under such circumstances, creep could become troublesome even though the anchor/soil system has not structurally failed. This results in the guy having to be periodically retensioned.

EFFECTIVE ANCHORING

The guiding principle to be used in selecting an anchor system is: FIELD CONDITIONS SHOULD DICTATE THE SYSTEM USED. The office solution, based on the best engineering analysis of the site, is subject to field changes. When a soil change occurs, one must consider how it affects the original solution. Steps must then be taken to compensate for differences due to changes.

Tabulated anchor holding capacities of earth anchors are the result of field tests in different soils as defined by recognized soil investigation procedures. All data is recorded on Engineering Test Report Sheets (*see below*).

During the anchor installation, care is taken to ensure regular practices are observed. If any special treatment is used, this is noted on the test data sheet.

The anchor is pulled in line with the intended guy so the results represent the usable holding capacity on the guy. Creep* is measured in line with the pull after some initial load is applied to seat the anchor. The initial load is generally

in the order of 2000 pounds (907 kg). The load is slowly increased throughout the test with stops at increments of load for creep reading. Creep is read with the load stable and the anchor holding.



Using a transit, anchor creep is monitored as load is applied to the installed anchor.

A. B. CHANCE COMPANY
ANCHOR TEST REPORT

TEST REPORT NO: 1-033-89-51
DATE OF TEST: 12-06-89
SHEET 6 OF 8

TEST FILE: B-4.52
PROJECT NO: PA-1514
REQUEST NO: 1-033-89

ANCHOR TYPE: TOUGH ONE - 15 (15000 FT.-LBS.)
DESCRIPTION: 10" DIA HELIX WITH 50 KIP ROD, INSTALLED WITH TOUGH ONE WRENCH AND LEBOW TORQUE INDICATOR

CAT. NO: C102-5001

TESTED FOR: ENGINEERING RESEARCH

LOCATION: ODOM'S SINK HOLE NEAR ELDRIDGE, MO
LACLEDE COUNTY, MISSOURI WEATHER: CLOUDY, COLD 35-40 DEGREES
DEPTH INSTALLED: 7 FEET 7 FEET 90 DEGREES
(ALONG ROD) (VERTICAL) (ANGLE)

LOAD TEST RESULTS				INSTALLATION TORQUE			SOIL TEST RESULTS		
TEST LOAD (KIPS)	TIME ELAPSED (MIN)	SCALE READING (IN)	DEFLECTION (IN)	DEPTH ALONG ROD (FT)	INSTALL. TORQUE (LB-FT)	COMMENTS	VERTICAL DEPTH (FT)	TEST DATA	SOIL CLASS
5		0.00	0.00	0.5					
10		0.03	0.03	1					
10	0.50	0.03	0.03	1.5					
20		0.22	0.22	2	3.6				
20	0.50	0.22	0.22	2.5	5				
30		0.38	0.38	3	6				
30	0.50	0.44	0.44	3.5	3.3				
30	0.50	0.44	0.44	4	3				
40		0.56	0.56	4.5	3.2				
40	0.50	0.63	0.63	5	3.5				
40	0.50	0.63	0.63	5.5	3.8				
45		0.72	0.72	6	14				
45	0.50	0.78	0.78	6.5					
45	0.50	0.88	0.88	7	15 +				
45	0.50	0.94	0.94						
45	0.50	0.97	0.97						
45	0.50	0.97	0.97						
50		1.25	1.25						
50	0.50	1.69	1.69						
50	0.50	1.72	1.72						
50	0.50	1.72	1.72						
55	0.50	1.97	1.97						
55	0.50	2.28	2.28						
55	0.50	2.34	2.34						
55	0.50	2.34	2.34						
60		2.56	2.56						
60	0.50	2.91	2.91						
60	0.50	2.91	2.91						
62.5		3.00	3.00						
62.5	0.50	3.22	3.22						
62.5	0.50	3.28	3.28						
62.5	0.50	3.28	3.28						
65		3.38	3.38						
65	0.50	3.63	3.63						
65	0.50	3.72	3.72						
65	0.50	3.75	3.75						
65	0.50	3.75	3.75						
5.0		3.19	3.19						

				RESULT SUMMARY									
				EFFECTIVE TORQUE (LB-FT):		12260	ULTIMATE LOAD (LB):		65000				
				LOAD @ 4" (LB):		65000	LOAD @ 1" (LB):		45000				
SITE CONDITIONS													
CLAY(X) SILT(X) SAND(X) GRAVEL(X) COBBLES(X) BOULDERS(X)													
ROCK (TYPE): LIMESTONE													
DRY(X) MOIST(X) SATURATED(X) HARD(X) FIRM(X) SOFT(X)													
EQUIPMENT USED: ALTEC D1000 DIGGER DERRICK WITH 20 FT-KIP DIGGER MOTOR, LEBOW TORQUE INDICATOR, TRANSIT, BI-POD													
PULL TEST UNIT.													
TESTED BY: DAN HAMILTON, G. SEIDER													
OBSERVED BY: TIM STAELENS, KEVIN CLIZER, TIM QUALHEIM, MIKE DENNIS													
REPORT BY: G. SEIDER													
APPROVED BY: <i>[Signature]</i>													



Chance has a full fleet of anchor testing equipment to help utilities plan their anchoring requirements.

*Creep-measurement of a point on the anchor rod in relation to a fixed position on the ground and in line with the direction of pull.

EXTENDIBLE-FOUNDATIONS

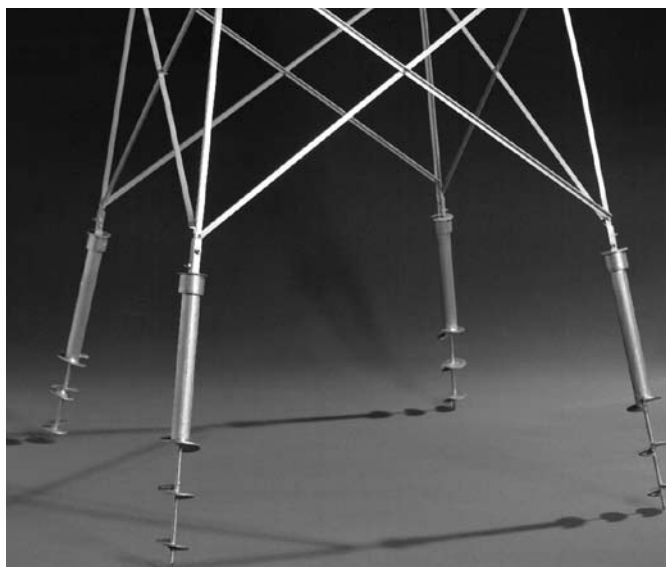
FOR DEEP-BEARING

Chance extendible foundations come in two types. Type HS is a multi-helix lead section of 3-inch extra-heavy pipe shaft (7.6cm) to which additional extensions of the same size diameter may be added if high lateral load-carrying capacity is not required. Type TC is a similar-design lead section with the same type helices used on Type HS foundations plus extensions of 8-inch pipe (20.3cm) for resisting uplift, compression, bending and lateral loads.

APPLICATIONS

Extendible foundations are especially applicable in areas where a high water table exists. Concrete foundations require soil preparation prior to installation. On jobs with low working clearances, such as when underpinning an existing building, Chance extendible foundations are ideal. Light, temporary structures and prefabricated buildings also have been supported by foundations. Each foundation element may be incorporated into a reinforced-concrete grade beam beneath the structure, or the foundation may attach directly to metal beams which support a structure. In many instances, power-installed foundations can be installed using the same equipment used for drilled foundations.

When encountering construction that demands low installing noise levels, vibration control, minimum spoils removal or ground-water concerns associated with excavation, look to removable and re-usable Chance power-installed foundations.



Each high-strength foundation has a galvanized multi-helix lead section of 3-inch extra-heavy pipe (7.6cm) to which extensions of the same size may be added. HS foundations are used in applications where compression and tension loads with moderate lateral loads are encountered. Various lead configurations and extensions allow flexibility in event of unexpected sub-surface conditions.

CONNECTION

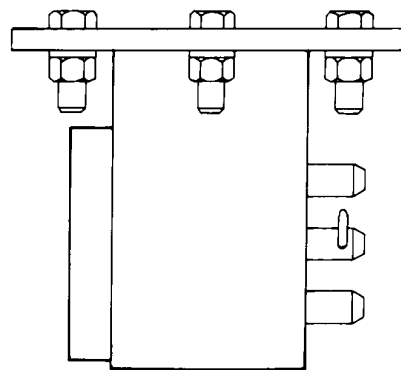
Type HS lead sections and extensions connect by bolted couplings. Two types of termination are available. One adapter accepts a threaded stud or L-Stud assembly for tension load. The adapter is embedded in a concrete cap. The other termination will accept a shackle or Chance ADJUST-A-GRIP® deadend for guy strands. Other special connectors can be fabricated on request.



HS Extension



Type HS Foundation



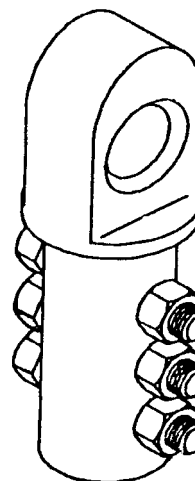
HS FOUNDATION TOOL

Tubular tool fits over end of 3-inch pipe (7.6cm pipe) Type HS foundation for power installation. A throughbolt secures the tool to the foundation for driving.

Catalog No.	Weight, lb.	Weight, kg
C303-0754	15	7

HS-Lead Sections

Cat. No.	Length, ft.	Length, m	Helix Config., in.	Helix Config., cm
C107-0561	4½	1.4	10, 12	25.4, 30.5
C107-0562	4½	1.4	12, 14	30.5, 35.6
C107-0564	7	2.1	10, 12, 14	25.4, 30.5, 35.6
C107-0565	6½	2.0	12, 14, 14	30.5, 35.6, 35.6
C107-0566	10½	3.2	8, 10, 12, 14	20.3, 25.4, 30.5, 35.6
C107-0567	10½	3.2	10, 12, 14, 14	25.4, 30.5, 35.6, 35.6
C107-0568	10½	3.2	12, 14, 14, 14	30.5, 35.6, 35.6, 35.6



Guy Termination Adapter
Catalog No. C111-0046

HS-Extensions

Cat. No.	Length, ft.	Length, m	Helix Config., in.	Helix Config., cm
C107-0577	4	1.2	14	35.6
C107-0579	7	2.1	14, 14	35.6, 35.6
C107-0573	3½	1.1	None	None
C107-0574	5	1.5	None	None
C107-0575	7	2.1	None	None

11,000 ft.-lb. (15,000Nm) Torque Capacity

See page 9 for foundation grillages and connections.

TYPE-TC-FOUNDATIONS

Tension/Compression Foundations have galvanized lead sections and extensions of 8-inch pipe (20.3cm) for resisting up-lift, compression and lateral loads. See page 9 for standardized components that provide flexibility in joining foundation to superstructure. A conventional pile cap will work with TC Foundations.

CONNECTION

Type TC members connect by bolted couplers at the top of the multi-helix lead section and each end of the extension section. For single-element foundations, two terminations are available. Bolted-Cap (to accept a shoe base or similar means to fit the superstructure) and Stub Angle (grouted into the extension cavity). For multi-element foundations, connections to transfer structural loads from the superstructure include the conventional concrete pile cap and metal grillages (Chance Tripod and Quadrapod designs for compression loads which can be field welded or bolted to also transfer tension loads).

Installation tolerances are incorporated into the Bolted Cap and Metal Grillage designs. The Bolted Cap provides a ± 1.4 inches (3.5cm) of horizontal adjustment. In general, grillages permit $\pm 2^\circ$ from a 10° batter on each element. Grouted or concrete connections provide considerable flexibility in setting the Stub Angle or conventional anchor bolts in the pipe cavity.



TC FOUNDATION TOOL

This special tool has drive pins that insert into the bolt holes of the couplers on TC foundation anchor lead sections and extensions. Easy-release mechanisms permit quick changes for additional extensions.

Catalog No.	Weight, lb.	Weight, kg
C303-0594	38	17

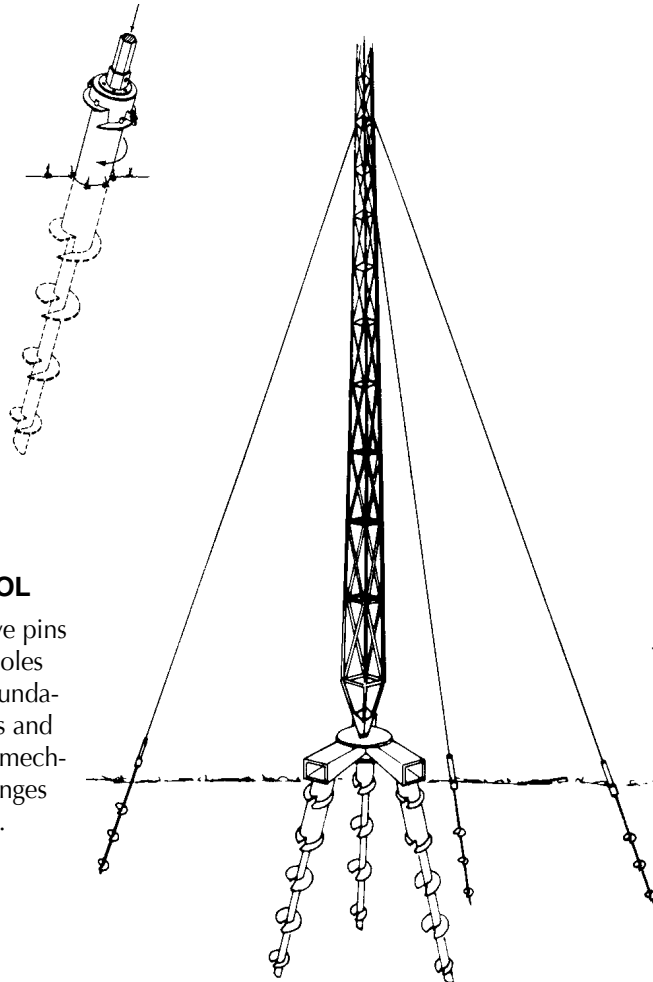
TC-Lead Sections (3-inch/7.6cm)

Cat. No.	Length, ft.	Length, m	Helix Config., in.	Helix Config., cm
C107-0666	5	1.5	10, 14	25.4, 35.6
C107-0667	7	2.1	8, 10, 14	20.3, 25.4, 35.6
C107-0668	7	2.1	10, 12, 14	25.4, 30.5, 35.6
C107-0669	10	3.0	8, 10, 12, 14	20.3, 25.4, 30.5, 35.6
C107-0670	10	3.0	10, 12, 14, 14	25.4, 30.5, 35.6, 35.6

11,000 ft.-lb. (15,000Nm) Torque Capacity

TC-Extension Sections (8-inch/20.3cm)

Cat. No.	Length, ft.	Length, m	Helix Config., in.	Helix Config., cm
C107-0656	3	0.9	14, 14	35.6, 35.6
C107-0657	5	1.5	14, 14	35.6, 35.6
C107-0658	7	2.1	14, 14	35.6, 35.6
C107-0659	10	3.0	14, 14	35.6, 35.6



TC Foundation

See page 9 for foundation grillages and connections.

Tripod Grillages



Tripod Grillage

Catalog No.	Description	Max. Compressive Load	
		KIPS	kg
C107-000203	Tripod to fit on 3" Pipe (7.6cm)	125	56,700
C107-001903	Tripod to fit on 3" Pipe (7.6cm)	150	68,000
C107-019203	Tripod to fit on 3" Pipe (7.6cm)	200	90,700
T107-027803	Tripod to fit on 3" Pipe (7.6cm)	250	113,400
C107-000208	Tripod with (3) 8" Pipe Adapters (20.3cm)	125	56,700
C107-001908	Tripod with (3) 8" Pipe Adapters (20.3cm)	150	68,000
C107-019208	Tripod with (3) 8" Pipe Adapters (20.3cm)	200	90,700
C107-027808	Tripod with (3) 8" Pipe Adapters (20.3cm)	250	113,400

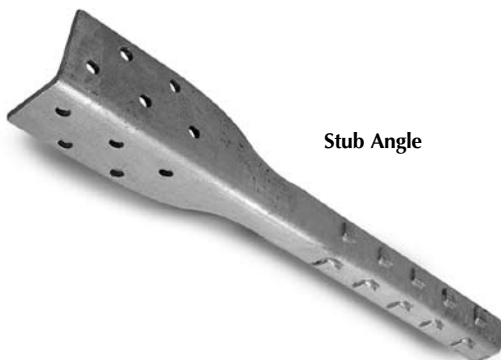


Quadrapod Grillage

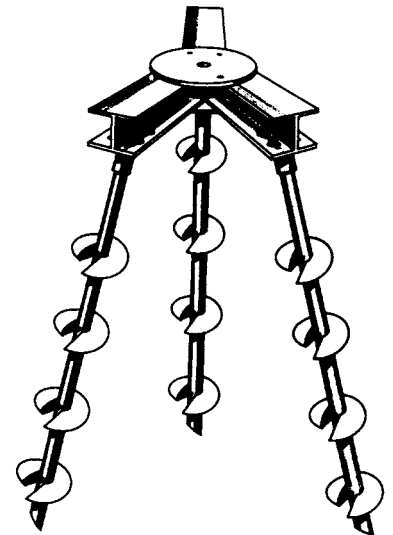
Quadrapod Grillages

Catalog No.	Description	Max. Compressive Load	
		KIPS	kg
T107-030303	Quadrapod to fit on 3" Pipe (7.6cm)	350	158,800

Note: Grillages available on a made-to-order basis.



Stub Angle



C107-0004 Adapter for 8" Pipe (20.3cm)



SQUARE SHAFT SS-ANCHORS

FOR HEAVY-GUYING APPLICATIONS

Square-Shaft SS multi-helix screw anchors are designed for heavy-guy loading. Two, three or four helices are welded on a round-cornered square-steel shaft (see page 11 for high-strength SS anchors). Each helix acts essentially as a separate anchor for increased holding capacity. Extension shafts may be coupled to the helix section for installation to the depth required to put the helices into firm anchoring soil. The top helix must be buried to a depth of at least 5 helix diameters into the soil. SS screw anchors consist of three galvanized components: the lead section, one or more extension shafts, which include an integral coupling, and the guy adapter. The extensions and guy adapters include a high-strength bolt and nut.



Guy Adapter

Extension

Lead Sec

ORDERING-INFORMATION

Typical working torque 5,500 ft.-lbs. (7,500Nm)
Ultimate tension strength 70,000 lbs. (32,000 kg)

Note: *Ultimate tension capacity may be limited to soil strength which could be less than 70,000 lbs. (32,000 kg)*

Lead Sections

Catalog No.	Length, ft.	Length, m	Helix Config, in.	Helix Config, cm
PO12642-AE	3	0.9	8, 10	20.3, 25.4
PO12642-EJ	3½	1.1	10, 12	25.4, 30.5
PO12642-AEJ	5½	1.7	8, 10, 12	20.3, 25.4, 30.5
PO12642-EJN	7	2.1	10, 12, 14	25.4, 30.5, 35.6
PO12642-AEJN	10½	3.2	8, 10, 12, 14	20.3, 25.4, 30.5, 35.6
PO12642-EJNS	10½	3.2	10, 12, 14, 14	25.4, 30.5, 35.6, 35.6

Extensions

Catalog No.	Nominal Length, ft.	Nominal Length, m	Std. Pkg./Pallet
12655	3½	1.1	1/50
12656	5	1.5	1/50
12657	7	2.1	1/50
12658	10	3.0	1/50

Extensions with helices are available. Contact your Chance representative for information.

Guy Adapters – All are 1½ ft. (0.5m) in length

Catalog No.	Description	Std. Pkg./Pallet
C102-0023	THIMBLEYE®	5/175
C102-0024	TWINEYE®	5/250
C102-0025	TRIPLEYE®	5/250
C102-0026	Threaded Stud	5/130
C102-0041	Ovaleye	5/200

SS-ANCHOR TOOL

These tools can be attached to a torque indicator, bolt circle adapter or the appropriate Kelly-Bar Adapter to install (Square Shaft) "SS" anchors. Each comes complete with bolts, nuts, lockwashers, one bent arm pin and one coil lock.

SS-ANCHOR
TOOL



FOR TORQUES UP TO 10,000 FT.-LBS. (13,600Nm)

Bolt Circle: six 9/16" holes (1.4cm) on 5¼" B.C. (13.3cm)

Cat. No.	Description	Weight, lbs.	Weight, kg
639001	SS5/SS150 Drive Tool	7	3

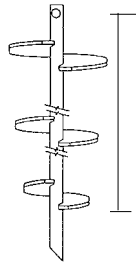
FOR TORQUES UP TO 15,000 FT.-LBS. (20,300Nm)

Bolt Circle: twelve 11/16" holes (1.7cm) on 75/8" B.C. (19.4cm)

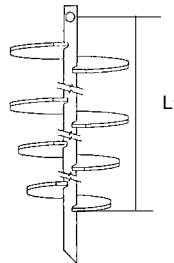
Cat. No.	Description	Weight, lbs.	Weight, kg
C303-0195	SS175 Drive Tool	18	8
C303-0201	SS200 Drive Tool	30	14
C303-0202	SS225 Drive Tool	30	14

HIGH STRENGTH SS-ANCHORS

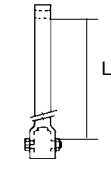
FOR HEAVY TENSION LOAD



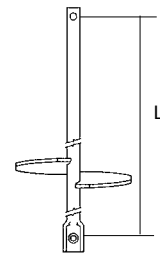
Lead Section



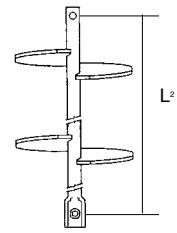
Lead Section



Extension



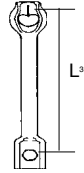
Single Helix
Extension



Two Helix
Extension



THIMBLEYE®
Adapter



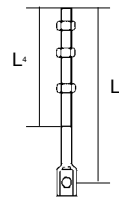
TWINEYE®
Adapter



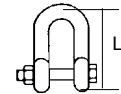
TRIPLEYE®
Adapter



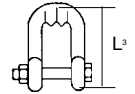
Ovaleye
Adapter



Threaded
Adapter



Chain Shackle



TRIPLEYE®
Chain Shackle

Ratings

Mechanical Properties	SS 150 1.50" Square Shaft	SS 175 1.75" Square Shaft	SS 200 2.00" Square Shaft	SS 225 2.25" Square Shaft
Max. Install. Torque	7,000 ft.-lbs. (9,500Nm)	10,000 ft.-lbs. (13,600Nm)	15,000 ft.-lbs. (20,300Nm)	20,000 ft.-lbs. (27,100Nm)
Min. Ultimate Tension Strength	70,000 lbs. (32,000 kg)	100,000 lbs. (45,400 kg)	150,000 lbs. (68,400 kg)	200,000 lbs. (90,700 kg)

Lead Sections

Helix Configuration	SS 150			SS 175			SS 200			SS 225		
	Catalog No.	L ¹ (in.)	L ¹ (cm)	Catalog No.	L ¹ (in.)	L ¹ (cm)	Catalog No.	L ¹ (in.)	L ¹ (cm)	Catalog No.	L ¹ (in.)	L ¹ (cm)
8" & 10"	C110-0385	30	76.2	C110-0227	30	76.2						
6", 8" & 10"							C110-0569	60	152.4	C110-0543	54	137.2
8", 10" & 12"	C110-0385	57	144.8	C110-0235	60	152.4	C110-0570	60	152.4	C110-0544	75	190.5
14", 14" & 14"	C110-0385	120	304.8	C110-0505	124	315.0	C110-0572	122	309.9	C110-0545	114	289.6
8", 10", 12" & 14"	C110-0385	120	304.8	C110-0247	124	315.0	C110-0573	122	309.9	C114-0189	115	292.1

Extensions

Helix Configuration	SS 150			SS 175			SS 200			SS 225		
	Catalog No.	L ² (in.)	L ² (cm)	Catalog No.	L ² (in.)	L ² (cm)	Catalog No.	L ² (in.)	L ² (cm)	Catalog No.	L ² (in.)	L ² (cm)
None	C110-0388	37	94.0	C110-0136	37	94.0	C110-0563	37	94.0	C110-0645	40	101.6
None	C110-0470	59	149.9	C110-0137	59	149.9	C110-0564	58	147.3	C110-0646	60	152.4
None	C110-0389	80	203.2	C110-0138	80	203.2	C110-0565	80	203.2	C110-0647	80	203.2
None	C110-0440	122	309.9	C110-0140	124	315.0	C110-0566	123	312.4			
Single 14" helix	C110-0471	48	121.9	C110-0472	48	121.9	C110-0577	45	114.3	C110-0650	39	99.1
Twin 14" helices	C110-0454	80	203.2	C110-0450	80	203.2	C110-0581	80	203.2	C110-0652	78	198.1
Three 14" helices	C110-0475	123	312.4	C110-0476	124	315.0	C110-0586	123	312.4			

Termination Adapters

	SS 150				SS 175				SS 200			SS 225		
	Catalog No.	L ³ (in.)	L ³ (cm)	L ⁴ (in.)	Catalog No.	L ³ (in.)	L ³ (cm)	L ⁴ (in.)	Catalog No.	L ³ (in.)	L ³ (cm)	Catalog No.	L ³ (in.)	L ³ (cm)
THIMBLEYE® Adapter	C102-0023	17	43.2		T110-0311	17	43.2		T110-0312	17	43.2			
TWINEYE® Adapter	C102-0024	17	43.2											
TRIPLEYE® Adapter	C102-0025	17	43.2		T110-0465	17	43.2							
Ovaleye Adapter	C110-0041	17	43.2											
Threaded Adapter	C110-0026	20	50.8	13 1/2	T110-0352*	48	121.9	36						
Chain Shackle	C110-0454				T110-0134	6 7/8	116.8		C110-0557	8 1/4	21.0	C110-0558	9	22.9

*T110-0352 includes two nuts.

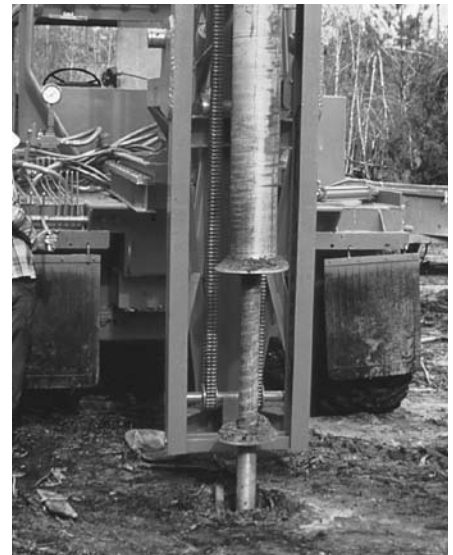
INSTALLING EQUIPMENT

GENERAL CONSIDERATIONS

To select appropriate anchor-installing equipment, first consider two basic requirements: Sufficient torque capacity and sufficient ground clearance at output shaft. Other criteria that deserve advance attention include: Material-handling capability, site limitations to overhead clearance, mobility (consider self-propelled vs. carrier-mounted and tracked vs. wheeled vs. floating).

For the requirements on a specific job, also consider the characteristics of two basic types of foundation-installing machinery. Guided-head installers offer excellent control over foundation posi-

tioning and alignment: suppliers include Acker, Highway, Hughes, ICE, Sterling, Texoma and Williams. Articulated-head installers usually suspend the torque head on a boom which also can be used to handle materials at the job site: suppliers include Altec, Caterpillar, Deere, Telelect and Wajax.



ANCHOR/FOUNDATION TORQUE HEAD



■ HYDRAULIC, VEHICLE-MOUNTED

- 3,500 FT.-LB. (4,700Nm),
6,000 FT.-LB. (8,100Nm),
& 12,000 FT.-LB. (16,000Nm)
TORQUE RATINGS

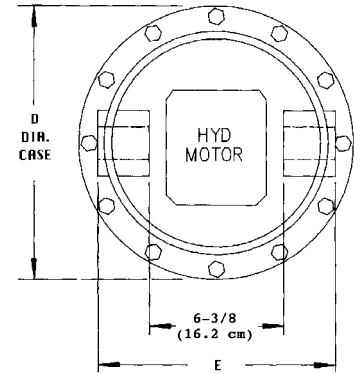
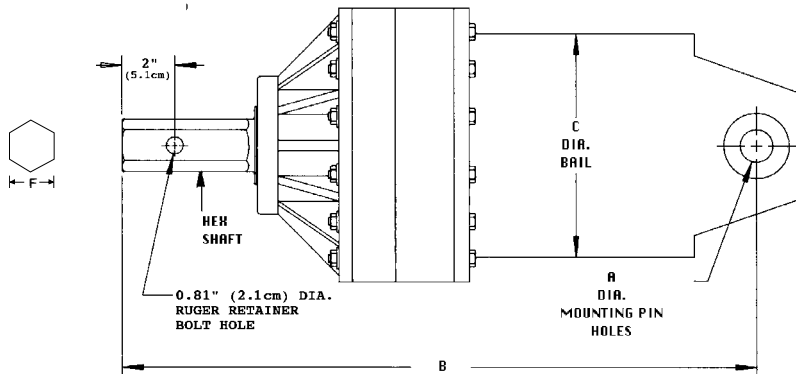
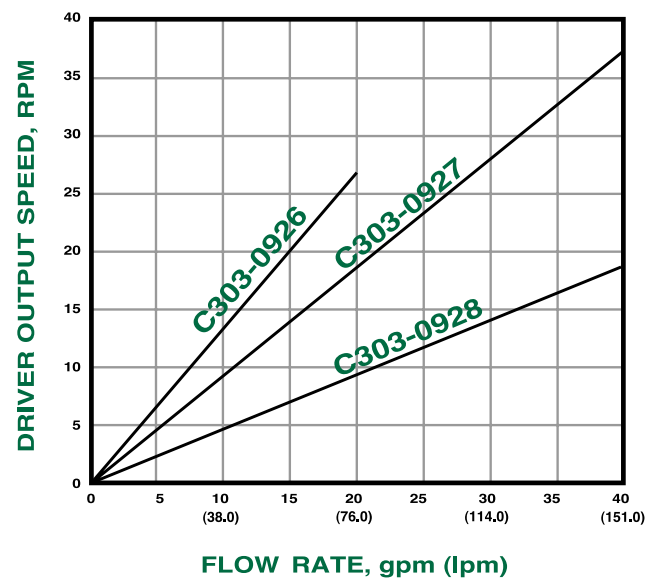
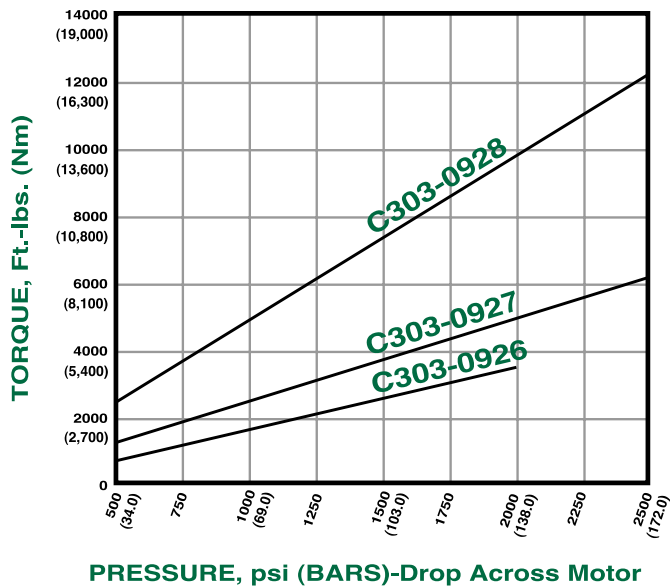
Specially suited for installing all screw-type anchors and foundations by such hydraulic equipment as backhoes, the torque head comes in three torque-rating ranges. The design also delivers other features for rugged field conditions:

- Precision planetary gears and bearings in oil-filled, sealed gearcase;
- Heavy-duty output housing and bearings;
- Backhoe bracket with dual-pin mounting provides drive-head positioning for controlled installations;
- Heavy-duty bail flange mounted to gearcase housing provides balanced load-sharing torque restraint;
- Torque head also readily accepts earth augers for hole digging.

Hose assemblies are not furnished with torque heads. For hydraulic flow more than 20 gpm (76 liters/min.), $\frac{3}{4}$ " diameter hose (1.9cm hose) is recommended. For flow rates of 20 gpm (76

liters/min.) and below, $\frac{1}{2}$ " hose (1.3cm hose) may be used. Swivel joint and swivel joint adapter are furnished. Thread size is 1"-1 $\frac{1}{2}$ " NPSM (National Pipe Straight Mechanical).





Anchor/Foundation Torque Heads

Catalog Number	Running Torque ft.-lb.	Running Torque Nm	Flow gpm	Speed rpm	Wt., lb.	Wt., kg	Dimensions (in., cm)											
							A	B	C	D	E	F						
C303-0926	3,500 @ 2,000 psi	4,700 @ 140 BARS	20	28	151	69	1.0	254	26	66.0	8.5	21.6	11	27.9	8.75	22.2	2	5.1
C303-0927	6,000 @ 2,400 psi	8,100 @ 165 BARS	40	39	246	112	1.5	3.81	29.5	74.9	10.7	27.2	13	33.0	11.4	28.9	2.5	6.4
C303-0928	12,000 @ 2,400 psi	16,000 @ 165 BARS	40	20	246	112	1.5	3.81	29.5	74.9	0.7	27.2	13	33.0	11.4	28.9	2.5	6.4

Mounting Brackets

Backhoe Name	Catalog Number	Bracket Description	Bracket Description
Case	C303-0969	6,000 & 12,000 ft.-lb. Eskridge	8,100 & 16,000Nm Eskridge
Case	C303-0970	3,500 ft.-lb. Eskridge	4,700Nm Eskridge
JCB	C303-0971	6,000 & 12,000 ft.-lb. Eskridge	8,100 & 16,000Nm Eskridge
JCB	C303-0972	3,500 ft.-lb. Eskridge	4,700Nm Eskridge
J.Deere	C303-0973	6,000 & 12,000 ft.-lb. Eskridge	8,100 & 16,000Nm Eskridge
J.Deere	C303-0974	3,500 ft.-lb. Eskridge	4,700Nm Eskridge

KELLY-BAR ADAPTERS

KELLY-BAR ADAPTERS

Kelly-Bar Adapters include bolts, nuts, and lock-washers, one bent arm pin and one coil lock.

FOR TORQUES UP TO 10,000 FT.-LBS. (13,600 Nm)

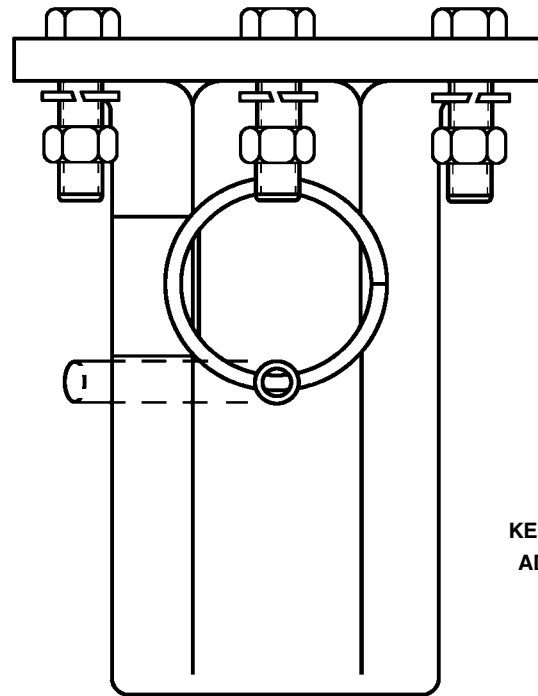
Bolt Circle: six $\frac{9}{16}$ " holes (1.4 cm) on $5\frac{1}{4}$ " B.C. (13.3 cm)

Catalog No.	Kelly-Bar Size, In.	Kelly-Bar Size, cm
P630011HD	2½" Hex	6.4 Hex
P630012HD	2½" Hex	6.7 Hex

FOR TORQUES UP TO 15,000 FT.-LBS. (20,300 Nm)

Bolt Circle: twelve $1\frac{1}{16}$ " holes (1.7 cm) on $7\frac{5}{8}$ " B.C. (19.4 cm)

Catalog No.	Kelly-Bar Size, In.	Kelly-Bar Size, cm
C303-0936	2½" Hex	6.4 Hex
C303-0937	2⅝" Hex	6.7 Hex
C303-0940	3" Hex	7.6 Hex
C303-0955	2½" Square	6.4 Square
C303-0958	3" Square	7.6 Square



**KELLY-BAR
ADAPTER**

BOLT CIRCLE ADAPTERS

BOLT-CIRCLE ADAPTERS

These adapters can be used between tools having incompatible bolt circles. Adapter C303-0115 may be used to connect two tools having $5\frac{1}{4}$ " bolt circles (13.3cm), for example when both have tapped holes. Adapter T303-0166 allows the connection of a tool with a $5\frac{1}{4}$ " bolt circle (13.3cm) to one with a $7\frac{5}{8}$ " bolt circle (19.4cm).



BOLT-CIRCLE ADAPTER

FOR TORQUES UP TO 10,000 FT.-LBS.

Catalog No.	Description	Wt., lbs.	Wt., kg
C303-0115	Adapter with two $5\frac{1}{4}$ " bolt circles (13.3cm) and six $\frac{1}{2}$ " x $1\frac{1}{4}$ " bolts (1.3cm x 3.2cm) and lockwashers	11	5
T303-0166	Adapter with one $5\frac{1}{4}$ " bolt circle (13.3cm) and one $7\frac{5}{8}$ " (19.4cm) bolt circle with six $\frac{3}{8}$ " x $1\frac{1}{2}$ " bolts (1.6 cm x 3.8 cm bolts) and lockwashers	18	8

INDICATES CORRECT ANCHOR DEPTH



SHEAR PIN TORQUE INDICATOR

With this Torque Indicator, screw anchors can be installed to a pre-determined torque value which gives a positive indication of the holding capacity of the anchor in any type soil. This tool also prevents excessive torsional loading of the anchor which could cause damage to the anchor during installation. By placing the correct number of shear pins in the tool, the pins shear clean at the proper torque value and the indicator becomes “free wheeling” to prevent the anchor from

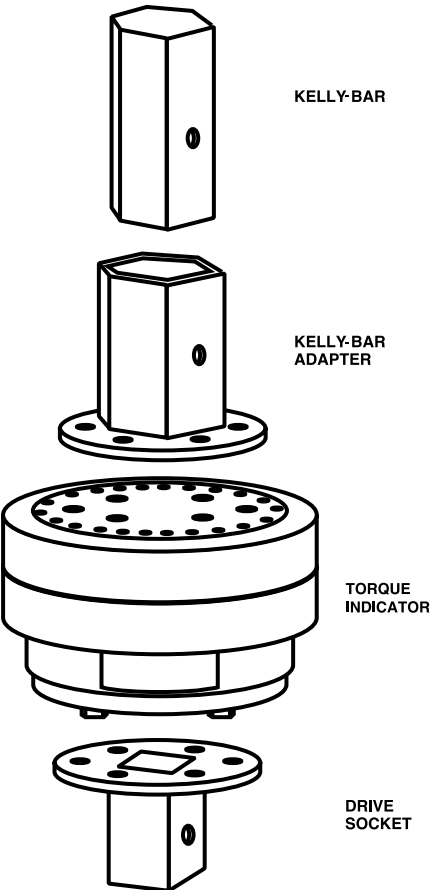
being driven deeper. Each shear pin value is 500 ft.-lbs. (6,800Nm).

The Torque Indicator is designed for installing Chance type PISA,® SS, RR and Foundation Anchors and will accurately measure installing torque up to 10,000 ft.-lbs. (13,600Nm). It is attached directly between the Kelly-Bar Adapter and the drive socket. The unit includes twelve ½” bolts (1.3cm) and lockwashers and has a 5¼” bolt circle (13.3cm) for attachment.

FOR TORQUES UP TO 10,000 FT.-LBS. (13,600Nm)

Catalog No.	Description	Weight, lbs.	Weight, kgs
C303-0044	Torque Indicator	54	24
C303-0045	One Carton of Shear Pins (Approx. 1700 pins)	50	23

ANCHOR
INSTALLING
SYSTEM



HS AND TC FOUNDATION TOOLS



TYPE HS-FOUNDATION-TOOL

TYPE HS FOUNDATION TOOL

Tubular tool fits over foundation shaft and throughpins secure the tool to the shaft for driving and can be attached to a torque indicator, bolt circle adapter, or 15,000 ft.-lb. Kelly-Bar Adapter. The tool includes six $\frac{5}{8}$ " bolts (1.6cm), nuts and lockwashers.

FOR TORQUES UP TO 15,000 FT.-LBS.

Bolt Circle: six $\frac{11}{16}$ " holes (1.7cm) on $7\frac{5}{8}$ " B.C. (19.4cm)

Catalog No.	Description	Weight lbs.	Weight, kg
C303-0754	HS Drive Tool	15	7



TC-FOUNDATION-TOOL

TC-FOUNDATION-TOOL

This tool has drive pins that insert into the bolt holes of the couplers on TC foundation lead sections and extensions. Easy-release mechanisms permit quick changes for additional extensions. The TC drive tool can be attached to torque indicator, bolt circle adapter or Kelly-Bar Adapter.

Catalog No.	Description	Weight, lbs.	Weight, kg
C303-0594	HS Drive Tool	38	17

For torques up to 10,000 ft.-lbs. (13,600Nm), drive tool has six $\frac{9}{16}$ " (1.4cm) holes on a $5\frac{1}{4}$ " (13.3cm) bolt circle. For torques up to 15,000 ft.-lbs. (20,300Nm), drive tool has six $\frac{11}{16}$ " (1.7cm) holes on a $7\frac{5}{8}$ " (19.4cm) bolt circle. Includes six $\frac{5}{8}$ " (1.6cm) bolts and lockwashers.

SS ANCHOR TOOL

SS ANCHOR TOOL

These tools can be attached to a torque indicator, bolt circle adapter or the appropriate Kelly-Bar Adapter to install (Square Shaft) "SS" anchors. Each comes complete with bolts, nuts, lockwashers, one bent arm pin and one coil lock.

SS ANCHOR TOOL



FOR TORQUES UP TO 10,000 FT.-LBS. (13,600 Nm)

Bolt Circle: six $\frac{9}{16}$ " holes (1.4cm) on $5\frac{1}{4}$ " B.C. (13.3cm)

Cat. No.	Description	Weight, lbs.	Weight, kg
639001	SS5/SS150 Drive Tool	7	3

FOR TORQUES UP TO 15,000 FT.-LBS. (20,300 Nm)

Bolt Circle: twelve $\frac{11}{16}$ " holes (1.7cm) on $7\frac{5}{8}$ " B.C. (19.4cm)

Cat. No.	Description	Weight, lbs.	Weight, kg
C303-0195	SS175 Drive Tool	18	8
C303-0201	SS200 Drive Tool	30	14
C303-0202	SS225 Drive Tool	30	14



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