

EARTH ANCHORS / KLAPANKERS

Anchor Type

Tie Bars & Tendons

AS-05

Material:
Stainless Steel; Cast Iron SG
Load range:
2 – 13 KN



Tie Bar:
Carbon Steel

Tendons:
Paracore; Stainless Steel; MS Galvanised

AS-10

Material:
Stainless Steel; Cast Iron SG
Load range:
4 – 27 KN



Tie Bar:
Carbon Steel

Tendons:
Paracore; Stainless Steel; MS Galvanised

AS-20

Material:
Stainless Steel; Cast Iron SG
Load range:
10 – 63 KN



Tie Bars:
**H.Y. Carbon Steel
Stainless Steel**

Tendons:
**Stainless Steel;
MS Galvanised**

AS-30

Material:
Stainless Steel; Cast Iron SG
Load range:
14 – 87 KN



Tie Bars:
**H.Y. Carbon Steel
Stainless Steel**

Tendons:
**Stainless Steel;
MS Galvanised**

AS-50

Material:
Stainless Steel; Cast Iron SG
Load range:
19 – 119 KN



Tie Bars:
**H.Y. Carbon Steel
Stainless Steel**

Tendons:
**Stainless Steel;
MS Galvanised**

AS-90

Material:
Stainless Steel; Cast Iron SG
Load range:
33 – 169 KN



Tie Bars:
**H.Y. Carbon Steel
Stainless Steel**

Tendons:
**Stainless Steel;
MS Galvanised**

AS-120

Material:
Stainless Steel; Cast Iron SG
Load range:
71 – 199 KN



Tie Bars:
**H.Y. Carbon Steel
Stainless Steel**

Tendons:
**Stainless Steel;
MS Galvanised**

AS-200

Material:
Stainless Steel; Cast Iron SG
Load range:
45 – 271 KN



Tie Bar:
H.Y. Carbon Steel

AS-300

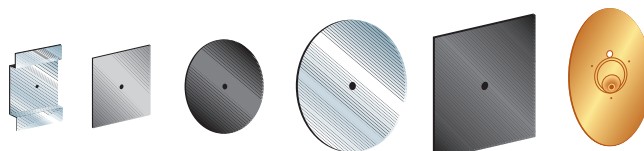
Material:
Stainless Steel; Cast Iron SG
Load range:
71 – 405 KN



Tie Bar:
H.Y. Carbon Steel

Load Bearing and Pattress Plates

Load bearing top termination or pattress plates are custom made to individual sizes, shapes and materials to suit customers' specific individual requirements.



Anchor load ranges are for guidance only

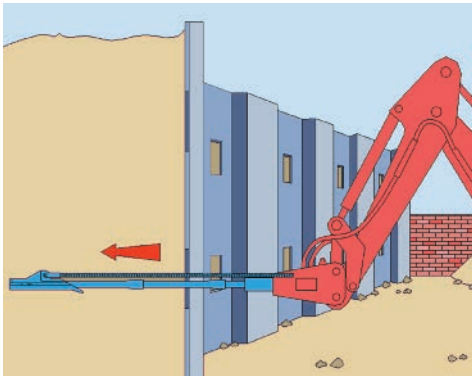
Installation

Bender
international b.v.

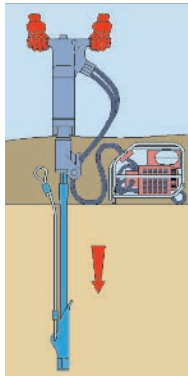
Postbus 85224
3009 ME Rotterdam
Tel. 0180 - 326 900

info@benderinternational.nl
www.benderinternational.nl

Machine Mounted

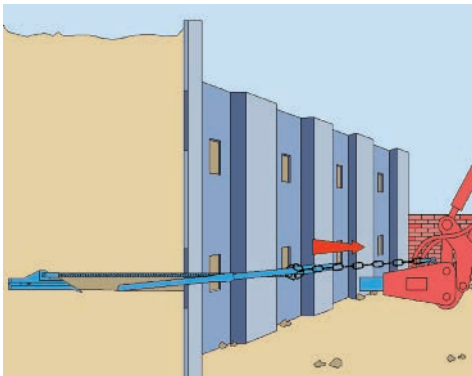


Hand Held

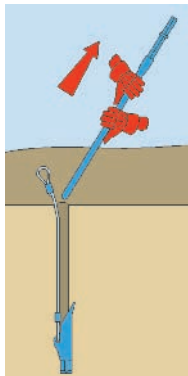


Anchors are designed to be driven into the ground using hydraulic or pneumatic equipment, with little or no disruption to the structure or surrounding area.

Machine Mounted

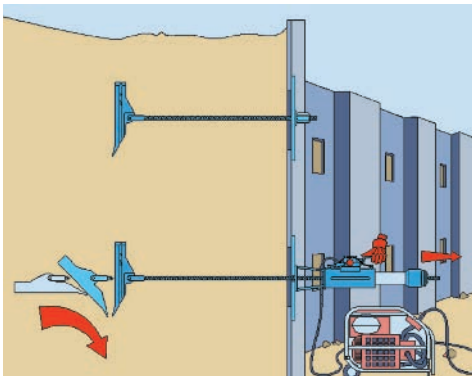


Hand Held

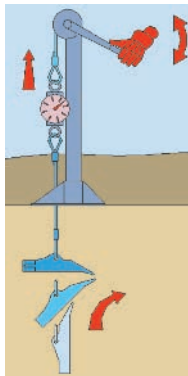


Once the anchor has been driven to the required depth the drive rod is removed.

Machine Mounted



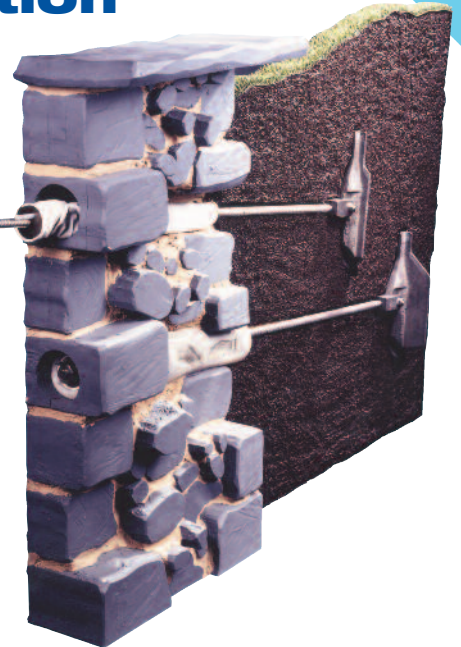
Hand Held



A tensile load is applied to the attached tie bar or tendon. This rotates the anchor into the locked position for maximum load holding capacity. The anchor is then proof tested to the designed loading requirements before the top termination is fitted, as specified by the civil or structural engineer.

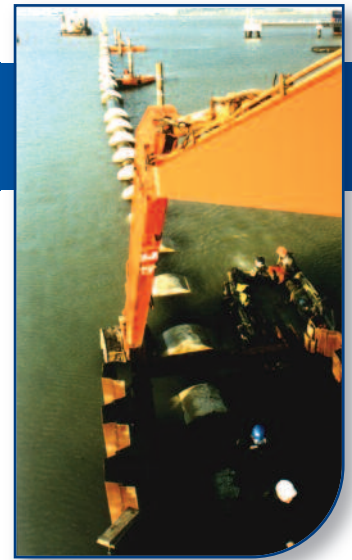
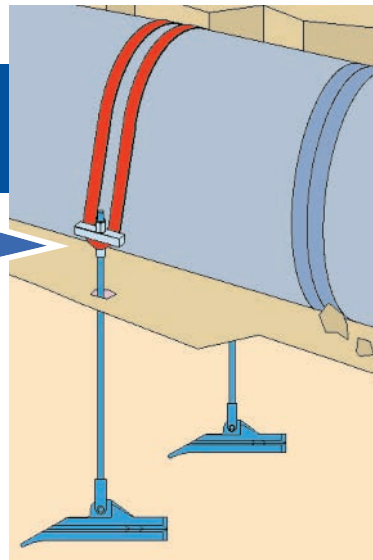
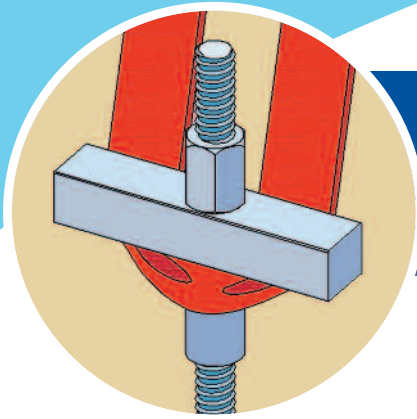
Combi-Tec concealed top termination

The Combi-Tec system comprises a stainless steel tube, front plate and polyester sock which is inserted over the installed anchor before pressure filling with grout to produce a mechanical and chemical bond within the structure. This provides a totally concealed top termination for earth anchors, making it ideal for historic and listed structures.



1. Remove stone or brick or core drill clearance hole
2. Position anchor for installation
3. Drive in anchor to required depth
4. Insert Combi-Tec sock over anchor
5. Inflate sock by injecting cementitious grout and leave to cure
6. Tension anchor to working load and secure to recessed front plate with load nut
7. Crop excess bar, mortar around Combi-Tec
8. Replace cored material and make good





Pipeline Anchoring System

- for land or underwater applications
- corrosion resistant components
- Kevlar webbing connects pairs of anchors to secure pipeline

High Yield Bars

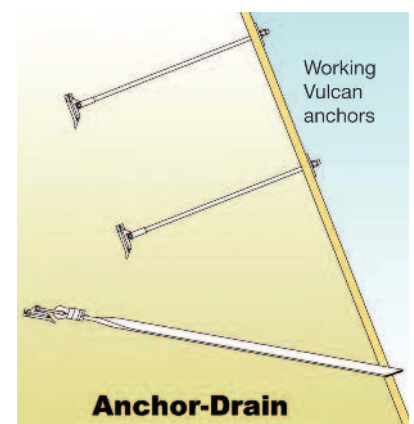


- carbon steel for temporary applications
- stainless steel for permanent and corrosive situations
- stainless steel tensile strength in excess of 650N/mm²
- can be cut on site without damaging thread
- anchors can be simply extended as required by means of a threaded coupler
- system can be safely grouted to enhance performance
- enables anchors to be re-tensioned, if necessary

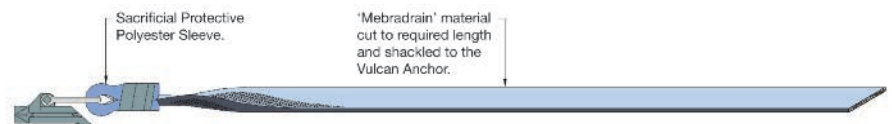
Anchor Drains

Anchor Drains are a quick, simple and effective means of reducing water puddling within clay slopes and behind retaining walls.

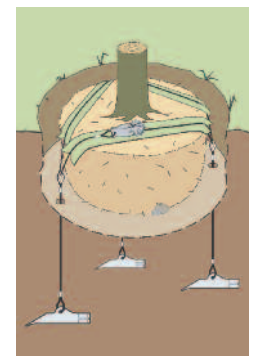
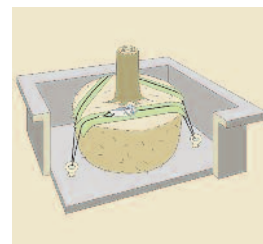
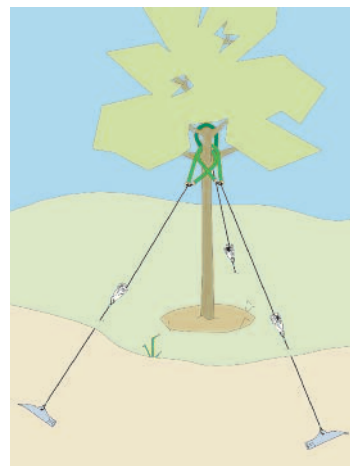
A length of 'Colbond' wicking material is secured to the anchor bar by means of cable ties and strain relief nuts. Once the anchor has been installed in the normal way the drive rod is withdrawn and the Anchor Drain provides an instant drainage channel.



- ideal for road and railway embankments and retaining walls
- relieves puddle pressure
- prevents ground becoming saturated
- helps avoid embankment failure
- rapidly and easily installed
- simple, effective and economical
- available in cast iron with carbon steel bar or stainless steel



Tree Anchoring Systems



- traditional or Paracore tree kits
- robust and easy to install
- no special tensioning tools needed
- anchor points hidden below ground
- easily re-tensioned or de-tensioned

All kN loadings are based upon the optimal tendon choice for the mechanical Anchoring systems to achieve Ultimate Resistance test.	Anchor System	AS05	AS10	AS20	AS30	AS50	AS90	AS120	AS200	AS300	AS-400
	Tendon type	M-8	M-12	16mm HYB	16mm HYB	20m HYB	20mm HYB	25mm HYB	28mm HYB	30mm HYB	30mm HYB
	Independent destructive TEST of Mechanical anchor head (kN)	30	55	70.74	112.6	195.3	195.3	222.2	356.7	450	500
	Ultimate strength of tendon (kN)	15	64	121	121	188	188	295	370	566	566
	Limiting structural strength	13.5	49.5	63.7	101.3	169.2	169.2	200.0	321.0	405.0	450.0
	Anchor Head surface area mm2	3,481	6,781	15,637	21,130	29,093	48,734	104,517	65,886	104,769	216,078
Common Soil Type Description	Blow Count or "SPT"	Ultimate anchor resistance (kN)									
Very Dense and/or Cemented Sands; Course Gravel & Cobbles	60 +	13	27	63	87	119	169	199	271	405	450
Dense Fine Sand; Very Hard Silts & Clays	45 - 60	12	24	57	77	106	169	199	242	384	450
Dense Clays, Sands & Gravel; Very Stiff to Hard Silts & Clays	35 - 50	10	20	48	64	89	149	199	202	322	450
Medium Dense Sandy Gravel; Very Stiff to Hard Silts & Clays	25 - 40	8	16	38	52	72	120	199	163	259	450
Medium Dense Course Sand & Sandy Gravel; Stiff to Very Stiff Silts & clays	14 - 25	5	11	26	35	49	82	177	112	178	367
Loose to Medium Dense Fine to Course Sand; Firm to Stiff Clays & Silts	7 - 14	4	7	18	24	33	56	121	76	121	251
Loose Fine Sand; Alluvium; Soft-Firm Clays; Varied Clays; Fill	4 - 8	3	6	14	18	26	43	93	58	93	193
Peat, Organic Silts; Inundates Silts Fly Ash	0 - 5	2	4	10	14	19	33	71	45	71	148

Holding Capacity Chart

The holding capacity chart was developed using in excess of 25 years of historical site test measurements, readings and soil condition correlation. In addition, the capacity chart uses Euro codes and published studies on the shear strength of a given soil type.

All kN loadings are based upon the optimal tendon choice for the mechanical Anchoring systems to achieve Ultimate Resistance test.

All kN loadings are based upon the optimal tendon choice for the mechanical Anchoring systems to achieve Ultimate Resistance test.	Anchor System	AS01	AS05	AS10	AS20	AS30	AS50	AS90	AS120	AS200	AS300	AS400
	Tendon type	3mm	M-8	M-12	16mm HYB	16mm HYB	20mm HYB	20mm HYB	25mm HYB	28mm HYB	30mm HYB	30mm HYB
	Independent destructive TEST of mechanical anchor head (kN)	5	30	55	70.74	112.6	195.3	195.3	222.2	356.7	450	500
	Ultimate strength of tendon (kN)	6.98	15	64	121	121	188	188	295	370	566	566
	Limiting structural strength	4.5	13.5	49.5	63.7	101.3	169.2	169.2	200.0	321.0	405.0	450.0
	Anchor head surface area mm2	1,500	3,481	6,781	15,637	21,130	29,093	48,734	104,517	65,886	104,769	216,078
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Peat, Organic Silts; Inundates Silts Fly Ash	0 - 5	1	2	4	10	14	19	33	71	45	71	148

N.B. For guidance purposes only – True capacity must be tested with a load locker: Previous project tests have shown that if an earth anchor is grouted into poor ground, the results that can be achieved are favorable to increased tensile loading capacity. Note: All below ground work should be undertaken after properly reviewing survey documentation on services. It is imperative in all cases that anchors are fully load locked before being out into service.

Using the Chart

Independent Test

All parts of the Earth Anchor System are checked through independent testing. The weakest components break load is then reduced by a further 10% and recorded as the Limiting Structural Strength of that particular anchor system. This capacity is usually far beyond what the soil will allow the anchor to achieve, so in some cases, especially in well compacted soils or gravel layers, the anchors achieve high loads allowing the designers to use smaller anchors to achieve the design load required, therefore offering the most cost-effective solution.

Limiting Structural Strength

The limiting structural strength is 10% less than the weakest component of a given anchor system and takes into account the tendon and destructive test of the anchor.

Based upon the for the systems to distance test.	Anchor System	AS01	AS05	AS10	AS20	AS30	AS50	AS90	AS120	AS200	
	Tendon type	3mm	M-8	M-12	16mm HYB	16mm HYB	20mm HYB	20mm HYB	25mm HYB	28mm HYB	
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Description	Blow Count or "SPT"	Ultimate anchor resistance (kN)									
Cemented Sands	60 +	4	13	27	63	87	119	169	199	271	
	45 - 60	4	12	24	57	77	106	169	199	242	

SPT

The standard penetration test (SPT) is an in-situ dynamic penetration test designed to provide information on the geotechnical engineering properties of soil. The SPT value indicates the hardness of the local soil. From this value we can evaluate the expected ultimate capacity of an anchor. Earth anchors are best suited in soil conditions with an SPT between 5 - 60. To give the best installation speed and practice a SPT value between 15 - 35 would be ideal as the soil is soft enough to allow ease of installation but firm enough to guarantee an overall loading capacity.

Ultimate anchor resistance

The Earth Anchor range has been carefully designed and named to reflect the holding capacity achieved in medium to poor soil conditions, e.g. an AS-90 anchor supplied on a 20mm galvanised bar system has a limiting structural strength of 169.2kN. However in medium to poor soil conditions this anchor will achieve a maximum capacity of 90kN. Anchors that are installed into stiffer substrates will exceed their named loads. This chart offers the ultimate holding capacity of a given anchor head in a specified soil type and allows this load to be used inclusive of any safety factors.