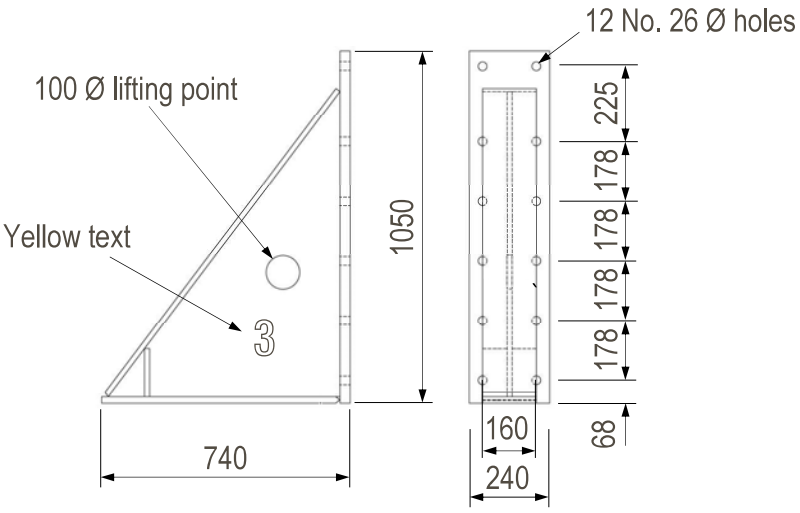
GEOBRACE 550

TRENCH LINING SYSTEM

GeoBrace 550 Uplift Brackets

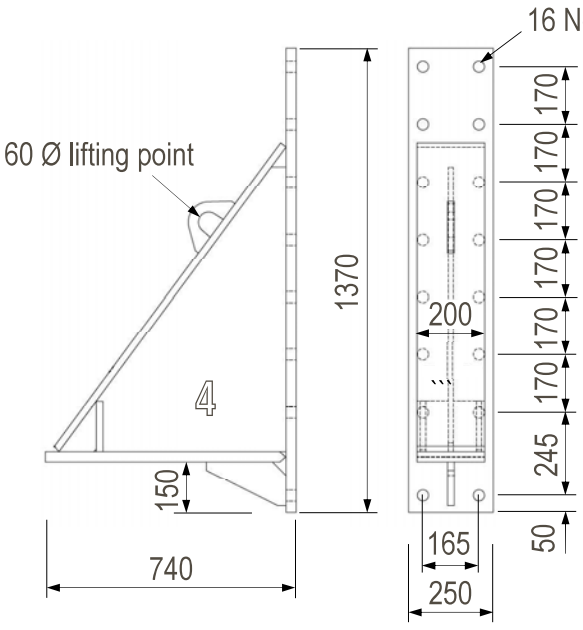
Used above GeoBrace 550 Inclined Prop Connector Plates to resist the uplift forces induced by a raking prop. Can either be welded to Sheet Piles or bolted to Concrete Capping Beams or D-Walls.

For allowable working loads, bolt and weld connection details refer to sheets 17 & 18.



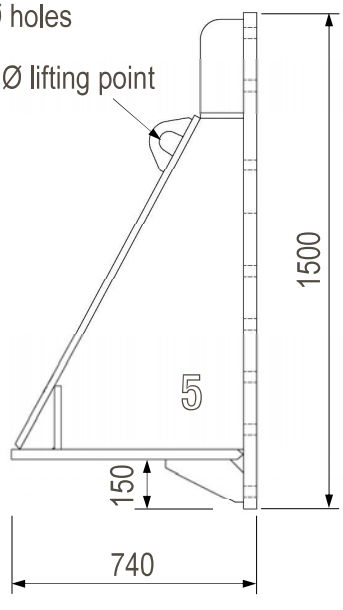
Elevation on Bracket 3

Bolt Face Details Bracket 3

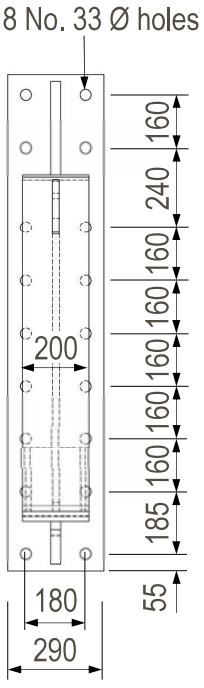


Elevation on Bracket 4

Bolt Face Details Bracket 4



Elevation on Bracket 5



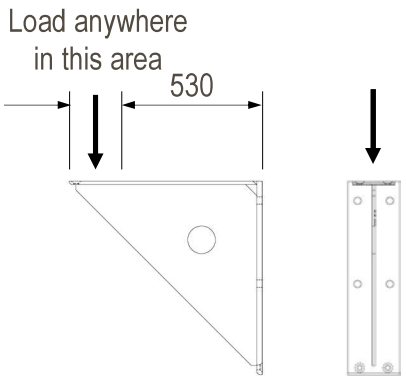
Bolt Face Details Bracket 5

Code	Description	Weight
GBX55303	GeoBrace 550 Uplift Bracket 3	136 kg
GBX55304	GeoBrace 550 Uplift Bracket 4	191 kg
GBX55305	GeoBrace 550 Uplift Bracket 5	289 kg

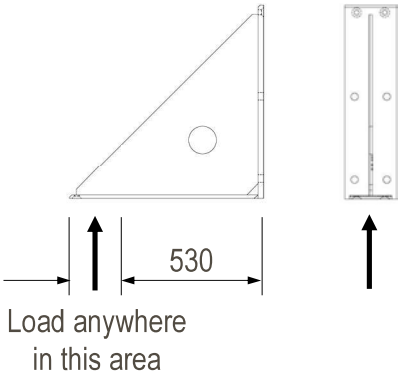
GEOBRACE 550

TRENCH LINING SYSTEM

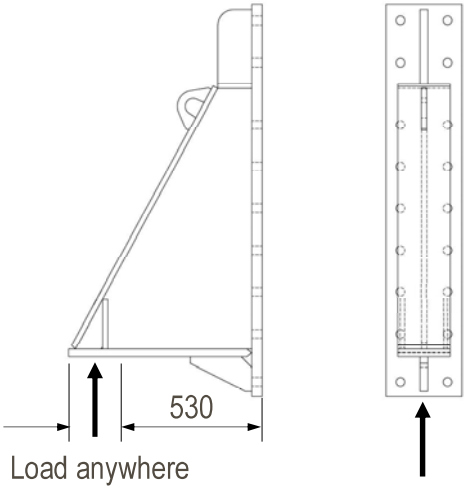
Support & Uplift Brackets Bolted to Concrete Structures



Support/Uplift Brackets 1 & 2
(Support Application)



Support/Uplift Brackets 1 & 2
(Uplift Application)



Uplift Brackets 3,4 or 5

Support/Uplift Bracket	1	2	3	4	5
AWL (kN)	60	125	200	300	500
Number of grade 8.8 ATR anchors	4	8	12	16	18
ATR diameter and thread	M24	M24	M24	M30	M30
Embedment Depth (mm)	300	450	450	600	600

Anchor design calculations have been carried out using the full bracket allowable working load and grade 8.8 all-thread rod (ATR) fixed into 50N/mm^2 cube strength un-cracked concrete using Hilti HIT-HY 200-A Injection Mortar in accordance with the manufacturer's recommendations.

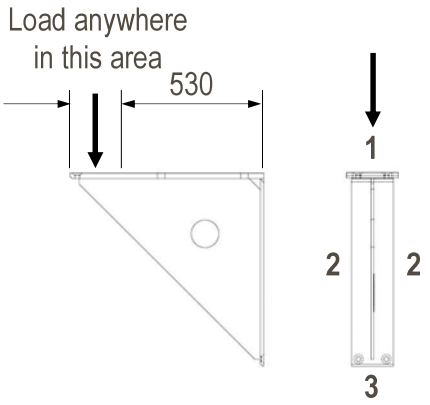
Un-reinforced concrete has been assumed and no account has been taken of edge or end distances. It is also assumed that appropriate strength grout is placed between the bracket and the prepared concrete surface.

The design, supply and correct installation of the anchors and grout for the applied loads are the responsibility of the Customer.

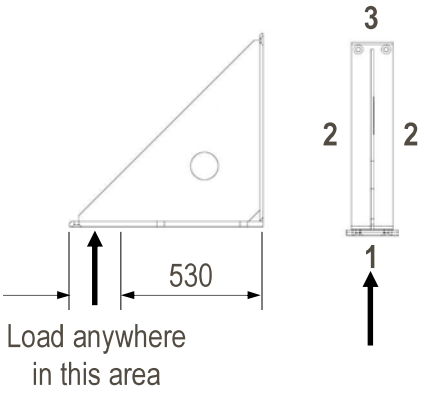
GEOBRACE 550

TRENCH LINING SYSTEM

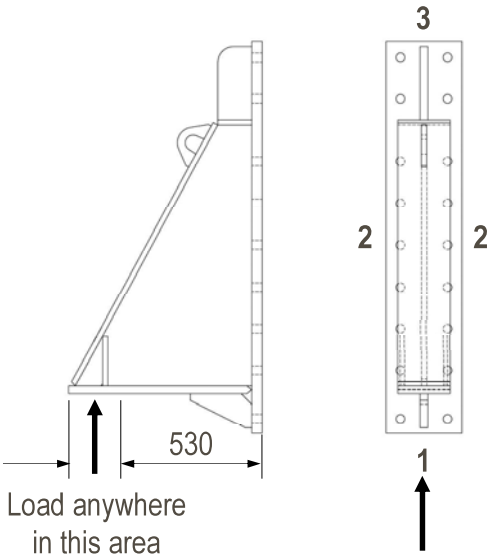
Support & Uplift Brackets Welded to Steel Sheet Piles



Support/Uplift Brackets 1 & 2
(Support Application)

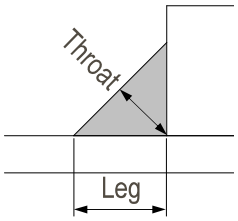


Support/Uplift Brackets 1 & 2
(Uplift Application)



Uplift Brackets 3,4 or 5

Sheet Steel Grade	Fillet Weld Number	Bracket	1	2	3	4	5
		AWL	60	175	300	500	750
S235	1	Throat	5.0	10.6	13.0	14.4	15.6
		Leg	7.1	15.0	18.4	20.3	22.1
	2	Throat	3.0	3.0	3.0	11.9	10.1
		Leg	4.2	4.2	4.2	16.8	14.3
	3	Throat	none	8.5	3.7	3.0	8.9
		Leg	none	12.0	5.2	4.2	12.6
S275	1	Throat	4.5	9.5	11.6	12.8	13.9
		Leg	6.4	13.4	16.4	18.1	19.7
	2	Throat	3.0	3.0	3.0	10.6	9.0
		Leg	4.2	4.2	4.2	14.9	12.7
	3	Throat	none	7.1	3.1	3.0	7.4
		Leg	none	10.0	4.4	4.2	10.5
S355	1	Throat	4.2	8.8	10.8	11.9	12.9
		Leg	5.9	12.4	15.3	16.8	18.3
	2	Throat	3.0	3.0	3.0	9.8	8.4
		Leg	4.2	4.2	4.2	13.9	11.9
	3	Throat	none	6.2	3.0	3.0	5.4
		Leg	none	8.8	4.2	4.2	7.6



Weld Dimensions

Weld sizes may be pro-rated according to applied load/AWL for the bracket however we recommend a minimum site weld throat dimension of 3mm. It is the Customer's responsibility to adjust the weld size in-situ to suit steel thickness, site conditions and welding methods. The sheet pile shall be at least equal in thickness to the weld throat dimension.

It is the Customer's responsibility to ensure that the sheet piles are not locally overstressed by bracket forces or weld connections and to weld the clutches between sheets or add shear plates as needed to prevent the ejection of individual sheets by uplift forces.

4 Leg Lifting Chains

Used for unloading and moving individual leg assembles. **SWL 6.7 tonnes.**

It is the Customer's responsibility to provide longer and higher load capacity lifting chains if large assemblies of equipment are to be moved.

Code	Description	Weight
VAU10019	4 Leg Chains 3mtr - SWL 6.7TON 10mm	30.0 kg
VAU10020	4 Leg Chains 5mtr - SWL 6.7TON 10mm	60.0 kg

Diesel Power Pack LP 80 bar (blue) (GBX01000) weight 301kg

A grade 46 mineral oil only, diesel powered, hydraulic pump used with GeoBrace 390 and GeoBrace 550 Ram Units to adjust length and pre-load.

Grade 46 Mineral Oil - 5 Litres (VAU19005)

Hydraulic Connecting Hoses

For use with the Diesel Power Pack LP 80 bar (blue) (GBX01000).

Code	Description	Weight
AGU20103	3/8" Hose M/F ISO A, 2.5m - 350bar	1.7 kg
AGU20104	3/8" Hose M/F ISO A, 3.5m - 350bar	2.3 kg
AGU20049	3/8" Hose M/F ISO A, 5.0m - 350bar	3.2 kg

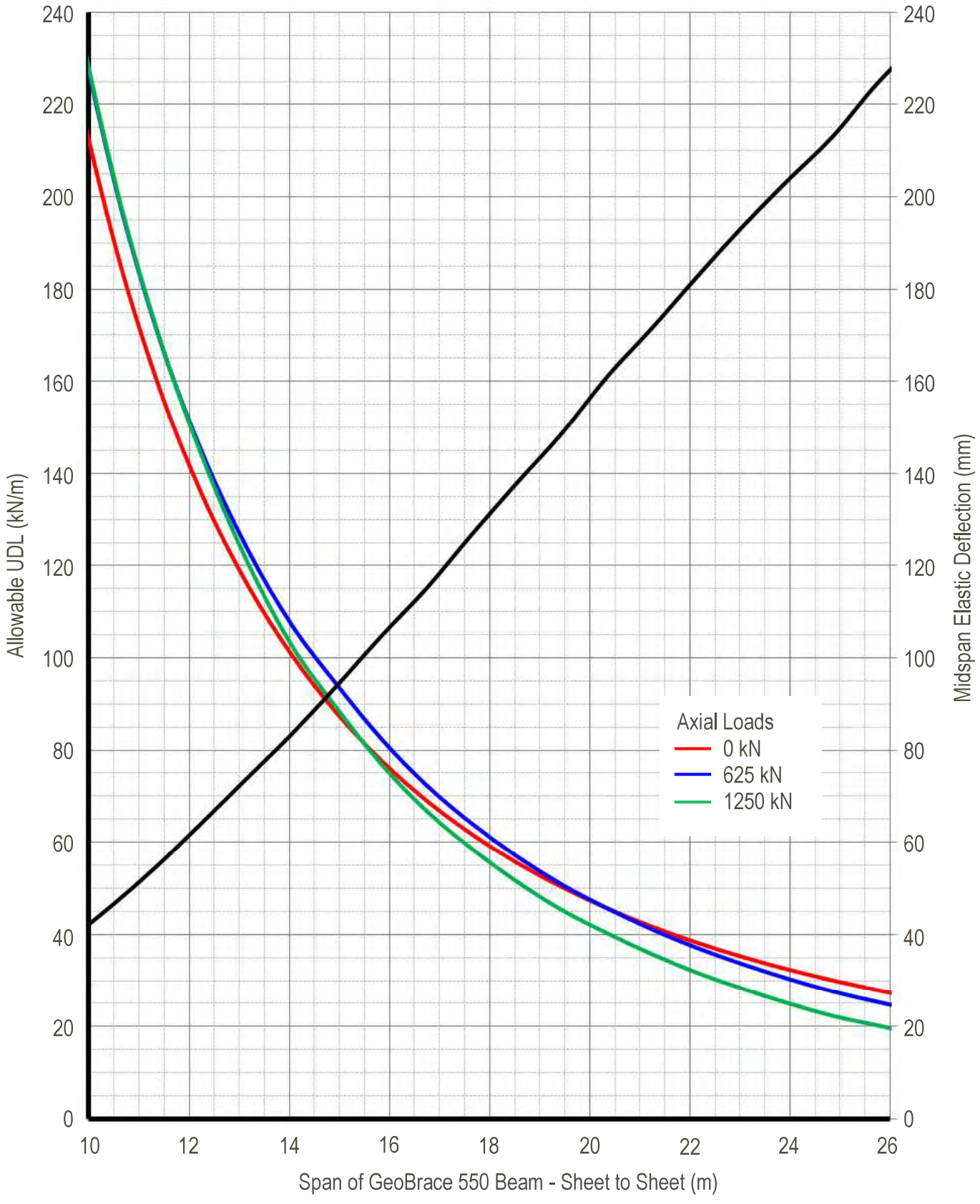
2 hoses are required to connect 1 hydraulic ram

GEOBRACE 550

TRENCH LINING SYSTEM

Allowable Working Loads - Simply Supported Beams, Sheet to Sheet

Graph 550/1



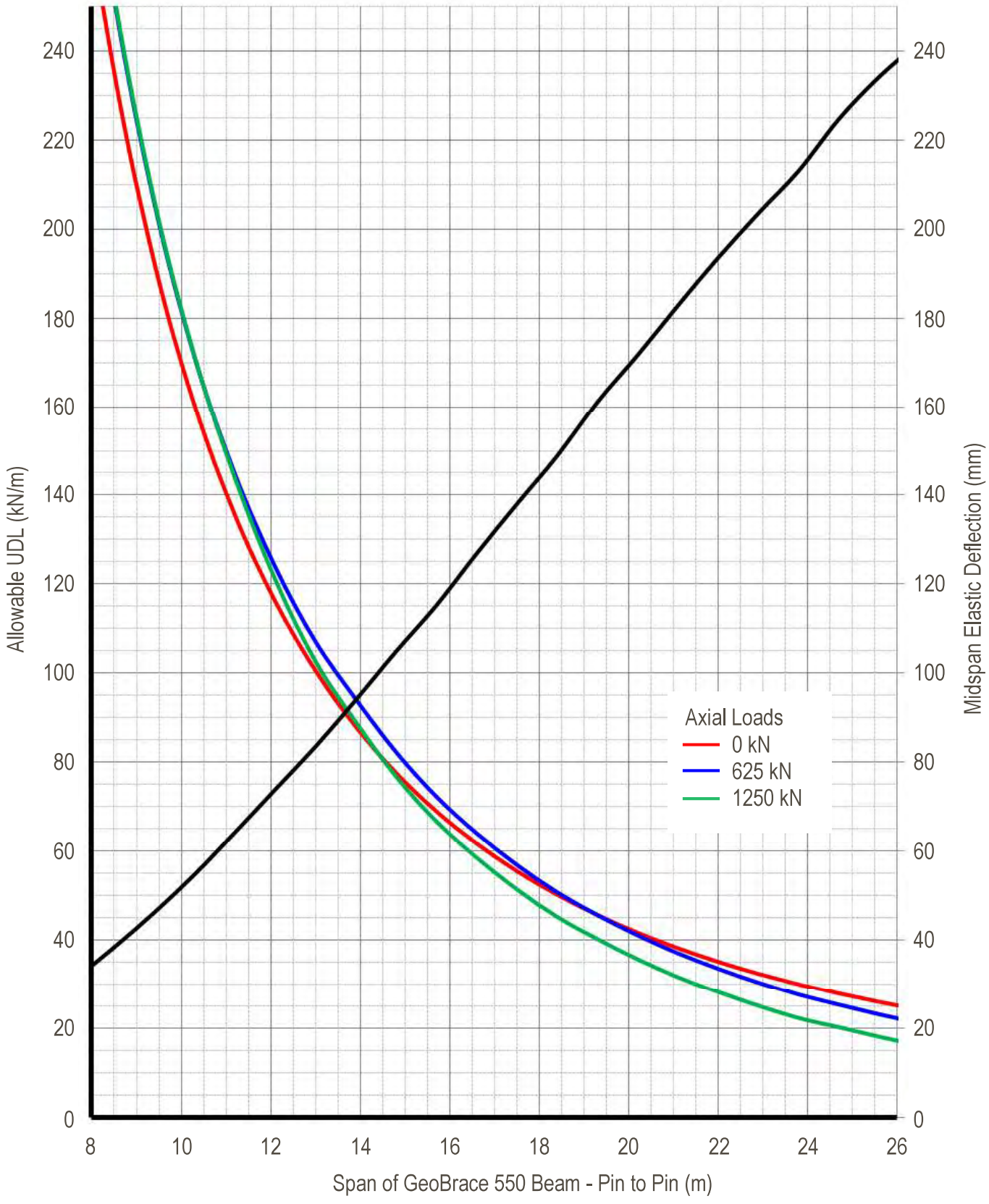
GEOBRACE 550

TRENCH LINING SYSTEM

R·M·D KWIKFORM

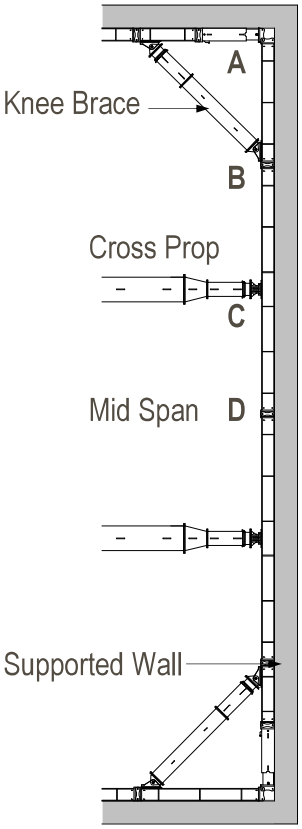
Allowable Working Loads - Simply Supported Beams, Pin to Pin

Graph 550/2



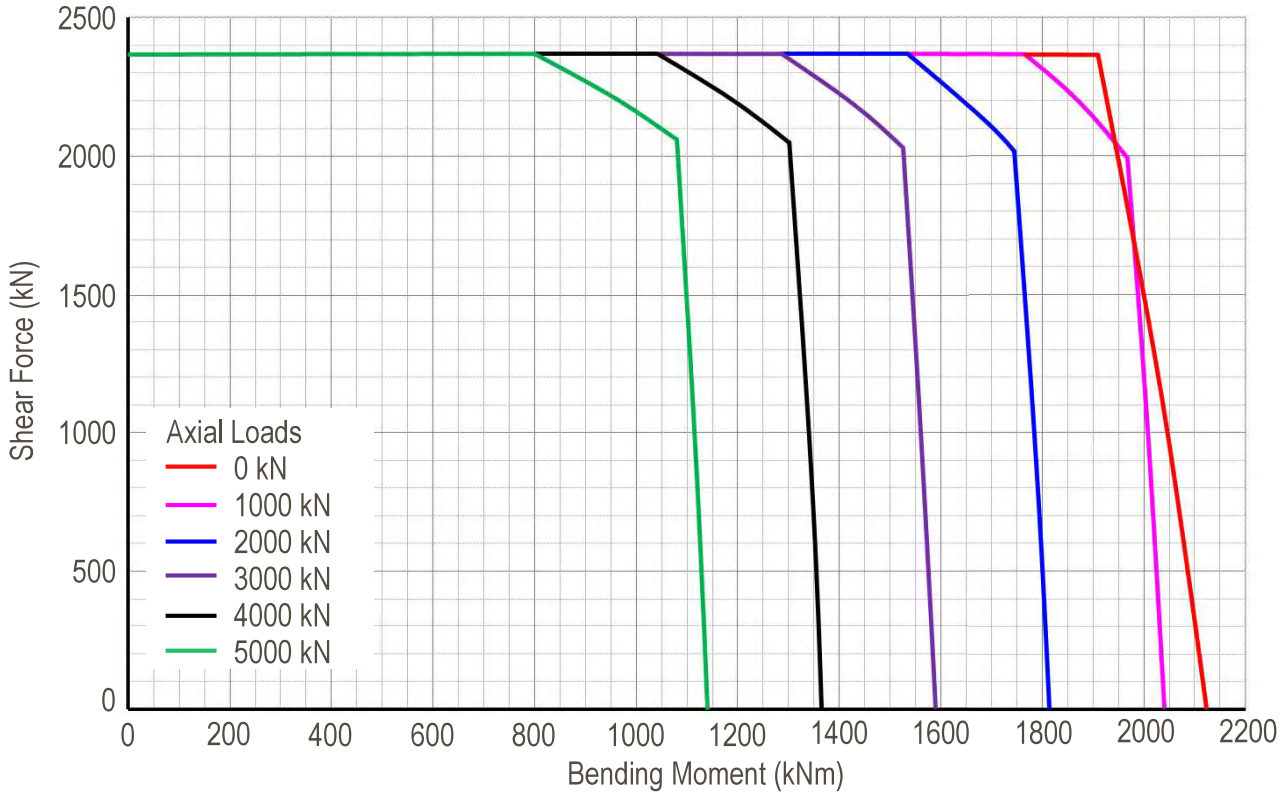
Design of Continuous Beams with or Without Knee Braces

It is not possible to produce graphs covering the design of these applications as there are too many variables; carry out analysis on a case by case basis. Care is needed to correctly consider axial compression arising as a result of connection with braces joining at the excavation corners (A) and knee brace props joining the 550 Brace at angles (B). Compression loads are carried by the GeoBrace flanges and joint pins remote from the supported wall. Critical points for consideration occur at point B and where props intersect the GeoBrace 550 (C). In these locations hogging bending moments also result in compression loads in the inner flanges which are additive to induced axial loads. In the mid-span (D), sagging bending moments place the inner flanges in tension which are reduced by the magnitude of any induced axial load. Deflection in the mid-span will also move the line of induced axial load towards the neutral axis of the GeoBrace section. For large excavations where supported perimeter walls have adequate in-plane stiffness, such as in D-wall or secant pile construction, it may be possible to shed axial loads from the GeoBrace 550 sections into the supported walls near the corners of the excavation by the use of substantial shear stubs welded to the wall-side flange of the GeoBrace which project and are grouted into purpose designed pockets cut into the perimeter wall. This allows fuller use of the allowable GeoBrace section bending moment in areas of hogging moment towards the central part of the excavation.



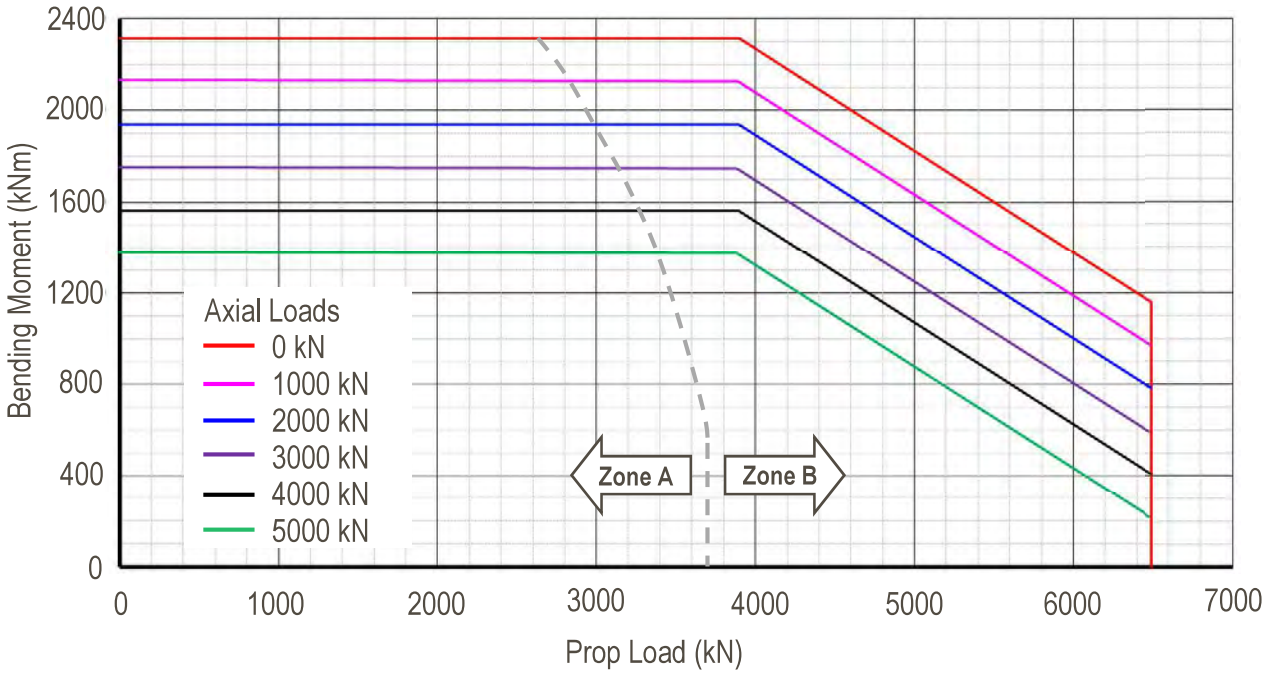
Working Load Envelope - Combined Axial / Bending / Shear

Graph 550/3



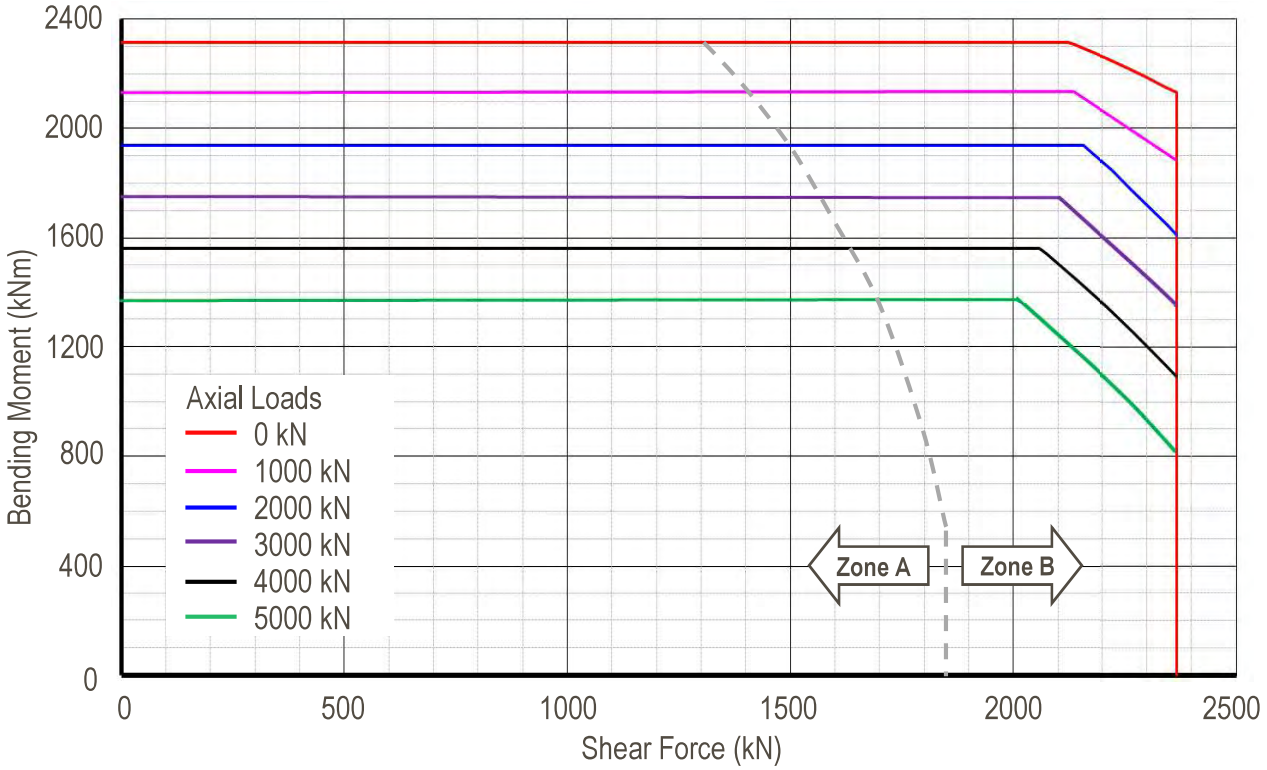
Intermediate Supports - Combined Axial / Bending / Prop Load

Graph 550/4



Intermediate Supports - Combined Axial / Bending / Shear

Graph 550/5



Zone A values have been limited due to the partial lateral and rotational restraint of the plate girder compression flange in accordance with BS5975 table K1 and for values of shear that do not exceed 55% of the prop load.

Separate calculations are required to access Zone B values in which detailed consideration is given to the lateral and rotational restraint of the girder compression flange in order to reduce the effective length of the plate girder web.

GEOBRACE 550

TRENCH LINING SYSTEM

Table 1 - Component Makeup for a GeoBrace 550 Assembly with Ram Unit

Leg Type	Kit Code	Sheet to Sheet Dimension (mm)		GBX55000	GBX55009	GBX55013	GBX55027	GBX55054	GBX55108	GBX55001	BVU70001	Weight (kg)	Pin Hole Deflection (mm)
		min	max	Ram Unit	900mm Extension	1350mm Extension	2700mm Extension	5400mm Extension	10800mm Extension	59x350mm Pin	8mm R-Clip		
1	KTU16120	3250	4250	1						1	2	2640	5
2	KTU16121	4150	5150	1	1					3	6	3430	8
3	KTU16122	4600	5600	1		1				3	6	3600	9
4	KTU16123	5050	6050	1	2					5	10	4220	13
5	KTU16124	5500	6500	1	1	1				5	10	4390	14
6	KTU16125	5950	6950	1			1			3	6	4080	12
7	KTU16126	6400	7400	1	2	1				7	14	5180	20
8	KTU16127	6850	7850	1	1		1			5	10	4870	16
9	KTU16128	7300	8300	1		1	1			5	10	5040	18
10	KTU16129	7750	8750	1	2		1			7	14	5670	21
11	KTU16130	8200	9200	1	1	1	1			7	14	5840	22
12	KTU16131	8650	9650	1				1		3	6	5040	17
13	KTU16132	9100	10100	1	2	1	1			9	18	6630	29
14	KTU16133	9550	10550	1	1			1		5	10	5840	19
15	KTU16134	10000	11000	1		1		1		5	10	6010	20
16	KTU16135	10450	11450	1	2			1		7	14	6630	22
17	KTU16136	10900	11900	1	1	1		1		7	14	6800	23
18	KTU16137	11350	12350	1			1	1		5	10	6490	23
19	KTU16138	11800	12800	1	2	1		1		9	18	7590	29
20	KTU16139	12250	13250	1	1		1	1		7	14	7280	25
21	KTU16140	12700	13700	1		1	1	1		7	14	7450	27
22	KTU16141	13150	14150	1	2		1	1		9	18	8070	33
23	KTU16142	13600	14600	1	1	1	1	1		9	18	8240	36
24	KTU16143	14050	15050	1					1	3	6	7000	20
25	KTU16144	14500	15500	1	2	1	1	1		11	22	9030	46
26	KTU16145	14950	15950	1	1				1	5	10	7790	22
27	KTU16146	15400	16400	1		1			1	5	10	7960	22
28	KTU16147	15850	16850	1	2				1	7	14	8580	24
29	KTU16148	16300	17300	1	1	1			1	7	14	8750	24
30	KTU16149	16750	17750	1			1		1	5	10	8440	24
31	KTU16150	17200	18200	1	2	1			1	9	18	9550	29
32	KTU16151	17650	18650	1	1		1		1	7	14	9240	26
33	KTU16152	18100	19100	1		1	1		1	7	14	9400	27
34	KTU16153	18550	19550	1	2		1		1	9	18	10000	34
35	KTU16154	19000	20000	1	1	1	1		1	9	18	10200	37
36	KTU16155	19450	20450	1				1	1	5	10	9410	27
37	KTU16156	19900	20900	1	2	1	1		1	11	22	11000	50
38	KTU16157	20350	21350	1	1			1	1	7	14	10200	28
39	KTU16158	20800	21800	1		1		1	1	7	14	10400	36
40	KTU16159	21250	22250	1	2			1	1	9	18	11000	42
41	KTU16160	21700	22700	1	1	1		1	1	9	18	11200	45
42	KTU16161	22150	23150	1			1	1	1	7	14	10800	45
43	KTU16162	22600	23600	1	2	1		1	1	11	22	12000	56
44	KTU16163	23050	24050	1	1		1	1	1	9	18	11600	52
45	KTU16164	23500	24500	1		1	1	1	1	9	18	11800	56

Table 1 (continued) - Component Makeup for a GeoBrace 550 Assembly with Ram Unit

Leg Type	Kit Code	Sheet to Sheet Dimension (mm)		GBX55000	GBX55009	GBX55013	GBX55027	GBX55054	GBX55108	GBX55001	BVU70001	Weight (kg)	Pin Hole Deflection (mm)
		min	max	Ram Unit	900mm Extension	1350mm Extension	2700mm Extension	5400mm Extension	10800mm Extension	59x350mm Pin	8mm R-Clip		
46	KTU16165	23950	24950	1	2		1	1	1	11	22	12400	62
47	KTU16166	24400	25400	1	1	1	1	1	1	11	22	12600	67
48	KTU16167	24850	25850	1					2	5	10	11400	43
49	KTU16168	25300	26300	1	2	1	1	1	1	13	26	13400	77
50	KTU16169	25750	26750	1	1				2	7	14	12200	47
51	KTU16170	26200	27200	1		1			2	7	14	12300	49
52	KTU16171	26650	27650	1	2				2	9	18	12900	54
53	KTU16172	27100	28100	1	1	1			2	9	18	13100	57
54	KTU16173	27550	28550	1			1		2	7	14	12800	55
55	KTU16174	28000	29000	1	2	1			2	11	22	13900	64
56	KTU16175	28450	29450	1	1		1		2	9	18	13600	61
57	KTU16176	28900	29900	1		1	1		2	9	18	13800	64
58	KTU16177	29350	30350	1	2		1		2	11	22	14400	69
59	KTU16178	29800	30800	1	1	1	1		2	11	22	14600	72
60	KTU16179	30250	31250	1				1	2	7	14	13800	65

Note: All legs are supplied fully assembled with 1 extra pin & R clip at the end to connect at the corner. If connecting end to end as parallel walers rather than a square or rectangular frame 1 extra pin & R clip will be required per leg.

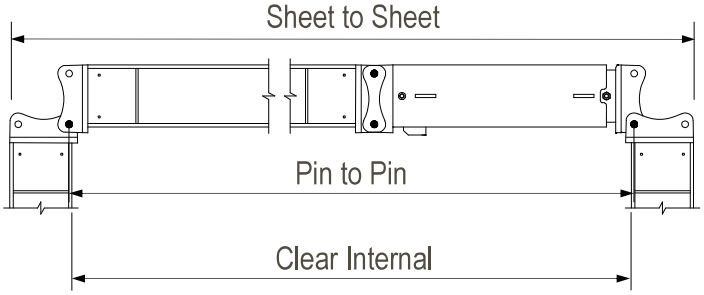
In order to minimise initial deflection caused by pin hole tolerances assemble the brace with the longest possible extensions in the middle and position shorter lengths at the ends. When assembling braces in accordance with RMDK drawings, follow the makeup shown.

When selecting the lengths of the GeoBrace 550 assemblies, make appropriate allowance for pin hole deflection, elastic deflection and adequate working space.

Dimension Conversions

To obtain the pin to pin, or clear internal dimensions for the GeoBrace 550 leg from the sheet to sheet dimension, subtract the following offsets:

Type	Pin to Pin (mm)	Clear Internal (mm)
DAMB (A-C)	172	382
DAMB (D-F)	202	442
GeoBrace 254	476	652
GeoBrace 390	720	920
GeoBrace 550	1050	1240



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DEWALT SC-PRO Carbon Steel Threaded Anchor Rods Technical Datasheets

GENERAL INFORMATION

SC-PRO

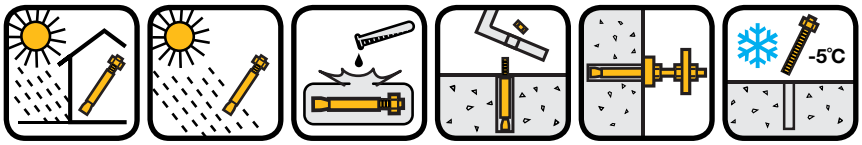
Vinylester Spinning Capsule Adhesive Anchoring System

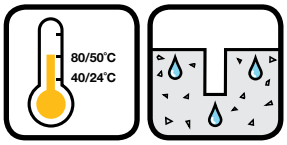
PRODUCT DESCRIPTION

The SC-PRO anchor system consists of integrated two-component glass capsules and matching chisel pointed anchor rods which are installed using a rotary hammer. The adhesive is designed for installation of M8 to M30 threaded rods in concrete. It is suitable for a wide range of steel grades and can be used for installations in water filled holes.




GENERAL APPLICATIONS AND USES



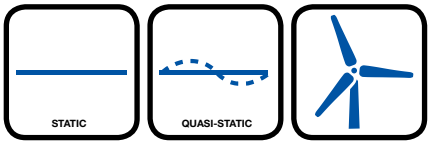


FEATURES AND BENEFITS

- Designed for use with chisel pointed threaded rod
- Simple and fast installation
- Quick curing time and good chemical resistance
- Versatile low odor formula with quick curing time
- Capsule design allows pre-measured adhesive volumes and avoids waste

APPROVALS AND LISTINGS

LOADING CONDITIONS

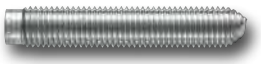


SUITABLE BASE MATERIALS

SECTION CONTENTS

SYSTEM COMPONENTS

SC-PRO



Chisel Pointed Rod

GRADES

Carbon Steel 5.8
Carbon Steel 8.8
Stainless Steel A4
Stainless Steel HCR

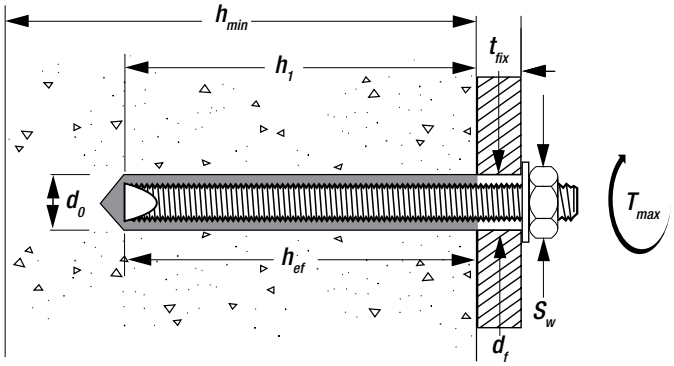
APPROVALS

- ETA-13/0051

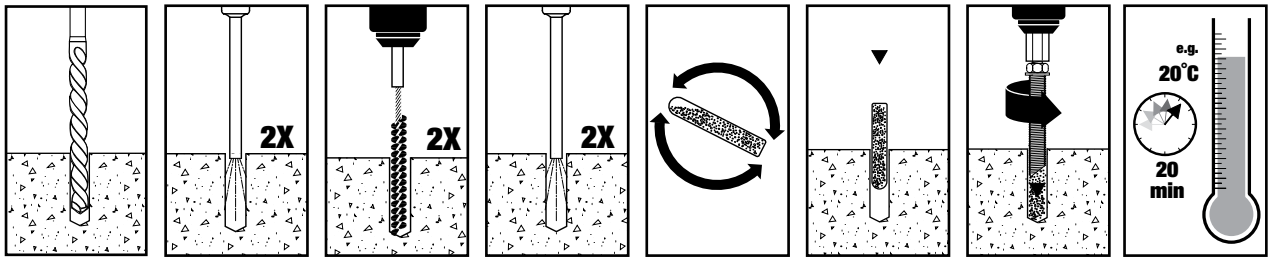
INSTALLATION INFORMATION

INSTALLATION DATA - THREADED ROD

	Notation	Unit	SC-PRO - Threaded rod								
			M8	M10	M12	M14	M16	M20	M22	M24	M30
Anchor diameter	d	[mm]	8	10	12	14	16	20	22	24	30
Nominal drill bit diameter	d_0	[mm]	10	12	14	16	18	22	24	26	32
Diameter of hole clearance in fixture	d_f	[mm]	9	12	14	16	18	22	24	26	33
Diameter of steel brush	d_b	[mm]	11	13	16	18	20	24	26	28	34
Effective embedment and drill hole depth 1 Effective embedment and drill hole depth 2	$h_{ef,1} = h_{1,1}$ $h_{ef,2} = h_{1,2}$	[mm] [mm]	80 -	90 -	110 165	120 -	125 190	170 255	190 -	210 315	280 -
Minimum member thickness for $h_{ef,1}$ Minimum member thickness for $h_{ef,2}$	$h_{min,1}$ $h_{min,2}$	[mm] [mm]	110 -	120 -	140 195	150 -	160 225	220 300	240 -	260 370	340 -
Minimum spacing for $h_{ef,1}$ Minimum spacing for $h_{ef,2}$	$s_{min,1}$ $s_{min,2}$	[mm] [mm]	40 -	45 -	55 85	60 -	65 95	85 130	95 -	105 160	140 -
Minimum edge distance for $h_{ef,1}$ Minimum edge distance or $h_{ef,2}$	$c_{min,1}$ $c_{min,2}$	[mm] [mm]	40 -	45 -	55 85	60 -	65 95	85 130	95 -	105 160	140 -
Thickness of fixture	t_{fix}	[mm]	0 mm ≤ t_{fix} ≤ 1500 mm								
Maximum torque	T_{max}	[Nm]	10	20	40	60	80	120	135	180	300
Torque wrench socket size	S_w	[mm]	13	17	19	22	24	30	32	36	46



INSTALLATION INSTRUCTIONS



1.) *Using the proper drill bit size, drill a hole into the base material to the required depth.*

2.) *Blow the hole clean using a hand pump or compressed air 2 times minimum.*

3.) *Brush the hole with the proper wire brush 2 times minimum.*

4.) *Blow the hole clean using a hand pump or compressed air 2 times minimum.*

5.) *Shake capsule to distribute adhesive components.*

6.) *Insert the capsule into the drilled hole.*

7.) *Thread hex nut on rod + coupler on nut. Insert drive unit in rotary hammer. In hammer drill mode, 250-500 rpm break glass.*

8.) *Allow the adhesive to cure for the time specified for the actual concrete temperature prior to applying any load.*

For complete installation instructions, see technical approval.

Concrete temperature	Minimum curing time[1)]
≥ - 5°C	5 h
≥ + 5°C	1 h
≥ + 20°C	20 min
≥ + 30°C	10 min
1) Time data for dry concrete, double curing time for wet concrete	

DESIGN INFORMATION

TENSION LOAD CAPACITIES - PARAMETERS FOR CALCULATION OF DESIGN STRENGTH

According to EOTA TR 029.

	Notation	Unit	SC-PRO - Threaded rod								
			M8	M10	M12	M14	M16	M20	M22	M24	M30
Steel failure											
Carbon steel											
Characteristic resistance, strength class 5.8	$N_{Rk,s}$	[kN]	18	29	42	58	78	123	152	177	281
Characteristic resistance, strength class 8.8	$N_{Rk,s}$	[kN]	29	46	67	92	126	196	242	282	449
Partial safety factor	γ_{Ms} [1)]	[-]	1.50								
A4 and HCR steel											
Characteristic resistance, strength class 50	$N_{Rk,s}$	[kN]	-	-	-	-	-	-	-	-	281
Characteristic resistance, strength class 70	$N_{Rk,s}$	[kN]	26	40	59	81	110	172	212	247	-
Partial safety factor	γ_{Ms} [1)]	[-]	1.87								2.86
Combined pullout and concrete failure											
Characteristic resistance in uncracked concrete, dry and wet concrete											
Temperature Range: 40°C / 24°C	$\tau_{Rk,uncr}$	[N/mm²]	12	12	12	12	12	11	11	11	10
Temperature Range: 80°C / 50°C	$\tau_{Rk,uncr}$	[N/mm²]	10	10	10	10	10	9.5	9.5	9.5	9
Partial safety factor	$\gamma_{Mc} = \gamma_{Mp}$ [1)]	[-]	1.5 [2)]								1.8 [3)]
Increasing factor for concrete strength											
C30/37	ψ_c	[-]	1.14								
C40/50	ψ_c	[-]	1.26								
C50/60	ψ_c	[-]	1.34								
Concrete failure											
Concrete cone failure											
Characteristic spacing	$s_{cr,N}$	[mm]	$3.0 \cdot h_{ef}$								
Characteristic edge distance	$c_{cr,N}$	[mm]	$1.5 \cdot h_{ef}$								
Partial safety factor	γ_{Mc} [1)]	[-]	1.5 [2)]								1.8 [3)]
Splitting failure											
Characteristic spacing	$s_{cr,sp}$	[mm]	$2 \cdot c_{cr,sp}$								
Characteristic edge distance	$c_{cr,sp}$	[mm]	160	135	140	150	160	215	240	265	350
Partial safety factor for uncracked concrete	γ_{Msp} [1)]	[-]	1.5 [2)]								1.8 [3)]
Increasing factor for concrete strength											
C30/37	ψ_c	[-]	1.14								
C40/50	ψ_c	[-]	1.26								
C50/60	ψ_c	[-]	1.34								

1) In absence of other national regulations
2) Partial safety factor $\gamma_2 = 1.0$ is included
3) Partial safety factor $\gamma_2 = 1.2$ is included

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SHEAR LOAD CAPACITIES - PARAMETERS FOR CALCULATION OF DESIGN STRENGTH

According to EOTA TR 029.

	Notation	Unit	SC-PRO - Threaded rod								
			M8	M10	M12	M14	M16	M20	M22	M24	M30
Steel failure											
Data base for steel failure without level arm											
Carbon steel											
Characteristic resistance, strength class 5.8	$V_{Rk,s}$	[kN]	9	14	21	29	39	61	76	88	140
Characteristic resistance, strength class 8.8	$V_{Rk,s}$	[kN]	15	23	34	46	63	98	121	141	224
Partial safety factor	γ_{Ms} 1)	[-]	1.25								
A4 and HCR steel											
Characteristic resistance, strength class 50	$V_{Rk,s}$	[kN]	-	-	-	-	-	-	-	-	140
Characteristic resistance, strength class 70	$V_{Rk,s}$	[kN]	13	20	30	40	55	86	106	124	-
Partial safety factor	γ_{Ms} 1)	[-]	1.56								2.38
Steel failure with level arm											
Carbon steel											
Characteristic resistance, strength class 5.8	$M^0_{Rk,s}$	[Nm]	19	37	65	105	166	325	448	561	1125
Characteristic resistance, strength class 8.8	$M^0_{Rk,s}$	[Nm]	30	60	105	168	266	519	716	898	1799
Partial safety factor	γ_{Ms} 1)	[-]	1.25								
A4 and HCR steel											
Characteristic resistance, strength class 50	$M^0_{Rk,s}$	[Nm]	-	-	-		-	-	-	-	1125
Characteristic resistance, strength class 70	$M^0_{Rk,s}$	[Nm]	26	52	92	146	233	454	627	786	-
Partial safety factor	γ_{Ms} 1)	[-]	1.56								2.38
Concrete failure											
Pry-out failure											
Factor in Equation (5.7) of TR 029	k	[-]	2								
Partial safety factor	γ_{Mcp} 1)	[-]	1.5 2)								
Edge failure											
Partial safety factor	γ_{Mc} 1)	[-]	1.5 2)								

1) In absence of other national regulations

2) The value contains an installation safety factor of $\gamma_2 = 1.0$

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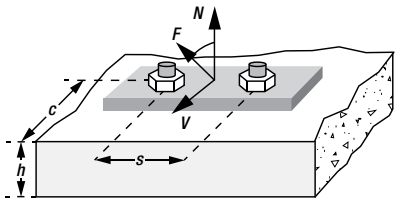
PRECALCULATED TENSION AND SHEAR CAPACITIES

According to EOTA TR 029.

- The following tables are meant to give the designer aid in the preliminary design process. No responsibility is taken for the correctness of these data.
- The given values are valid for normal concrete C20/25 and static/quasi-static loads with the exact dimensional information given. For any other conditions, the use of DDA is recommended.
- The values in the table below are strength design level loads. This assumes a safety factor is included both on the loading and the resistance.
- For further details and background information please see the introduction of this manual.



Influence of steel grades				
Size	**Property**	**5.8**	**8.8**	**A4 / HCR**
M8	N_{Rd} [kN]	12.0	19.3	13.9
	V_{Rd} [kN]	7.2	12.0	8.3
M10	N_{Rd} [kN]	19.3	30.7	21.9
	V_{Rd} [kN]	12.0	18.4	12.8
M12	N_{Rd} [kN]	28.0	44.7	31.6
	V_{Rd} [kN]	16.8	27.2	19.2
M16	N_{Rd} [kN]	52.0	83.3	58.8
	V_{Rd} [kN]	31.2	50.4	35.3
M20	N_{Rd} [kN]	81.3	130.7	91.4
	V_{Rd} [kN]	48.8	78.4	55.1
M24	N_{Rd} [kN]	117.3	188.0	132.1
	V_{Rd} [kN]	70.4	112.8	79.5
M30	N_{Rd} [kN]	186.7	299.3	98.3
	V_{Rd} [kN]	112.0	179.2	58.8

Instructions:

- The steel grade potentially influences the load capacity of the anchor. Table depicts ultimate steel strengths of threaded rods for given steel grades.
- The steel strength equals the load capacity of the anchor provided other failure modes, i.e. concrete failure or pullout failure, do not yield lower strengths and therefore do not control the anchor capacity.
- To determine the critical failure mode, the steel strength identified in the table has to be compared with the concrete and pullout strengths in the following tables.

M8	**C20/25 8.8 steel dry/wet concrete**	**Anchoring located far from any edge**					**Anchoring located close to an edge**				
Embedment depth	h_{ef} [mm]	80									
Member thickness	h [mm]	110									
Edge distance	c [mm]	-	-	-	-	-	40	40	40	40	40
Anchor spacing	s [mm]	0	40	240	40	240	0	40	240	40	240
40/24°C	N_{Rd} [kN]	16.1	21.3	32.2	28.8	64.3	9.2	12.1	18.4	15.8	36.7
	$F_{Rd}^{45°}$ [kN]	11.7	19.1	23.3	30.6	46.7	4.5	6.0	9.0	6.4	10.5
	V_{Rd} [kN]	12.0	24.0	24.0	48.0	48.0	3.7	5.0	7.5	5.0	7.5
80/50°C	N_{Rd} [kN]	13.4	18.4	26.8	26.0	53.6	8.0	10.9	15.9	15.8	31.9
	$F_{Rd}^{45°}$ [kN]	10.7	17.7	21.5	28.6	43.0	4.3	5.8	8.6	6.4	10.3
	V_{Rd} [kN]	12.0	24.0	24.0	48.0	48.0	3.7	5.0	7.5	5.0	7.5

■ - Steel strengths controls ■ - Concrete strength controls ■ - Anchor pullout strength controls

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M10	C20/25 8.8 steel dry/wet concrete	Anchoring located far from any edge					Anchoring located close to an edge				
Embedment depth	h_{ef} [mm]	90									
Member thickness	h [mm]	120									
Edge distance	c [mm]	-	-	-	-	-	45	45	45	45	45
Anchor spacing	s [mm]	0	45	270	45	270	0	45	270	45	270
40/24°C	N_{Rd} [kN]	22.6	28.5	45.2	36.8	90.5	12.4	15.6	24.7	21.6	49.5
	$F_{Rd}^{45°}$ [kN]	17.2	27.3	34.4	41.6	68.9	5.8	7.5	11.5	8.2	13.2
	V_{Rd} [kN]	18.4	36.8	36.8	73.5	73.6	4.7	6.2	9.3	6.2	9.3
80/50°C	N_{Rd} [kN]	18.8	24.9	37.7	33.9	75.4	10.7	14.2	21.4	20.6	42.8
	$F_{Rd}^{45°}$ [kN]	15.8	25.2	31.6	38.4	63.2	5.5	7.3	11.0	8.1	13.0
	V_{Rd} [kN]	18.4	36.8	36.8	67.8	73.6	4.7	6.2	9.3	6.2	9.3

■ - Steel strengths controls ■ - Concrete strength controls ■ - Anchor pullout strength controls

M12	C20/25 8.8 steel dry/wet concrete	Anchoring located far from any edge					Anchoring located close to an edge				
Embedment depth	h_{ef} [mm]	110									
Member thickness	h [mm]	140									
Edge distance	c [mm]	-	-	-	-	-	55	55	55	55	55
Anchor spacing	s [mm]	0	55	330	55	330	0	55	330	55	330
40/24°C	N_{Rd} [kN]	33.2	41.1	66.4	51.7	132.7	18.3	22.6	36.6	30.2	73.1
	$F_{Rd}^{45°}$ [kN]	25.4	39.7	50.7	58.5	101.5	8.2	10.7	16.4	11.5	18.6
	V_{Rd} [kN]	27.2	54.4	54.4	103.5	108.8	6.6	8.7	13.1	8.7	13.1
80/50°C	N_{Rd} [kN]	27.6	36.1	55.3	48.4	110.6	15.8	20.7	31.6	29.7	63.3
	$F_{Rd}^{45°}$ [kN]	23.3	36.9	46.5	54.8	93.1	7.9	10.4	15.7	11.5	18.4
	V_{Rd} [kN]	27.2	54.4	54.4	96.8	108.8	6.6	8.7	13.1	8.7	13.1

■ - Steel strengths controls ■ - Concrete strength controls ■ - Anchor pullout strength controls

M16	C20/25 8.8 steel dry/wet concrete	Anchoring located far from any edge					Anchoring located close to an edge				
Embedment depth	h_{ef} [mm]	125									
Member thickness	h [mm]	160									
Edge distance	c [mm]	-	-	-	-	-	65	65	65	65	65
Anchor spacing	s [mm]	0	65	375	65	375	0	65	375	65	375
40/24°C	N_{Rd} [kN]	47.1	55.2	94.1	64.8	188.2	25.5	29.9	50.9	37.6	108.8
	$F_{Rd}^{45°}$ [kN]	41.3	60.5	82.6	73.3	165.2	11.2	14.4	22.3	15.3	25.1
	V_{Rd} [kN]	50.4	100.8	100.8	129.6	201.6	8.9	11.8	17.7	11.8	17.7
80/50°C	N_{Rd} [kN]	41.9	51.1	83.8	63.1	167.6	22.8	27.8	45.6	36.8	91.2
	$F_{Rd}^{45°}$ [kN]	38.8	57.5	77.6	71.4	155.3	10.8	14.1	21.7	15.2	25.1
	V_{Rd} [kN]	50.4	100.8	100.8	126.2	201.6	8.9	11.8	17.7	11.8	17.7

■ - Steel strengths controls ■ - Concrete strength controls ■ - Anchor pullout strength controls

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M20	C20/25 8.8 steel dry/wet concrete	Anchoring located far from any edge					Anchoring located close to an edge				
Embedment depth	h_{ef} [mm]	170									
Member thickness	h [mm]	220									
Edge distance	c [mm]	-	-	-	-	-	85	85	85	85	85
Anchor spacing	s [mm]	0	85	510	85	510	0	85	510	85	510
40/24°C	N_{Rd} [kN]	74.6	87.1	149.2	101.6	298.5	39.8	46.4	79.6	58.0	170.4
	$F_{Rd}^{45°}$ [kN]	64.9	95.0	129.8	114.9	259.5	17.6	22.7	35.3	24.1	39.8
	V_{Rd} [kN]	78.4	156.8	156.8	203.1	313.6	14.1	18.8	28.1	18.8	28.1
80/50°C	N_{Rd} [kN]	67.6	82.9	135.3	101.6	270.6	37.9	46.4	75.8	58.0	151.6
	$F_{Rd}^{45°}$ [kN]	61.6	92.0	123.3	114.9	246.5	17.4	22.7	34.8	24.1	39.8
	V_{Rd} [kN]	78.4	156.8	156.8	203.1	313.6	14.1	18.8	28.1	18.8	28.1

■ - Steel strengths controls ■ - Concrete strength controls ■ - Anchor pullout strength controls

M24	C20/25 8.8 steel dry/wet concrete	Anchoring located far from any edge					Anchoring located close to an edge				
Embedment depth	h_{ef} [mm]	210									
Member thickness	h [mm]	260									
Edge distance	c [mm]	-	-	-	-	-	105	105	105	105	105
Anchor spacing	s [mm]	0	105	630	105	630	0	105	630	105	630
40/24°C	N_{Rd} [kN]	102.5	119.5	204.9	139.5	409.8	54.6	63.7	109.3	79.7	255.5
	$F_{Rd}^{45°}$ [kN]	91.1	132.6	182.2	157.8	364.5	24.9	32.0	49.9	34.0	56.8
	V_{Rd} [kN]	112.8	225.6	225.6	278.9	451.2	20.1	26.8	40.2	26.8	40.2
80/50°C	N_{Rd} [kN]	100.3	119.5	200.6	139.5	401.1	54.6	63.7	109.3	79.7	227.4
	$F_{Rd}^{45°}$ [kN]	90.1	132.6	180.2	157.8	360.4	24.9	32.0	49.9	34.0	56.8
	V_{Rd} [kN]	112.8	225.6	225.6	278.9	451.2	20.1	26.8	40.2	26.8	40.2

■ - Steel strengths controls ■ - Concrete strength controls ■ - Anchor pullout strength controls

M30	C20/25 8.8 steel dry/wet concrete	Anchoring located far from any edge					Anchoring located close to an edge				
Embedment depth	h_{ef} [mm]	280									
Member thickness	h [mm]	340									
Edge distance	c [mm]	-	-	-	-	-	140	140	140	140	140
Anchor spacing	s [mm]	0	140	840	140	840	0	140	840	140	840
40/24°C	N_{Rd} [kN]	131.4	153.4	262.9	178.9	525.8	70.1	81.8	140.2	102.2	338.1
	$F_{Rd}^{45°}$ [kN]	128.7	182.3	257.4	214.3	514.7	37.6	48.0	75.3	51.6	91.7
	V_{Rd} [kN]	179.2	358.4	358.4	429.4	716.8	32.4	43.2	64.9	43.2	64.9
80/50°C	N_{Rd} [kN]	131.4	153.4	262.9	178.9	525.8	70.1	81.8	140.2	102.2	311.5
	$F_{Rd}^{45°}$ [kN]	128.7	182.3	257.4	214.3	514.7	37.6	48.0	75.3	51.6	91.1
	V_{Rd} [kN]	179.2	358.4	358.4	429.4	716.8	32.4	43.2	64.9	43.2	64.9

■ - Steel strengths controls ■ - Concrete strength controls ■ - Anchor pullout strength controls

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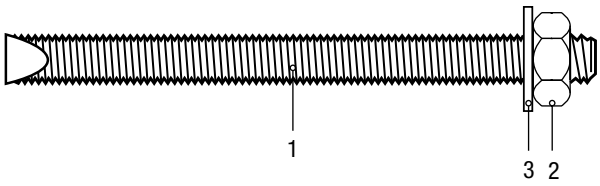
MATERIAL INFORMATION

MATERIAL SPECIFICATIONS - CHISEL POINTED THREADED ROD



Part no.	Designation	Material
Carbon steel 5.8		
1	Anchor rod	Steel zinc plated ≥ 5 µm or hot-dip galvanized ≥ 40 µm; Strength class 5.8, R_m = 500 MPa; $R_{p\ 0.2}$ = 400 MPa
2	Hexagon nut	Steel zinc plated ≥ 5 µm or hot-dip galvanized ≥ 40 µm; Strength class 5
3	Washer	Steel zinc plated ≥ 5 µm or hot-dip galvanized ≥ 40 µm
Carbon steel 8.8		
1	Anchor rod	Steel zinc plated ≥ 5 µm or hot-dip galvanized ≥ 40 µm; Strength class 8.8, R_m = 800 MPa; $R_{p\ 0.2}$ = 640 MPa
2	Hexagon nut	Steel zinc plated ≥ 5 µm or hot-dip galvanized ≥ 40 µm; Strength class 8
3	Washer	Steel zinc plated ≥ 5 µm or hot-dip galvanized ≥ 40 µm
Stainless steel A4		
1	Anchor rod	Stainless steel 1.4401 / 1.4571; Strength class 50, R_m = 500 MPa; $R_{p\ 0.2}$= 210 MPa (for > M24) Strength class 70, R_m = 700 MPa; $R_{p\ 0.2}$= 450 MPa (for ≤ M24)
2	Hexagon nut	Stainless steel 1.4401 / 1.4571; Strength class 50 for class 50 rod; Strength class 70 for class 70 rod
3	Washer	Stainless steel 1.4401 / 1.4571
Stainless steel HCR		
1	Anchor rod	Stainless steel 1.4529 / 1.4565; Strength class 50, R_m = 500 MPa; $R_{p\ 0.2}$= 210 MPa (for > M24) Strength class 70, R_m = 700 MPa; $R_{p\ 0.2}$= 450 MPa (for ≤ M24)
2	Hexagon nut	Stainless steel 1.4529 / 1.4565; Strength class 50 for class 50 rod; Strength class 70 for class 70 rod
3	Washer	Stainless steel 1.4529 / 1.4565

ORDERING INFORMATION

SC-Pro Vinylester Spinning Capsules

Art. no.	Type	Drill hole dia. [mm]	Length [mm]	Box qty.	Carton qty.
DFC1510000	Spinning capsule M8	10	80	10	500
DFC1510050	Spinning capsule M10	12	90	10	500
DFC1510100	Spinning capsule M12	14	110	10	500
DFC1510150	Spinning capsule M16	18	125	10	200
DFC1510200	Spinning capsule M20	22	170	10	100
DFC1510250	Spinning capsule M24	26	210	10	100

SC-PRO

Accessories

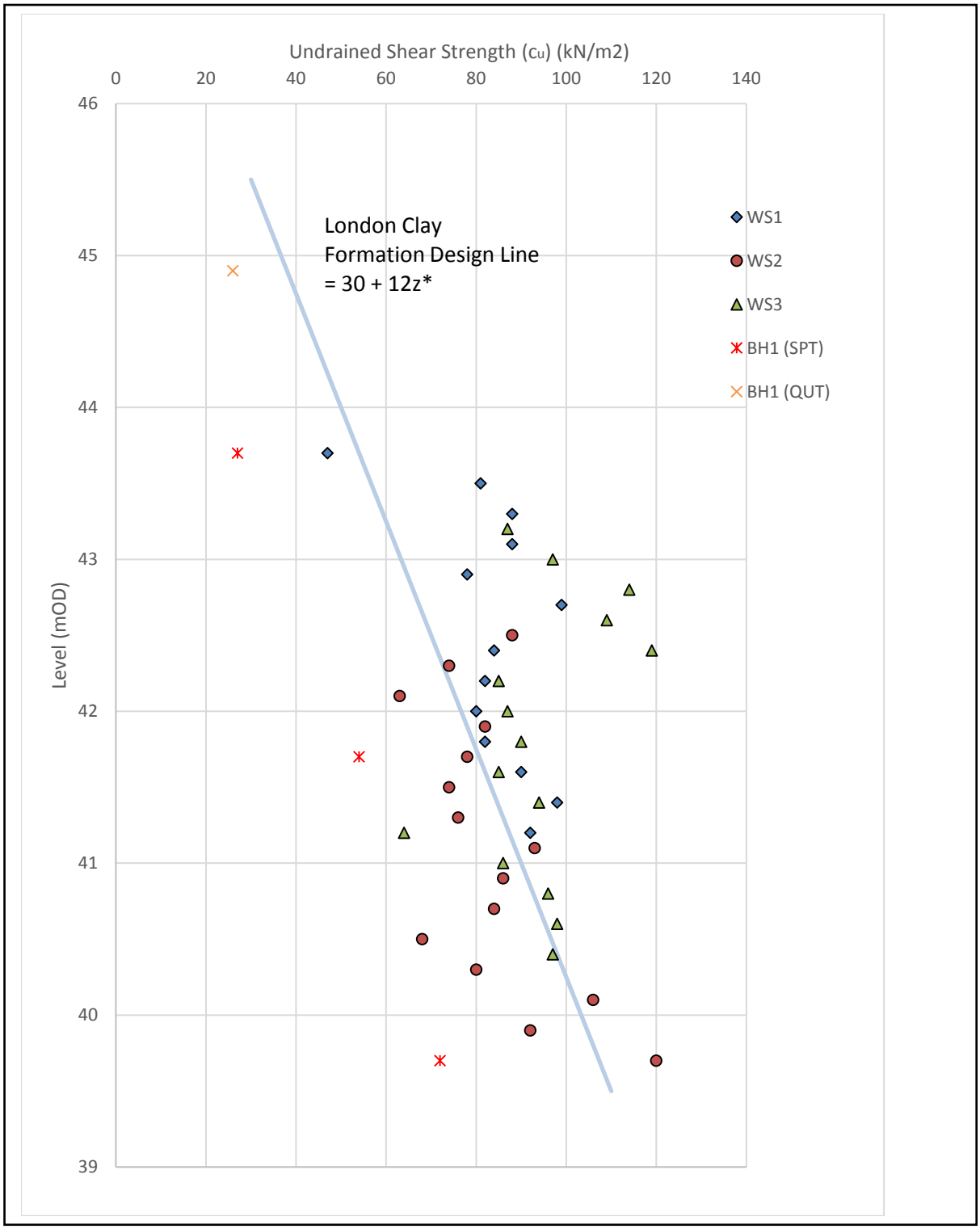
Art. no.	Type	Drill hole dia. [mm]	Length [mm]	Box qty.	Carton qty.
DFC1650050	DEWALT blow pump	-	-	1	-
DFC1670000	SDS connection for steel brushes	-	-	1	20
DFC1670050	300mm extension for steel brushes	-	300	1	20
DFC1670100	Steel brush for SDS - 12mm diameter	M8	170	1	10
DFC1670150	Steel brush for SDS - 14mm diameter	M10	170	1	10
DFC1670200	Steel brush for SDS - 16mm diameter	M12	200	1	10
DFC1670250	Steel brush for SDS - 18mm diameter	-	200	1	10
DFC1670300	Steel brush for SDS - 20mm diameter	M16	300	1	10
DFC1670350	Steel brush for SDS - 22mm diameter	-	300	1	10
DFC1670400	Steel brush for SDS - 26mm diameter	M20	300	1	10
DFC1670450	Steel brush for SDS - 30mm diameter	M24	300	1	10
DFC1670500	Steel brush for SDS - 34mm diameter	M27	300	1	10
DFC1670550	Steel brush for SDS - 37mm diameter	M30	300	1	10
DFC1670600	Steel brush for SDS - 40mm diameter	-	300	1	10

BLOW PUMP


SDS CONNECTION


STEEL BRUSH

Reference Exploratory Holes & Clay Strength Plot



z = depth below top of strata

Client	Project	Job No
Parmarbrook	**Barrie House**	**CG/28408**
CGL	Title **Undrained Shear Strength (c_u) vs Level**	**Figure 3**

Site	**Barrie House**	Borehole No:	**BH1**
Location	**29 St Edmund's Terrace, London NW8 7QH**		
Client:	**Robert Morley, Kaleminster Ltd**	Sheet	**1 of 1**
Engineer:	**StructureMode Ltd**	Report No:	**9241/OT**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]	Strata Level[mOD]	Strata Description
BH constructed 17 Sep 2012				0.00	+46.00	MADE GROUND: asphalt [100mm] over grey/black mixture of ashy sand with asphalt, clinker and flint gravel; below about 0.35m becoming grey/brown clay with some ash and clinker
BH dia: 150mm				0.50	+45.50	
Cased to: 1.50m	D	0.60				Soft brown CLAY with grey patches
	U	1.10				
Groundwater not observed						
	D	1.60				…below about 1.6m becoming firm brown CLAY with occasional grey gleying
	S/D	2.30	6			
	D	2.70				
	U	3.00				
	D	3.50				
	S/D	4.30	12			
	D	4.60				
	U	5.00				
	D	5.50				
	S/D	6.30	16			…becoming stiff below about 6.0m
	D	6.60				
	U	7.00				
	D	7.50		7.50	+38.50	END OF BOREHOLE

Legend

Constructed using cable percussive techniques

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Backfilled with arisings and surface reinstated on completion
Ground level interpolated from topographical survey

Borehole No: **BH1**

[* = extrapolated SPT 'N' value]

Soil Consultants

Site	**Barrie House**	Borehole No:	**WS1**
Location	**29 St Edmund's Terrace, London NW8 7QH**		
Client:	**Robert Morley, Kaleminster Ltd**	Sheet	**1 of 2**
Engineer:	**StructureMode Ltd**	Report No:	**9241/OT**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]		Strata Level[mOD]	Strata Description	Legend
BH constructed 17 Sep 2012				0.00	0	+45.60	MADE GROUND: [trial pit] - brown topsoil and clay with occasional building rubble	0
BH dia: 60mm reducing with depth								
Groundwater at 0.95m on				0.90	1	+44.70	Concrete foundation [no reinforcement observed]	1
Groundwater at 1.4m on								
				1.75		+43.85	Stiff brown CLAY with occasional grey gleying, selenite crystals and rare orange sand partings	
Some disturbance in upper 200mm of clay due to coring operations and HV testing	HV	1.90	47		2		…incipient claystone at 2.05m	2
	HV/D	2.10	81					
	HV	2.30	88					
	D	2.40						
	HV	2.50	88					
	D	2.60						
	HV	2.70	78					
	D	2.80						
	HV	2.90	99		3			3
	D	3.10						
	HV	3.20	84					
	HV/D	3.40	82					
	HV	3.60	80					
	D	3.70						
	HV	3.80	82					
	HV/D	4.00	90		4			4
	HV	4.20	98					
	D	4.30						
	HV	4.40	92					
	D	4.60						
				5.00	5	+40.60	END OF BOREHOLE	5

Constructed using hand held window sample equipment

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Borehole constructed through an open trial pit which exposed the top of a footing and cored to base of footing at 75mm dia
Standpipe installed to 5.0m depth
Ground level interpolated from topographical survey

Borehole No: **WS1**

[* = extrapolated SPT 'N' value]

Soil Consultants

Site	**Barrie House**	Borehole No: **WS2**
Location	**29 St Edmund's Terrace, London NW8 7QH**	
Client:	**Robert Morley, Kaleminster Ltd**	Sheet **1 of 2**
Engineer:	**StructureMode Ltd**	Report No: **9241/OT**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]		Strata Level[mOD]	Strata Description	Legend
BH constructed 17 Sep 2012 BH dia: 60mm reducing with depth				0.00	0	+44.60	MADE GROUND: [trial pit] - brown topsoil and clay with occasional building rubble	0
					1			1
				1.13		+43.47	MADE GROUND: soft to firm brown clay with occasional flint gravel and dark brown sand/silt lenses	
					2			2
	HV/D	2.10	88	2.10		+42.50	Stiff, locally firm brown CLAY with orange patches and scattered selenite crystals	
	HV/D	2.30	74					
	HV	2.50	63				…below 2.25m becoming brown with occasional grey gleying and selenite crystals	
	D	2.60						
	HV	2.70	82					
	HV/D	2.90	78					
					3			3
	HV/D	3.10	74					
	HV	3.30	76					
	D	3.40						
Groundwater at 3.5m on 15/10/12	HV	3.50	93					
	HV/D	3.70	86					
	HV	3.90	84					
					4			4
	HV/D	4.10	68					
	HV	4.30	80					
	HV/D	4.50	106					
	HV	4.70	92					
	HV	4.90	120					
				5.00	5	+39.60	END OF BOREHOLE	5

Constructed using hand held window sample equipment

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Borehole constructed off edge of pad footing
Standpipe installed to 5.0m depth
Ground level interpolated from topographical survey

Borehole No: **WS2**

[* = extrapolated SPT 'N' value]

Soil Consultants

Site	**Barrie House**	Borehole No:	**WS3**
Location	**29 St Edmund's Terrace, London NW8 7QH**		
Client:	**Robert Morley, Kaleminster Ltd**	Sheet	**1 of 1**
Engineer:	**StructureMode Ltd**	Report No:	**9241/OT**

Comments	Samples Type	Samples Depth[m]	Field Test	Strata Depth[m]		Strata Level[mOD]	Strata Description	Legend
BH constructed 17 Sep 2012				0.00	0	+45.30	MADE GROUND: [trial pit] - brown topsoil and clay with occasional building rubble	0
BH dia: 60mm reducing with depth								
				0.90	1	+44.40	Concrete foundation [single reinforcement bar, c.10mm dia, observed at 0.5m in core]	1
Groundwater not observed								
				1.62	2	+43.68	Stiff brown CLAY with occasional grey gleying, selenite crystals and rare orange sand partings	2
Some disturbance in upper 200mm of clay due to coring operations and HV testing								
							…incipient claystone at 2.05m	
	HV	2.10	87					
	D	2.20						
	HV	2.30	97					
	HV	2.50	114					
	HV	2.70	109					
	D	2.80						
	HV	2.90	119		3			3
	HV/D	3.10	85					
	HV	3.30	87					
	HV	3.50	90					
	D	3.60						
	HV	3.70	85					
	HV	3.90	94		4			4
	HV	4.10	64					
	D	4.20						
	HV	4.30	86					
	HV	4.50	96					
	HV	4.70	98					
	D	4.80						
	HV	4.90	97					
				5.00	5	+40.30	END OF BOREHOLE	5

Constructed using hand held window sample equipment

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water S = SPT 'N' [split spoon sampler] C = SPT 'N' [solid cone] HV = Hand Vane [kPa] PP = Pocket Penetrometer [kg/cm^2]

Remarks :- Borehole constructed through an open trial pit which exposed the top of a footing and cored to base of footing at 75mm dia
Standpipe installed to 5.0m depth
Ground level interpolated from topographical survey

Borehole No: **WS3**

[* = extrapolated SPT 'N' value]

Soil Consultants

TQ28SE409

TQ 28 SE

GROUND LEVEL: 164·5 A.O.D. 50·14m
NOMINAL B.H. DIA.: 6" Casing to 140ft.
DATE OF BORING: 21 Feb. to 14 March '60

BOREHOLE No. 27

N.G.R. 2755, 8360

GROUNDWATER LEVEL	GROUNDWATER DATE	SAMPLE DEPTH	B.H.	DEPTH 0'-0"	R.L.		DESCRIPTION OF STRATA
							Fairly firm fissured brown clay becoming stiffer with increasing depth
				34'-0" 10·36m	+130·8 +39·78m		
							Stiff grey - blue fissured clay
							Contd. Mudstone, boulder

REMARKS:
No water in borehole

SAMPLES
■ Undisturbed
• Disturbed

SCALE:
1/8" to 1'-0"

METROPOLITAN WATER BOARD.
MAIN IN TUNNEL BETWEEN THAMES AND LEA VALLEYS.

SOILS No. S/371

DRWG. No. S/R/526

GEORGE WIMPEY & CO. LTD., CENTRAL LABORATORY, SOUTHALL.

TQ28SE409

276-836 256 TQ 20 SE/409 2 of 2

GROUND LEVEL: 164·5 A.O.D. 50·14m
NOMINAL B.H. DIA. 6" Casing to 140 ft.
DATE OF BORING: 21 Feb. to 14 March '50

BOREHOLE No. 27

N. & E. 2755·8360 (Contd.)

GROUNDWATER LEVEL	GROUNDWATER DATE	SAMPLE DEPTH	B.H.	DEPTH	R.L.	DESCRIPTION OF STRATA
				129'-0" 89.32m	+35·5 -10·82m	
		140'-0" to 141'-6"				Stiff grey - blue fissured clay
						(Sand in fissures below 155 ft. depth)
		157'-0" to 158'-0"				
		165'-0" to 166'-0"				
				54·5m	-4·42m	
				179'-0"	-14·5	Mudstone with siliceous intrusion
				180'-0" 54·86m	-15·5 -4·72m	
						Stiff grey - blue fissured clay becoming increasingly silty and sandy below 181'-0" depth. Traces of shell fragments and lignite at 218 ft.
				67·68 220'-0"	-16·82m -65·5	Bottom of borehole

REMARKS:

SAMPLES
■ Undisturbed
• Disturbed

SCALE: 1" to 1'-0"

SOILS No. S/371

DRWG. No. S/R/526

METROPOLITAN WATER BOARD
MAIN IN TUNNEL BETWEEN THAMES AND LEA VALLEYS.

GEORGE WIMPEY & CO. LTD., CENTRAL LABORATORY, SOUTHALL.

TQ28 SE /1230

Contract Name AVENUE ROAD — **Borehole No.** 1

2740, 8347 — **Sheet** 1 **of** 3

Method of boring Shell and Auger
Diameter 200 mm nominal

Ground level 38.02 m OD
Start 5.9.78
Finish 6.9.78

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
5/9			U			1.40	Soft grey-brown silty clay with chalk and brick fragments — Made ground
				1.40	36.62		
			U				2
			U				4
5/9			U				Firm to stiff brown silty clay with selenite crystals becoming fissured with depth with occasional yellow-brown silt partings and blue grey mottlings (London Clay) 6
			U				8
			U				Contd/.. 10
			U				

Notes

Terresearch Limited | **Report No.** S.28/591 | **Appendix 1 Sheet** 1

TQ28 SE / 1230

Contract Name AVENUE ROAD

Borehole No. 1

Sheet 2 **of** 3

Method of boring
Diameter

Ground level
Start
Finish

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
						9.40	Firm to stiff brown silty clay with selenite crystals becoming fissured with depth with occasional yellow-brown silt partings and blue grey mottlings(London Clay)
			U	10.80	27.22		
			U				
			U				
			U				
			U				
			U				Very stiff fissured dark grey silty clay (London Clay)

12 14 16 18 Contd/.. 20

Notes

Terresearch Limited | **Report No.** S.28/591 | **Appendix 1 Sheet** 2

TQ28SE/1230

Contract Name AVENUE ROAD | **Borehole No.** 1

Sheet 3 **of** 3

Method of boring
Diameter

Ground level
Start
Finish

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
			U			14.20	Very stiff fissured dark grey silty clay (London Clay)
			U				
			U				
6/9				25.00	13.02		Bottom ofBorehole

22
24
26

Notes

Terresearch Limited | **Report No.** S.28/591 | **Appendix 1 Sheet** 3

TQ28SE/1231

Contract Name AVENUE ROAD 2739, 8347	**Borehole No.** 2
	Sheet 1 **of** 3

Method of boring	Shell and Auger	**Ground level**	38.18 m OD
Diameter	200 mm nominal	**Start**	7.9.78
		Finish	8.9.78

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
				0.06	38.12	0.06	Tarmac
			B			2.44	Soft dark brown and black silty clay with chalk lumps and bricks Made ground
			B				
7/9				2.50	35.68		
7/9			U				Stiff to very stiff brown silty clay with occasional yellow-brown silt partings(London Clay)
			U				
			U				
			U				
			U				

Contd/.. 10

Notes Borehole backfilled to 10.00 m on 8.9.78 and casing pulled back 1.50m
SWL then 10.20 (11.9.78)
Not enough of water to get sample

Terresearch Limited	**Report No.** S.28/591	**Appendix 1 Sheet** 4

TQ 28SE/123/

Contract Name	AVENUE ROAD	Borehole No. 2
		Sheet 2 of 3

Method of boring
Diameter

Ground level
Start
Finish

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
			U			8.70	Stiff to very stiff brown silty clay with occasional yellow-brown-silt partings(London Clay)
				11.20	26.98		
7/9			U				12
			U				
							14
			U				Stiff to very stiff fissured dark grey silty clay with some carbonaceous impurities(London Clay)
			U				16
			U				18
			U				Contd/..20

Notes

Terresearch Limited | Report No. S.28/591 | Appendix 1 Sheet 5

TQ 28 SE / 123

Contract Name	AVENUE ROAD	Borehole No. 2
		Sheet 3 of 3

Method of boring
Diameter

Ground level
Start
Finish

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
			U				
						13.80	Stiff to very stiff fissured dark grey silty clay with some carbonaceous impurities (London Clay)
			U				
			U				
8/9				25.00	13.18		Bottom of Borehole

Notes

Terresearch Limited	Report No. S.28/591	Appendix 1 Sheet 6