Göteborg:2017-09-14

CALIBRATION CERTIFICATE FOR CPT PROBE 4616

Probe No	4616
Date of Calibration	2017-09-12
Calibrated by	Christoffer Hurtig……
Run No	523
Test Class:	ISO 1

Point Resistance **Tip Area 10cm²**

Maximum Load	100	MPa
Range	100	MPa
Scaling Factor	**852**	
Resolution	0,8955	kPa
Area factor (a)	0,834	

ERRORS

Max. Temperature effect when not loaded 60,856 kPa

Temperature range 5 –40 deg. Celsius.

Local Friction **Sleeve Area 150cm²**

Maximum Load	0,5	MPa
Range	0,5	MPa
Scaling Factor	**3700**	
Resolution	0,0103	kPa
Area factor (b)	0	

ERRORS

Max. Temperature effect when not loaded 0,566 kPa

Temperature range 5 –40 deg. Celsius.

Pore Pressure

Maximum Load	2	MPa
Range	2	MPa
Scaling Factor	**3780**	
Resolution	0,0202	kPa

ERRORS

Max. Temperature effect when not loaded 1,069 kPa

Temperature range 5 –40 deg. Celsius.

Tilt Angle. **Scaling Factor: 0,95**

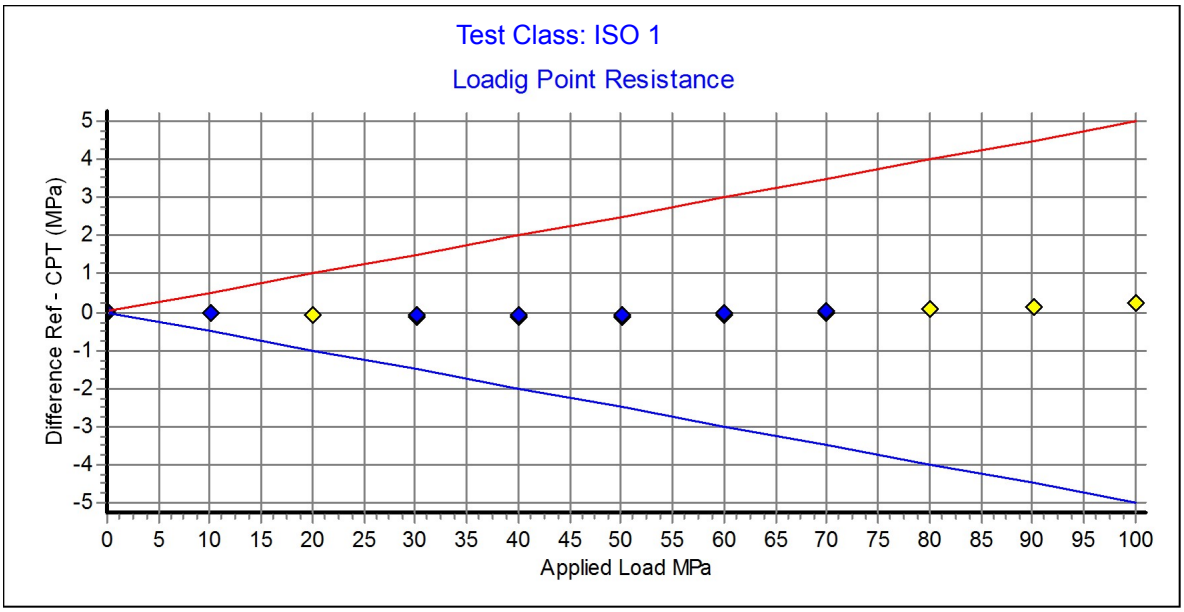
Range	0 - 40	Deg.

Backup memory

Calibration Certificate. **Loading Point Resistance** Göteborg:2017-09-14

Probe No: **4616**
Date of Calibration: **2017-09-12**
Calibration Run No: **523**
Calibrated by: **Christoffer Hurtig**
Scaling Factor: 852
Reference Cell: 75672

Applied Load MPa	PointRes. MPa	Difference MPa	Accuracy %/MV	Friction MPa	PorePress MPa
0,000	0,000	0,000	0,000	0,000	0,000
10,004	10,047	-0,043	-0,429	0,000	0,000
20,047	20,135	-0,088	-0,439	0,000	-0,001
30,033	30,148	-0,115	-0,382	0,001	-0,001
40,009	40,136	-0,127	-0,317	0,002	-0,001
50,041	50,151	-0,110	-0,219	0,002	-0,002
59,993	60,069	-0,076	-0,126	0,003	-0,002
69,969	69,992	-0,023	-0,032	0,004	-0,002
80,004	79,949	0,055	0,068	0,005	-0,002
90,032	89,890	0,142	0,157	0,006	-0,002
100,018	99,763	0,255	0,255	0,007	-0,003
90,029	89,879	0,150	0,166	0,005	-0,001
80,001	79,927	0,074	0,092	0,004	-0,001
69,997	69,990	0,007	0,010	0,003	0,000
60,017	60,060	-0,043	-0,071	0,002	0,000
50,041	50,119	-0,078	-0,155	0,001	0,000
40,031	40,128	-0,097	-0,242	0,001	0,000
30,039	30,142	-0,103	-0,342	0,000	0,000
20,014	20,106	-0,092	-0,459	0,000	0,000
10,025	10,061	-0,036	-0,359	0,000	0,000
0,003	-0,002	0,005	0,000	0,000	0,000



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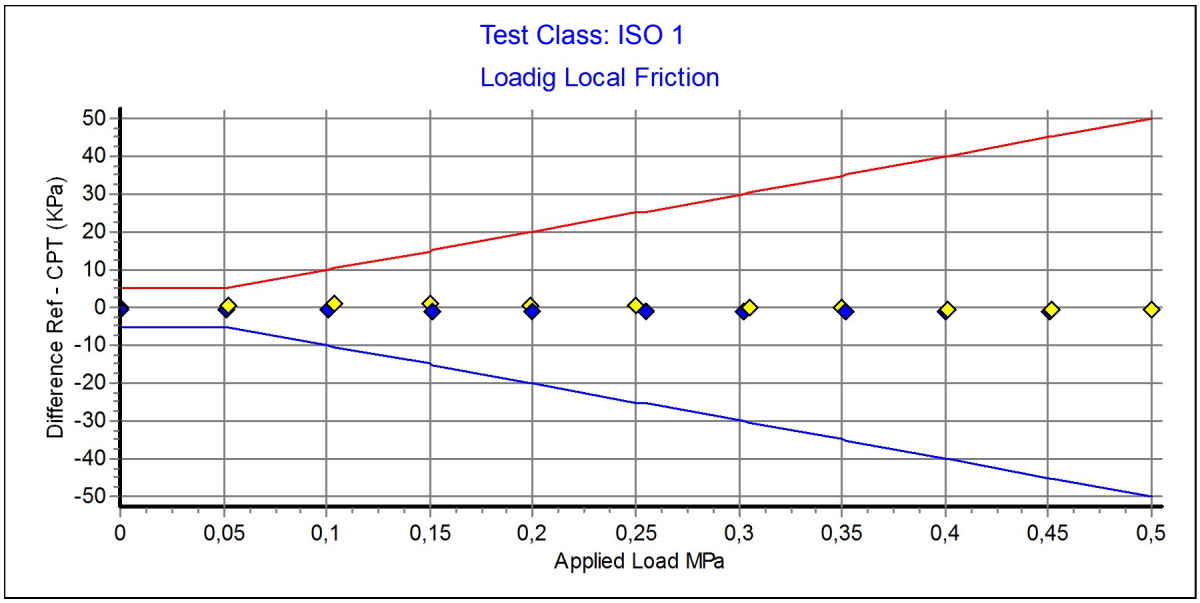
SE-436 32 ASKIM, Sweden SE556098559901

Calibration Certificate. **Loading Local Friction** Göteborg:2017-09-14

Probe No: **4616**
Date of Calibration: **2017-09-12**
Calibration Run No: **523**
Calibrated by: **Christoffer Hurtig**
Scaling Factor: 3700
Reference Cell: 76360

Ref MPa	Friction MPa	Difference KPa	Accuracy %/MV	PointRes. MPa	PorePress MPa
0,000	0,000	0,000	0,000	0,000	0,000
0,052	0,051	0,653	0,000	0,010	0,000
0,104	0,103	0,792	0,000	0,014	0,000
0,150	0,149	0,846	0,000	0,017	0,000
0,199	0,198	0,674	0,000	0,018	0,000
0,250	0,250	0,397	0,158	0,019	0,000
0,305	0,304	0,218	0,071	0,021	0,000
0,350	0,350	0,066	0,019	0,023	0,000
0,401	0,401	-0,271	-0,067	0,024	0,000
0,452	0,452	-0,403	-0,089	0,025	0,000
0,500	0,501	-0,778	-0,155	0,025	0,000
0,451	0,452	-1,047	-0,231	0,021	0,000
0,400	0,402	-1,212	-0,301	0,018	0,000
0,352	0,354	-1,252	-0,353	0,017	0,000
0,302	0,303	-1,141	-0,375	0,015	0,000
0,255	0,256	-1,104	-0,431	0,011	0,000
0,200	0,201	-0,993	-0,492	0,010	0,000
0,151	0,152	-0,849	0,000	0,008	0,000
0,101	0,102	-0,567	0,000	0,008	0,000
0,051	0,051	-0,300	0,000	0,005	0,000
0,000	0,000	-0,340	0,000	0,000	0,000



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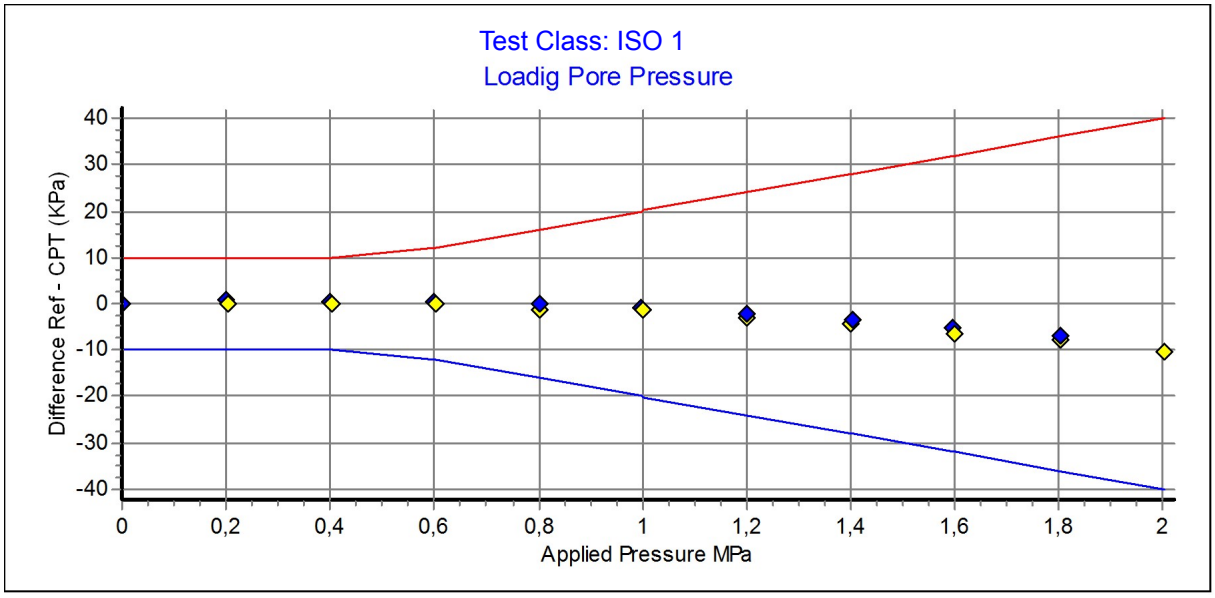
Calibration Certificate. **Loading Pore Pressure** Göteborg:2017-09-14

Probe No: **4616**
Date of Calibration: **2017-09-12**
Calibration Run No: **523**
Calibrated by: **Christoffer Hurtig**
Scaling Factor: 3780
Reference Cell: 44410026

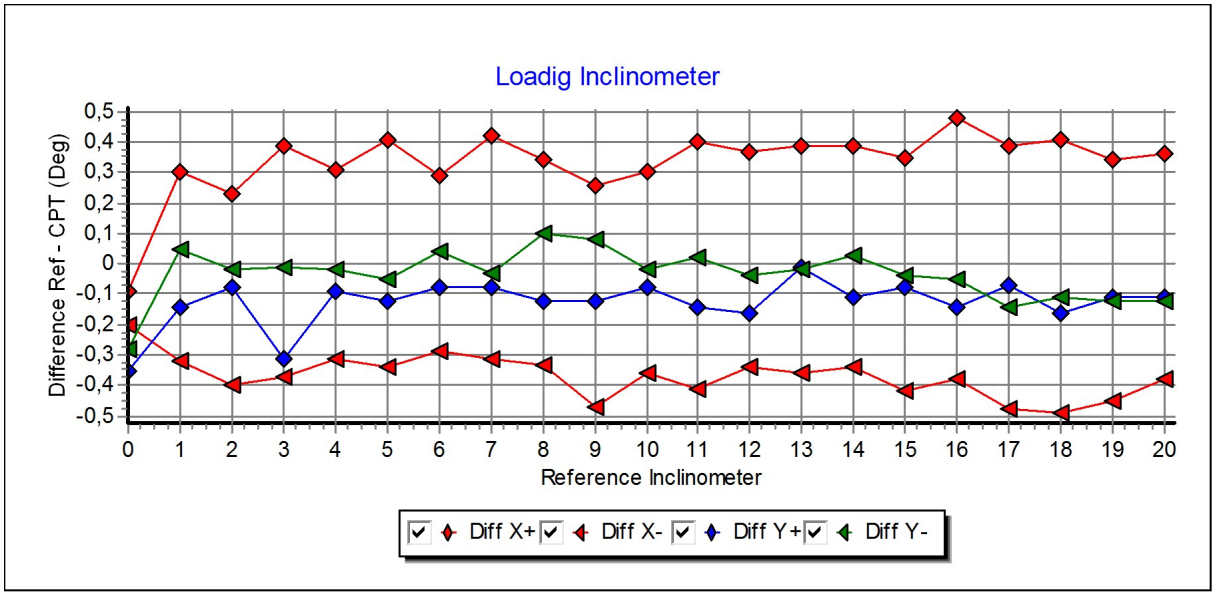
Appl. Press MPa	PorePress MPa	Difference KPa	Accuracy %/MV	PointRes. MPa	Friction MPa	Area Factor A = PR/PP	Area Factor B = LF/PP
0,000	0,000	0,100	0,000	0,000	0,000		
0,202	0,202	-0,129	-0,064	0,162	0,000	0,802	0,000
0,402	0,402	-0,154	-0,038	0,319	0,000	0,793	0,000
0,603	0,603	-0,177	-0,029	0,490	0,000	0,812	0,000
0,801	0,803	-1,426	-0,177	0,660	0,000	0,821	0,000
1,002	1,003	-1,470	-0,146	0,832	0,000	0,829	0,000
1,202	1,205	-2,805	-0,232	1,005	0,000	0,834	0,000
1,401	1,405	-4,495	-0,319	1,176	0,000	0,837	0,000
1,598	1,604	-6,245	-0,389	1,346	0,000	0,839	0,000
1,802	1,810	-7,907	-0,436	1,523	0,000	0,841	0,000
2,002	2,012	-10,277	-0,510	1,697	0,000	0,843	0,000
1,803	1,809	-6,976	-0,385	1,525	0,000	0,843	0,000
1,597	1,602	-5,181	-0,323	1,350	0,000	0,842	0,000
1,403	1,406	-3,230	-0,229	1,184	0,000	0,842	0,000
1,202	1,204	-2,079	-0,172	1,014	0,000	0,842	0,000
0,998	0,999	-0,709	-0,071	0,842	0,000	0,842	0,000
0,801	0,800	0,183	0,022	0,673	0,000	0,841	0,000
0,600	0,600	0,530	0,088	0,503	0,000	0,838	0,000
0,400	0,399	0,513	0,128	0,333	0,000	0,834	0,000
0,200	0,199	0,702	0,000	0,163	0,000	0,819	0,000
0,000	0,000	0,100	0,000	-0,002	0,000		



Calibration Certificate. **Loading Inclinometer** Göteborg:2017-09-14

Probe No: **4616**
Date of Calibration: **2017-09-12**
Calibration Run No: **523**
Calibrated by: **Christoffer Hurtig**
Scaling Factor: 0,95

Appl. Incin. Deg	X+ Deg	X- Deg	Y+ Deg	Y- Deg	Diff X+ Deg	Diff X- Deg	Diff Y+ Deg	Diff Y- Deg
0,00	0,09	0,20	0,35	0,28	-0,09	-0,20	-0,35	-0,28
1,00	0,70	1,32	1,14	0,95	0,30	-0,32	-0,14	0,05
2,00	1,77	2,40	2,08	2,02	0,23	-0,40	-0,08	-0,02
3,00	2,61	3,37	3,31	3,01	0,39	-0,37	-0,31	-0,01
4,00	3,69	4,31	4,09	4,02	0,31	-0,31	-0,09	-0,02
5,00	4,59	5,34	5,12	5,05	0,41	-0,34	-0,12	-0,05
6,00	5,71	6,29	6,08	5,96	0,29	-0,29	-0,08	0,04
7,00	6,58	7,31	7,08	7,03	0,42	-0,31	-0,08	-0,03
8,00	7,66	8,33	8,12	7,90	0,34	-0,33	-0,12	0,10
9,00	8,74	9,47	9,12	8,92	0,26	-0,47	-0,12	0,08
10,00	9,70	10,36	10,08	10,02	0,30	-0,36	-0,08	-0,02
11,00	10,60	11,41	11,14	10,98	0,40	-0,41	-0,14	0,02
12,00	11,63	12,34	12,16	12,04	0,37	-0,34	-0,16	-0,04
13,00	12,61	13,36	13,01	13,02	0,39	-0,36	-0,01	-0,02
14,00	13,61	14,34	14,11	13,97	0,39	-0,34	-0,11	0,03
15,00	14,65	15,42	15,08	15,04	0,35	-0,42	-0,08	-0,04
16,00	15,52	16,38	16,14	16,05	0,48	-0,38	-0,14	-0,05
17,00	16,61	17,48	17,07	17,14	0,39	-0,48	-0,07	-0,14
18,00	17,59	18,49	18,16	18,11	0,41	-0,49	-0,16	-0,11
19,00	18,66	19,45	19,11	19,12	0,34	-0,45	-0,11	-0,12
20,00	19,64	20,38	20,11	20,12	0,36	-0,38	-0,11	-0,12



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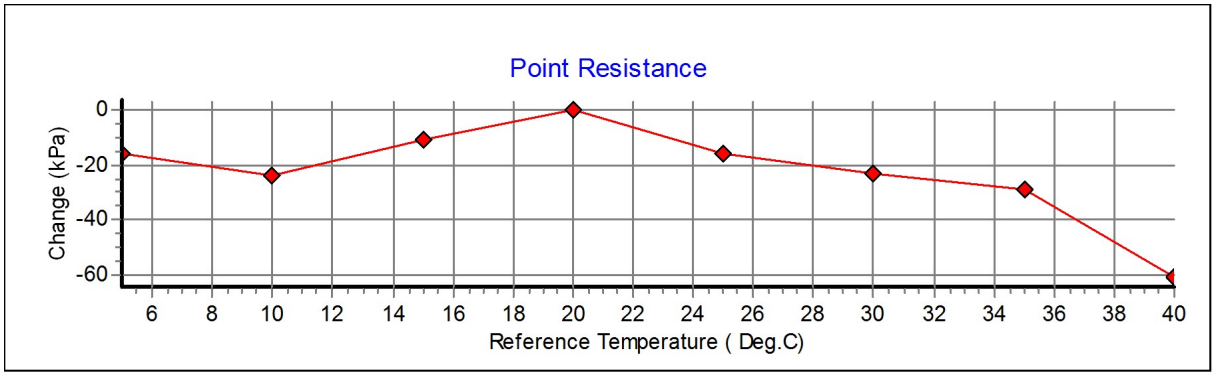
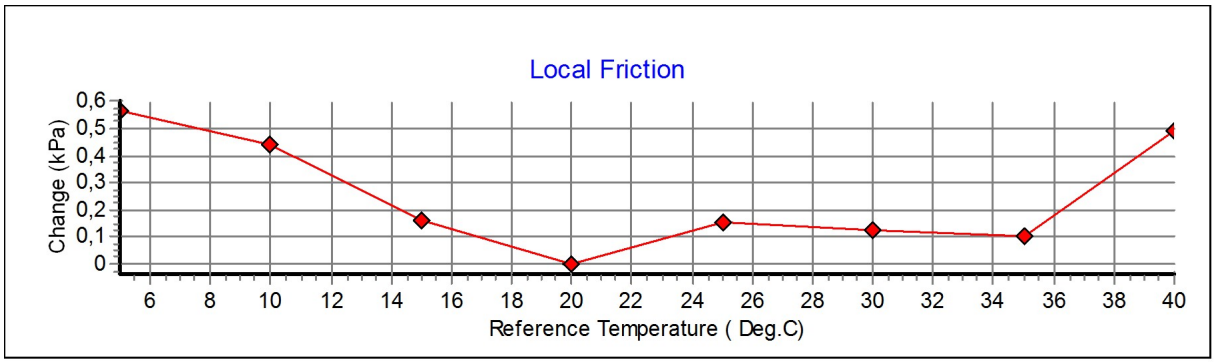
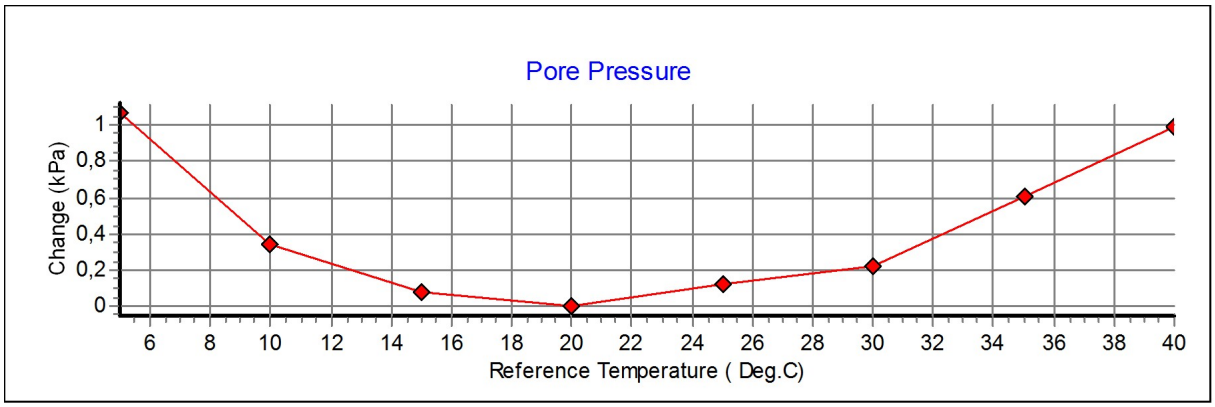
Calibration of temperature effect when not loaded.

Göteborg:2017-09-14

Probe No:	**4616**
Date of Calibration:	**2017-09-12**
Calibration Run No:	**523**
Calibrated by:	**Christoffer Hurtig**







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Calibration procedure.

Göteborg: 2017-09-14

We are following the procedure that is described in the European Standard **EN ISO22476-1:**

Point resistance.

The point resistance is calibrated from 0 to maximum range in 10 steps up and down.
Then we adjust the calibration factor to fit the best linearity.

Local friction.

A special adapter unit substitutes the cone and transfers the axial forces to the lower end of the friction sleeve. The friction is calibrated from 0 to maximum range in 10 steps up and down then the sleeve is turned 90 degrees and the calibration repeated.
Then we adjust the calibration factor to fit the best linearity.

Pore pressure & Area ratio a and b.

The completed probe is installed in a special chamber and the pore pressure sensor are calibrated from 0 to maximum range in 10 step up and down.
Then we adjust the calibration factor to fit the best linearity.
At half range the pressure of the point and friction is registered and used for calculation of the area factor.

Tilt inclination.

The tilt sensor is calibrated +/- 20deg. from vertical line in steps of 1 deg.
This will be done in 2 orthogonal directions.

Temperature.

The temperature sensor are calibrated in steps of 5**°C** from 5 to 40 **°C**.

Temperature compensation.

The Point, Friction and the Pore pressure sensors in the probe is temperature compensated and tested in the range 5 to 40 **°C.**

Calibration reference equipment.

Reference	Load cell	HBM C2/100kN FB088 no.N75672
Reference	Load cell	HBM C2/20kN FB088 no.N76360
Reference	Pressure sensor	HBM P3MB 1MPa no.160410072
Reference	Pressure sensor	HBM P3MB 2MPa no.44410026
Reference	Pressure sensor	HBM P3MB 50MPa no.140510158

The reference sensors are connected to the Geotech black box together with the CPT probe. The measuring data from the reference sensors are simultaneously send to the computer and stored in the Geotech calibration software. The completed systems are recalibrated at RISE Research Institutes of Sweden once a year.

Environment.
Air pressure: 990,6 hPa.
Temperature: 25,5 °C.

Cptlog Cone data base information

Göteborg: 2017-09-14

Cone name	Serial number	Date of purchase
4616	4616	User.

Ranges		Geometric parameters		Scaling factors
Point resistance		Area factor a		Point resistance
100	(Mpa)	0,834		852
Local friction		Area factor b		Local friction
0,5	(Mpa)	0		3700
Pore pressure		Tip area		Pore pressure
2	(Mpa)	10	(cm^2)	3780
Tilt sensor		Sleeve area		Tilt sensor
40	(Deg)	150	(cm^2)	0,95
temperature				temperature
	©			1
Elect. Conductivity				Elect. Conductivity A
	(mS/m)			
				Elect. Conductivity B

Type

NOVA cone

Memory option

With memory