

CALIBRATION CERTIFICATE



APPLICANT FCI Houston

Certificate number FC071310

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SUBMITTED A Piezo Cone Penetrometer

Manufacturer Fugro Engineers B.V.

Device type CONE, A15F7.5CKEW2/B, 70 bar

Serial number 1701-1498

The device contains an electronic data sheet which contains, amongst others, the characteristics of all the sensors inside the device. The data acquisition system calculates the measured value from these known characteristics. All calibration results are conform the values specified below.

Force calibration

Calibration reference : 548 FRE.002

Procedure : FEBV.CAL.PRO.003 KALIBRATIE KRACHT

Title of channel(s) : Cone and Cone+Fric.

Max. load 150 kN

Range	Calibration range From to	Sensitivity Deviation	Zero load output
1	0 75 kN	< 0.5 %	< 1.50 kN
Calibration uncertainty		0.3 %	0.008 kN

Pressure test :

Deviation from specified Alpha factor at 2.5 MPa	< 5 %
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Cone quality control values :

Max. deviation from reference	< 1 %
Max. Tip to Sleeve friction Crosstalk	< 1 %

Pressure calibration

Calibration reference : 3257-0001

Procedure : FEBV.CAL.PRO.004 KALIBRATIE DRUK

Title of channel : Pore 2

Max. load 10.5 Mpa

Range	Calibration range From	Sensitivity Deviation	Zero load output
1	0 2.5 MPa	< 1.0 %	< 0.28 MPa
Calibration uncertainty		0.6 %	0.003 MPa
Pore 2 transducer : Kulite HKM 150-70bar SN : 7056-1-133			

Calibration of the slope sensor

Calibration reference :

Procedure; FEBV.CAL.PRO.006 KALIBRATIE HELLING

Title of channel : Slope x

Range	Calibration range From	Sensitivity Deviation	Zero load output
1	0 15 deg	< 10 %	< 1.5 deg
Calibration uncertainty		1 %	0.5 deg

Typical values for this type of device

Cone diameter (mm)	43.7	Pore 2 position	2	Alpha factor	0.58
Cone area (square cm)	15	Sleeve length (mm)	144.7	Cone - Sleeve distance (mm)	14.4
Sleeve diameter (mm)	43.9	Sleeve area (square cm)	200	Cone - Pore 2 distance (mm)	6.0

TRACEABILITY The measurements have been executed using standards for which the traceability to primary and/or (inter)national standards has been demonstrated.

Calibrated by: Boer de, Kimmo

Approved by: Sinjorgo, Gerry

Calibration date: 03/12/2007

Approval date: 03/12/2007

Calibrate before: 27/11/2008



Calibration Verification Certificate



Device Type: Piezo Cone Penetrometer

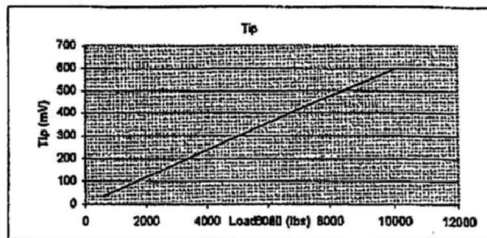
Device Number: F7.5CKEW2/B 1701-1498

TIP CALIBRATION

Tip area = 15 cm² = 0.0161 ft²

Tip readings in mV

Load lb	Load Tons	load/area tsf	Tip mV	TIP Cal Factor Mpa
0	0	0	0	0
595	0.2975	18.47826	35.3	50.1272162
6120	3.06	190.0621	363.9	50.0150484
8510	4.255	264.2857	505.6	50.0557325
10010	5.005	310.8696	595.3	50.0068526
15005	7.5025	465.9938	892.3	50.0099515
19985	9.9925	620.6522	1184.3	50.1849794

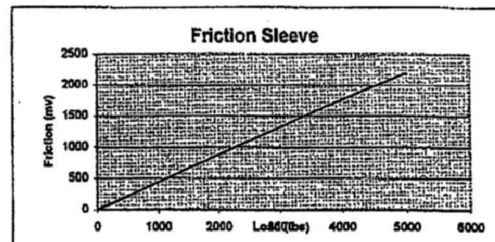


FRICITION CALIBRATION

Sleeve area = 200 cm² = 0.2153 ft²

Friction readings in mV

Load lb	Load Tons	load/area tsf	Friction mV	Friction Cal Factor Mpa
0	0	0	0	0
520	0.26	1.207617	230.6	0.50148415
2490	1.245	5.782629	1101.3	0.50281344
3510	1.755	8.151417	1548.2	0.50418884
4990	2.495	11.58848	2191.6	0.50635188
7520	3.76	17.464	3286.3	0.50888987



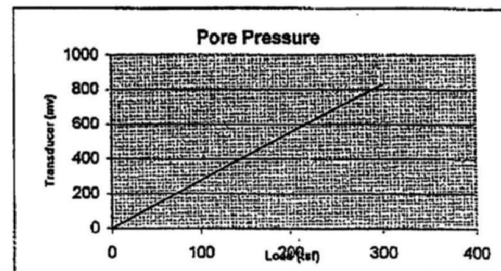
PORE PRESSURE TRANSDUCER CALIBRATION

Serial : 7056-1-133

Pore Pressure readings in mV

Pressure Pressure Transducer readings

psi	tsf	mV	P.Pres. Cal Factor Mpa
0	0	0	0
75	5.4	207.8	2.48848722
150	10.8	414.3	2.49629565
300	21.6	827.8	2.49870812



Temperature Calibration (30 - 115 degrees F)

Temp (deg TIP (mV) FRIC (mV) PIEZO (mV)

30	1.578	0.973	-0.438
50	1.652	0.939	-0.984
75	1.681	0.981	-1.023
100	1.840	1.222	1.564
115	1.877	2.011	3.210

Deviation	mV	Mpa	% Full Scale
Tip	0.338	0.0169	0.0338
Friction	1.694	0.000847	0.1694
Piezo	5.714	0.014285	0.5714

TIP CALIBRATED BY GEOTAC (A2LA APPROVED) LOAD CELL:

Model 560K, Serial No. 129739

FRICITION CALIBRATED BY INTERFACE (A2LA APPROVED) LOAD CELL :

Model: 1211EX-10K-B, Serial : 113655

PORE PRESSURE TRANSDUCER CALIBRATED BY GE SENSING (AANSI/NCSL APPROVED)

Pressure Indicator Model: UPS3000CC, Serial : A0813

TEMPERATURE CALIBRATED BY HOUSTON PRECISION TYPE K THERMOCOUPLE (A2LA APPROVED)

Model # 8528-40, Serial # C95005824, ID # TD-001

Calibration Verified by: Dennis Stauffer

Date: 12/16/2007

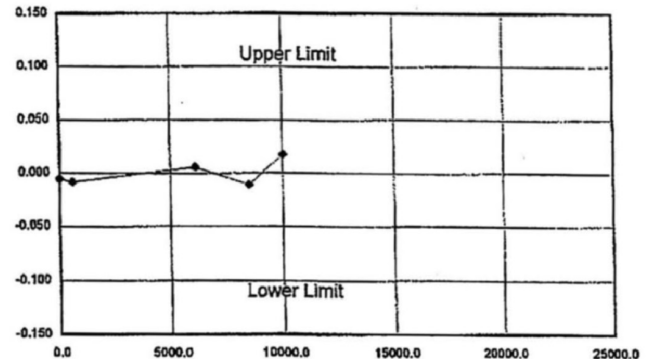
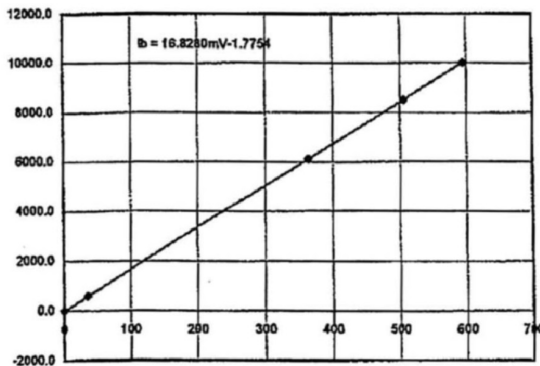
Checked By : Recep Yilmaz

Date: 12/16/2007

HGL Instrument Verification

DATE: 12/16/2007 Instrument No.: ft Location: Houston LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. Reading Resolution of Instrument: 0.000001

Instrument Identification/Data		Instrument	Standard	Prediction	Abs. Error	Full Scale
Type	Cone Penetrometer-TIP	mV	lb	lb	lb	Error (%)
Manufacturer	Fugro	0.000000	0.0	-1.8	1.8	-0.01
Model Number	F7.5CKE3SW2/B	35.300000	595.0	592.3	2.7	-0.01
Serial Number	1701-1498(Tip)	363.900000	6120.0	6121.9	1.9	0.01
HGL Instrument Number	ft	505.600000	8510.0	8506.4	3.6	-0.01
Excitation (V)		595.300000	10010.0	10015.9	5.9	0.02
Gain/Span Setting	NA	892.300000	15005.0	15013.8	8.8	0.03
Full Range Output (V)		1187.200000	19985.0	19976.4	8.6	-0.03
Full Range/Capacity (lb)	33716					
Date Verified	12/16/2007					
Date Due	12/15/2008					
Service Status	In Service					
Accept. Abs. or FS Error (%)	0.1	☒ FS;				
Verification/Standard Equipment						
Type	Load Cell (A2AL APPROVED)					
Manufacturer	Geotak					
Model Number	560K					
Serial Number	129739					
HGL Instrument Number						
Date Verified						
Temperature	$^{\circ}\text{C} = $ $^{\circ}\text{F}$					
Linear Regression, Uncertainty, & Error Summary						
Correlation Coeff. (R^2)	0.999999325					
Intercept (lb)	-1.775423408					
Slope (lb/mV)	16.82797742					
Verification (Calib.) Factor	16.82797742					
Verification Factor Units	lb/mV					
Absolute Zero (V)						
Floating Zero (V)						
Combined Uncertainty (lb)	1.145434402					
Coverage Factor	2					
Expanded Uncertainty (lb)	2.290868805					
Max. Abs. or FS Error (%)	0.03	☒ FS;				



Uncertainty Budget Analysis For ft							
Source of Uncertainty	Value in lb	Distribution	Divisor	Type	Uncertainty (u_i)	u_i^2	Comments
Standard's Uncertainty		N	2.0000	B			
Abs. Error-STDEV ¹	1.1454	N	1.0000	A	1.1454	1.3120	
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000	
Repeatability ²		N	1.0000	A			
Resolution of Standard	#N/A	R	3.4641	B			
Combined Uncertainty	1.1454		Coverage Factor	2			for 95% confidence level.
Expanded Uncertainty (Best Measurement Capability) ³	2.291			lb			

(1) This equation follows the approach presented by A2LA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.

(2) This value is unique for type (model) of equipment.

(3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of $k=2$.

Verified By: [Signature]

Input By: _____

Reviewed By: _____

Checked By: [Signature]

File: _____

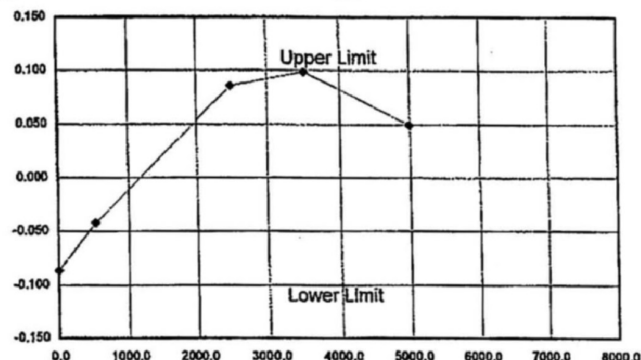
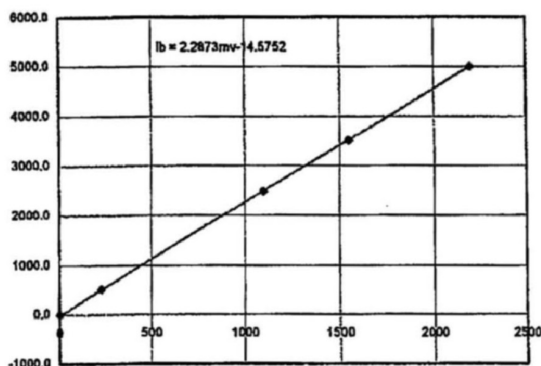
Remarks: _____

HGL Instrument Verification

DATE: 12/16/2007 Instrument No.: ft100 Location: LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. Reading Resolution of Instrument: 0.000001

Instrument Identification/Data		Instrument	Standard	Prediction	Abs. Error	Full Scale
Type	Cone Penetrometer	mv	lb	lb	lb	Error (%)
Manufacturer	Fugro	0.000000	0.0	-14.6	14.6	-0.09
Model Number	F7.5CKEW2/B	230.600000	520.0	512.9	7.1	-0.04
Serial Number	1701-1498 (Friction)	1101.300000	2490.0	2504.5	14.5	0.09
HGL Instrument Number	ft100	1548.200000	3510.0	3526.7	16.7	0.10
Excitation (V)		2191.600000	4990.0	4998.3	8.3	0.05
Gain/Span Setting	NA	3286.300000	7520.0	7502.3	17.7	-0.11
Full Range Output (V)						
Full Range/Capacity (lb)	16858					
Date Verified	12/16/2007					
Date Due	12/15/2008					
Service Status	In Service					
Accept. Abs. or FS Error (%)	0.1	☒ FS; ☐ Abs.				
Verification/Standard Equipment						
Type	Load Cell (A2AL APPROVED)					
Manufacturer	INTERFACE					
Model Number	1211EX-10K-B					
Serial Number	113655					
HGL Instrument Number						
Date Verified						
Temperature	$^{\circ}\text{C} = $ $^{\circ}\text{F}$					
Linear Regression, Uncertainty, & Error Summary						
Correlation Coeff. (R^2)	0.999971576					
Intercept (lb)	-14.57516298					
Slope (lb/mv)	2.287323639					
Verification (Calib.) Factor	2.28732364					
Verification Factor Units	lb/mv					
Absolute Zero (V)						
Floating Zero (V)						
Combined Uncertainty (lb)	1.796528357					
Coverage Factor	2					
Expanded Uncertainty (lb)	3.593056715					
Max. Abs. or FS Error (%)	-0.11	☒ FS; ☐ Abs.				

MTS ☐ Yes; ☒ No



Uncertainty Budget Analysis For ft100							
Source of Uncertainty	Value in lb	Distribution	Divisor	Type	Uncertainty (u_i)	u_i^2	Comments
Standard's Uncertainty		N	2.0000	B			
Abs. Error-STDEV ¹	1.7965	N	1.0000	A	1.7965	3.2275	
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000	
Repeatability ²		N	1.0000	A			
Resolution of Standard	#N/A	R	3.4641	B			
Combined Uncertainty	1.7965						
Coverage Factor	2						for 95% confidence level.
Expanded Uncertainty (Best Measurement Capability) ³	3.593			lb			

(1) This equation follows the approach presented by A2LA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.

(2) This value is unique for type (model) of equipment.

(3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of k=2.

Verified By: MS

Input By: _____

Reviewed By: _____

Checked By: Ry

File: _____

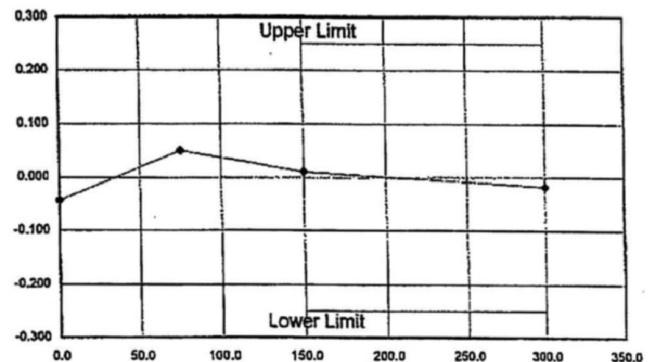
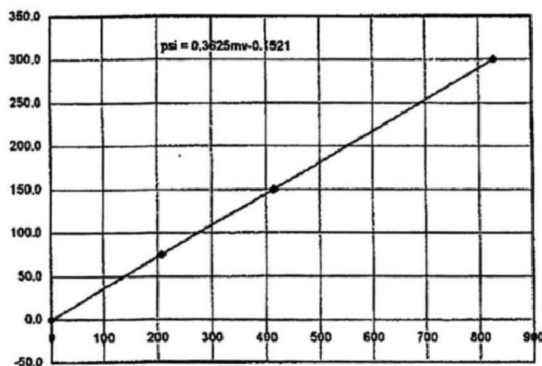
Remarks: _____

HGL Instrument Verification

DATE: 12/16/2007 Instrument No.: pt Location: Houston LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. Reading Resolution of Instrument: 0.000001

Instrument Identification/Data		Instrument	Standard	Prediction	Abs. Error	Full Scale
Type	Cone Penetrometer	mv	psi	psi	psi	Error (%)
Manufacturer	Fugro	0.000000	0.0	-0.2	0.2	-0.04
Model Number	F7.5CKEW2/B	207.800000	75.0	75.2	0.2	0.05
Serial Number	1701-1576-7056-1-133 (Piezo)	414.300000	150.0	150.0	0.0	0.01
HGL Instrument Number	pt	827.800000	300.0	299.9	0.1	-0.02
Excitation (V)						
Gain/Span Setting	NA					
Full Range Output (V)						
Full Range/Capacity (psi)	360					
Date Verified	12/16/2007					
Date Due	12/15/2008					
Service Status	In Service					
Accept. Abs. or FS Error (%)	0.25 ☒ FS; ☐ Abs.					
Verification/Standard Equipment						
Type	PT(ANSI/NCSTL APPROVED)					
Manufacturer	Eaton					
Model Number	UPS3000CC					
Serial Number	A0813					
HGL Instrument Number						
Date Verified						
Temperature	°C = °F					
Linear Regression, Uncertainty, & Error Summary						
Correlation Coeff. (R ²)	0.99998775					
Intercept (psi)	-0.152094883					
Slope (psi/mv)	0.362513539					
Verification (Calib.) Factor	0.36251354					
Verification Factor Units	psi/mv					
Absolute Zero (V)						
Floating Zero (V)						
Combined Uncertainty (psi)	0.03399576					
Coverage Factor	2					
Expanded Uncertainty (psi)	0.06799152					
Max. Abs. or FS Error (%)	0.05 ☒ FS; ☐ Abs.					

MTS ☐ Yes; ☒ No



Uncertainty Budget Analysis For pt							
Source of Uncertainty	Value in psi	Distribution	Divisor	Type	Uncertainty (u)	u ²	Comments
Standard's Uncertainty		N	2.0000	B			
Abs. Error-STDEV ¹	0.0340	N	1.0000	A	0.0340	0.0012	
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000	
Repeatability ²		N	1.0000	A			
Resolution of Standard	#N/A	R	3.4641	B			
Combined Uncertainty	0.0340	Coverage Factor		2	for 95% confidence level.		
Expanded Uncertainty (Best Measurement Capability) ³	0.068			psi			

(1) This equation follows the approach presented by A2LA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.

(2) This value is unique for type (model) of equipment.

(3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of k=2.

Verified By: RS Input By: _____ Reviewed By: _____ Checked By: Ly
 File: _____
 Remarks: _____

CALIBRATION CERTIFICATE



APPLICANT FGI HOUSTON

Certificate number FC070040

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SUBMITTED A Piezo Cone Penetrometer

Manufacturer

Fugro Engineers B.V.

Device type CONE, A15F2.5CKE3SW2/ B. 50 bar

Serial number 1701-1788

The device contains an electronic data sheet which contains, amongst others, the characteristics of all the sensors inside the device. The data acquisition system calculates the measured value from these known characteristics. All calibration results are conform the values specified below.

Force calibration

Calibration reference : 548 FRE.001

Procedure : FEBV.CAL.PRO.003 KALIBRATIE KRACHT

Title of channel(s) : Cone and Cone+Fric.

Max. load 150 kN

Range	Calibration range From to	Sensitivity Deviation	Zero load output
1	0 25 kN	< 0.5 %	< 0.75 kN
Calibration uncertainty		0.3 %	0.008 kN

Pressure test :

Deviation from specified Alpha factor at 2.5 MPa	< 5 %
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Cone quality control values :

Max. deviation from reference	< 1 %
Max. Tip to Sleeve friction Crosstalk	< 1 %

Pressure calibration

Calibration reference : 3257-0001

Procedure : FEBV.CAL.PRO.004 KALIBRATIE DRUK

Title of channel : Pore 2

Max. load 30 Mpa

Range	Calibration range From	Sensitivity Deviation	Zero load output
1	0 2.5 MPa	< 1.0 %	< 0.002 MPa
Calibration uncertainty		0.6 %	0.003 MPa
Pore 2 transducer : Kistler 4043A50 SN : 1233109			

Calibration of the slope sensor

Calibration reference :

Procedure: FEBV.CAL.PRO.006 KALIBRATIE HELLING

Title of channel : Slope x

Range	Calibration range From	Sensitivity Deviation	Zero load output
1	0 15 deg	< 10 %	< 1.5 deg
Calibration uncertainty		1 %	0.5 deg

Typical values for this type of device

Cone diameter (mm)	43.7	Pore 2 position	2	Alpha factor	0.58
Cone area (square cm)	15	Sleeve length (mm)	144.7	Cone - Sleeve distance (mm)	14.4
Sleeve diameter (mm)	43.9	Sleeve area (square cm)	200	Cone - Pore 2 distance (mm)	6.0

TRACEABILITY: The measurements have been executed using standards for which the traceability to primary and/or (inter)national standards has been demonstrated.

Calibrated by: Hoogendoorn, Raymond

Approved by: Sinjorgo, Gerry

Calibration date: 16-1-2007

Approval date: 16-1-2007

Calibrate before: 16-1-2008



Calibration Verification Certificate



Device Type: Piezo Cone Penetrometer

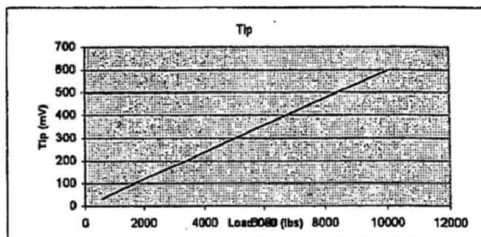
Device Number: F7.5CKESW2/V 1701-1788

TIP CALIBRATION

Tip area = 15 cm² = 0.0161 ft²

Tip readings in mV

Load lb	Load Tons	load/area tsf	Tip mV	TIP Cal Factor Mpa
0	0	0	0	0
540	0.27	16.77019	32.1	50.0287963
5110	2.555	158.6957	303.4	50.0883413
7580	3.79	235.4037	449.8	50.1165401
10020	5.01	311.1801	596.3	49.9728639
15020	7.51	466.4596	892.5	50.0487269
20005	10.0025	621.2733	1183.2	50.2819048

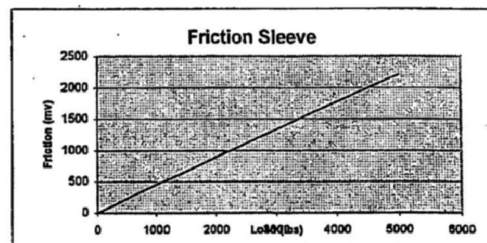


FRICTION CALIBRATION

Sleeve area = 200 cm² = 0.2153 ft²

Friction readings in mV

Load lb	Load Tons	load/area tsf	Friction mV	Friction Cal Factor Mpa
0	0	0	0	0
620	0.31	1.439851	279.8	0.49278463
1990	0.995	4.621458	884.6	0.50028711
3520	1.76	8.17464	1562.3	0.50106193
5010	2.505	11.63493	2212.2	0.5036473
7510	3.755	17.44078	3308.9	0.50474203

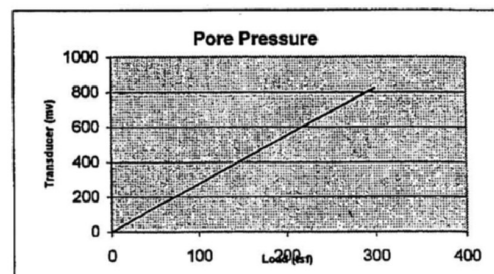


PORE PRESSURE TRANSDUCER CALIBRATION

Serial : 1233109

Pore Pressure readings in mV

Pressure psi	Pressure tsf	Transducer readings mV	P.Pres. Cal Factor Mpa
0	0	0	0
75	5.4	206.7	2.50173026
150	10.8	413.6	2.50052053
300	21.6	824.2	2.50962215



Temperature Calibration (30 - 115 degrees F)

Temp (deg F)	TIP (mV)	FRIC (mV)	PIEZO (mV)	Deviation mV	Mpa	% Full Scale
30	-0.017	-0.198	-0.109	Tip	0.274	0.0137
50	-0.008	-0.336	-0.067	Friction	3.185	0.001593
75	0.011	-0.456	-0.054	Piezo	2.593	0.006483
100	0.132	2.307	-2.192			
115	0.257	2.987	-2.647			

TIP CALIBRATED BY GEOTAC (A2LA APPROVED) LOAD CELL:

Model 560K, Serial No. 129739

FRICTION CALIBRATED BY INTERFACE (A2LA APPROVED) LOAD CELL :

Model: 1211EX-10K-B, Serial : 113655

PORE PRESSURE TRANSDUCER CALIBRATED BY GE SENSING (AANSI/NC SL APPROVED)

Pressure Indicator Model: UPS3000CC, Serial : A0813

TEMPERATURE CALIBRATED BY HOUSTON PRECISION TYPE K THERMOCOUPLE (A2LA APPROVED)

Model # 8528-40, Serial # C95005824, ID # TD-001

Calibration Verified by: Dennis Stauffer

Date: 11/5/2007

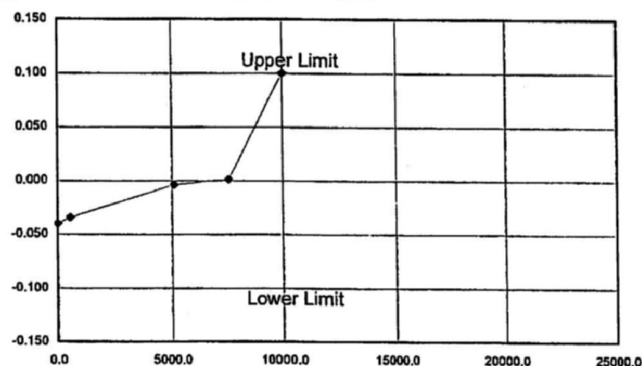
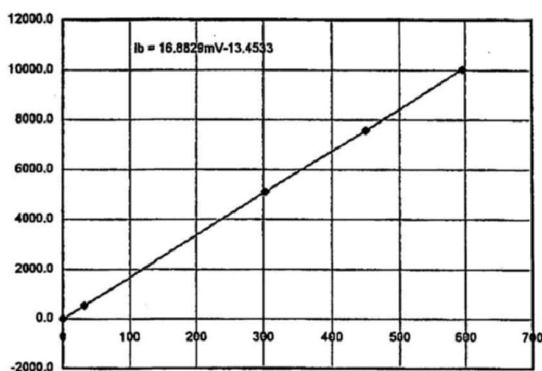
Checked By : Recep Yilmaz

Date: 11/5/2007

HGL Instrument Verification

DATE: 11/5/2007 Instrument No.: ft Location: Houston LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. Reading Resolution of Instrument: 0.000001

Instrument Identification/Data		Instrument	Standard	Prediction	Abs. Error	Full Scale
Type	Cone Penetrometer_TIP	mV	lb	lb	lb	Error (%)
Manufacturer	Fugro	0.000000	0.0	-13.5	13.5	-0.04
Model Number	F7.5CKESW2/B1	32.100000	540.0	528.5	11.5	-0.03
Serial Number	1701-1788 (Tip)	303.400000	5110.0	5108.8	1.2	0.00
HGL Instrument Number	ft	449.800000	7580.0	7580.5	0.5	0.00
Excitation (V)		596.300000	10020.0	10053.8	33.8	0.10
Gain/Span Setting	NA	892.500000	15020.0	15054.5	34.5	0.10
Full Range Output (V)		1183.200000	20005.0	19962.4	42.6	-0.13
Full Range/Capacity (lb)	33716					
Date Verified	11/5/2007					
Date Due	11/4/2008					
Service Status	In Service					
Accept. Abs. or FS Error (%)	0.1 ☒ FS; ☐ Abs.					
Verification/Standard Equipment						
Type	Load Cell (A2AL APPROVED)					
Manufacturer	Geotac					
Model Number	560K					
Serial Number	129739					
HGL Instrument Number						
Date Verified						
Temperature	°C = °F					
Linear Regression, Uncertainty, & Error Summary						
Correlation Coeff. (R ²)	0.999986252					
Intercept (lb)	-13.45326099					
Slope (lb/mV)	16.88287763					
Verification (Calib.) Factor	16.88287763					
Verification Factor Units	lb/mV					
Absolute Zero (V)						
Floating Zero (V)						
Combined Uncertainty (lb)	6.479058372					
Coverage Factor	2					
Expanded Uncertainty (lb)	12.95811674					
Max. Abs. or FS Error (%)	-0.13 ☒ FS; ☐ Abs.					
		MTS ☐ Yes; ☒ No				



Uncertainty Budget Analysis For ft							
Source of Uncertainty	Value in lb	Distribution	Divisor	Type	Uncertainty (u _i)	u _i ²	Comments
Standard's Uncertainty		N	2.0000	B			
Abs. Error-STDEV ¹	6.4791	N	1.0000	A	6.4791	41.9782	
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000	
Repeatability ²		N	1.0000	A			
Resolution of Standard	#N/A	R	3.4641	B			
Combined Uncertainty	6.4791						
Coverage Factor	2						for 95% confidence level.
Expanded Uncertainty (Best Measurement Capability) ³	12.958			lb			

(1) This equation follows the approach presented by A2LA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.

(2) This value is unique for type (model) of equipment.

(3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of k=2.

Verified By: LS

Input By: _____

Reviewed By: _____

Checked By: Ry

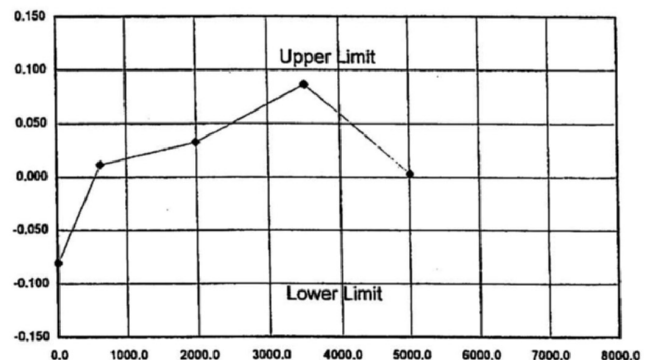
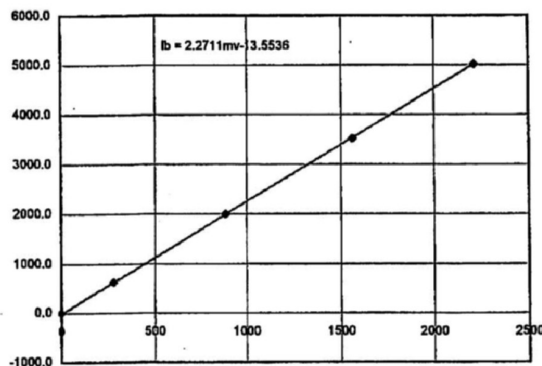
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Remarks: _____

HGL Instrument Verification

DATE: 11/5/2007 Instrument No.: ft100 Location: LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. Reading Resolution of Instrument: 0.000001

Instrument Identification/Data		Instrument	Standard	Prediction	Abs. Error	Full Scale
Type	Cone Penetrometer	mv	lb	lb	lb	Error (%)
Manufacturer	Fugro	0.000000	0.0	-13.6	13.6	-0.08
Model Number	F7.5CKESW2/B1	279.800000	620.0	621.9	1.9	0.01
Serial Number	1701-1788 (Friction)	884.600000	1990.0	1995.4	5.4	0.03
HGL Instrument Number	ft100	1562.300000	3520.0	3534.5	14.5	0.09
Excitation (V)		2212.200000	5010.0	5010.5	0.5	0.00
Gain/Span Setting	NA	3308.900000	7510.0	7501.2	8.8	-0.05
Full Range Output (V)						
Full Range/Capacity (lb)	16858					
Date Verified	11/5/2007					
Date Due	11/4/2008					
Service Status	In Service					
Accept. Abs. or FS Error (%)	0.1	☒ FS;	☐ Abs.			
Verification/Standard Equipment						
Type	Load Cell (A2AL APPROVED)					
Manufacturer	INTERFACE					
Model Number	1211EX-10K-B					
Serial Number	113655					
HGL Instrument Number						
Date Verified						
Temperature	°C = °F					
Linear Regression, Uncertainty, & Error Summary						
Correlation Coeff. (R ²)	0.999987431					
Intercept (lb)	-13.55356528					
Slope (lb/mv)	2.271068817					
Verification (Calib.) Factor	2.27106882					
Verification Factor Units	lb/mv					
Absolute Zero (V)						
Floating Zero (V)						
Combined Uncertainty (lb)	2.398188297					
Coverage Factor	2					
Expanded Uncertainty (lb)	4.796376595					
Max. Abs. or FS Error (%)	0.09	☒ FS;	☐ Abs.			
		MTS		☐ Yes;	☒ No	



Uncertainty Budget Analysis For ft100							
Source of Uncertainty	Value in lb	Distribution	Divisor	Type	Uncertainty (u _i)	u _i ²	Comments
Standard's Uncertainty		N	2.0000	B			
Abs. Error-STDEV ¹	2.3982	N	1.0000	A	2.3982	5.7513	
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000	
Repeatability ²		N	1.0000	A			
Resolution of Standard	#N/A	R	3.4641	B			
Combined Uncertainty	2.3982	Coverage Factor		2	for 95% confidence level.		
Expanded Uncertainty (Best Measurement Capability) ³	4.796			lb			

(1) This equation follows the approach presented by A2LA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.

(2) This value is unique for type (model) of equipment.

(3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of k=2.

Verified By: [Signature]

Input By: _____

Reviewed By: _____

Checked By: [Signature]

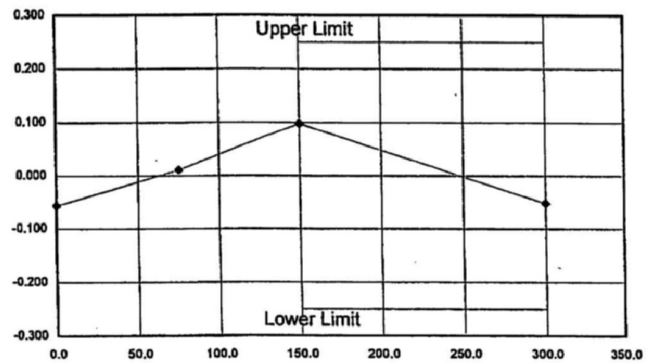
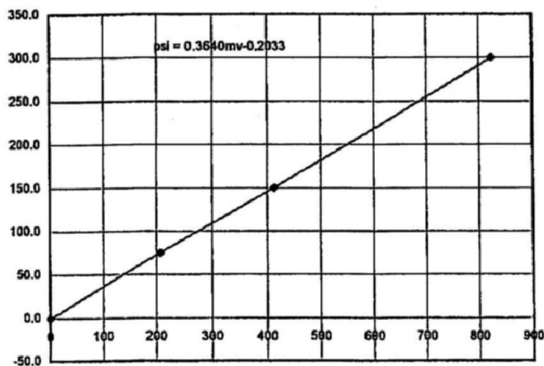
File: _____

Remarks: _____

HGL Instrument Verification

DATE: 11/5/2007 Instrument No.: pt Location: Houston LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. Reading Resolution of Instrument: 0.000001

Instrument Identification/Data				Instrument	Standard	Prediction	Abs. Error	Full Scale
Type	Cone Penetrometer			mv	psi	psi	psi	Error (%)
Manufacturer	Fugro			0.000000	0.0	-0.2	0.2	-0.06
Model Number	F7.5CKESW2/B1			206.700000	75.0	75.0	0.0	0.01
Serial Number	1701-1788-1233109 (Piezo)			413.600000	150.0	150.4	0.4	0.10
HGL Instrument Number	pt			824.200000	300.0	299.8	0.2	-0.05
Excitation (V)								
Gain/Span Setting	NA							
Full Range Output (V)								
Full Range/Capacity (psi)	360							
Date Verified	11/5/2007							
Date Due	11/4/2008							
Service Status	In Service							
Accept. Abs. or FS Error (%)	0.25	☒ FS;	☐ Abs.					
Verification/Standard Equipment								
Type	PT(ANSI/NCSL APPROVED)							
Manufacturer	Eaton							
Model Number	UPS3000CC							
Serial Number	A0813							
HGL Instrument Number								
Date Verified								
Temperature	°C = °F							
Linear Regression, Uncertainty, & Error Summary								
Correlation Coeff. (R ²)	0.99999592							
Intercept (psi)	-0.20331044							
Slope (psi/mv)	0.364010552							
Verification (Calib.) Factor	0.36401055							
Verification Factor Units	psi/mv							
Absolute Zero (V)								
Floating Zero (V)								
Combined Uncertainty (psi)	0.064150208							
Coverage Factor	2							
Expanded Uncertainty (psi)	0.128300415							
Max. Abs. or FS Error (%)	0.10	☒ FS;	☐ Abs.					
				MTS	☐ Yes;	☒ No		



Uncertainty Budget Analysis For pt							
Source of Uncertainty	Value in psi	Distribution	Divisor	Type	Uncertainty (u _i)	u _i ²	Comments
Standard's Uncertainty		N	2.0000	B			
Abs. Error-STDEV ¹	0.0642	N	1.0000	A	0.0642	0.0041	
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000	
Repeatability ²		N	1.0000	A			
Resolution of Standard	#N/A	R	3.4641	B			
Combined Uncertainty	0.0642	Coverage Factor		2	for 95% confidence level.		
Expanded Uncertainty (Best Measurement Capability) ³	0.128			psi			

(1) This equation follows the approach presented by A2LA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.

(2) This value is unique for type (model) of equipment.

(3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of k=2.

Verified By: HS Input By: _____ Reviewed By: _____ Checked By: Ry
 File: _____
 Remarks: _____

CALIBRATION CERTIFICATE



APPLICANT FGI HOUSTON

Certificate number FC070494

Page 1 of 1

SUBMITTED A Piezo Cone Penetrometer

Manufacturer Fugro Engineers B.V.

Device type CONE, A15F7.5CKEW2/B, 50 bar (2.5 ton)

Serial number 1701-1831

The device contains an electronic data sheet which contains, amongst others, the characteristics of all the sensors inside the device. The data acquisition system calculates the measured value from these known characteristics. All calibration results are conform the values specified below.

Force calibration

Calibration reference : 548 FRE.001

Procedure : FEBV.CAL.PRO.003 KALIBRATIE KRACHT

Title of channel(s) : Cone and Cone+Fric.

Max. load 150 kN

Range	Calibration range From to	Sensitivity Deviation	Zero load output
1	0 25 kN	< 0.5 %	< 0.75 kN
Calibration uncertainty		0.3 %	0.008 kN

Pressure test :

Deviation from specified Alpha factor at 2.5 MPa	< 5 %
--	-------

Cone quality control values :

Max. deviation from reference	< 1 %
Max. Tip to Sleeve friction Crosstalk	< 1 %

Pressure calibration

Calibration reference : 3257-0001

Procedure : FEBV.CAL.PRO.004 KALIBRATIE DRUK

Title of channel : Pore 2

Max. load 12.5 MPa

Range	Calibration range From	Sensitivity Deviation	Zero load output
1	0 2.5 MPa	< 1.0 %	< 0.002 MPa
Calibration uncertainty		0.6 %	0.003 MPa
Pore 2 transducer : Kistler 4043A50 SN : 1233111			

Calibration of the slope sensor

Calibration reference :

Procedure: FEBV.CAL.PRO.006 KALIBRATIE HELLING

Title of channel : Slope x

Range	Calibration range From	Sensitivity Deviation	Zero load output
1	0 15 deg	< 10 %	< 1.5 deg
Calibration uncertainty		1 %	0.5 deg

Typical values for this type of device

Cone diameter (mm)	43.7	Pore 2 position	2	Alpha factor	0.58
Cone area (square cm)	15	Sleeve length (mm)	144.7	Cone - Sleeve distance (mm)	14.4
Sleeve diameter (mm)	43.9	Sleeve area (square cm)	200	Cone - Pore 2 distance (mm)	6.0

TRACEABILITY The measurements have been executed using standards for which the traceability to primary and/or (inter)national standards has been demonstrated .

Calibrated by: Mouaouya, Mo

Calibration date: 15/05/2007

Calibrate before: 15/05/2008

Approved by: Sinjorgo, Gerry

Approval date: 15/05/2007



Calibration Verification Certificate



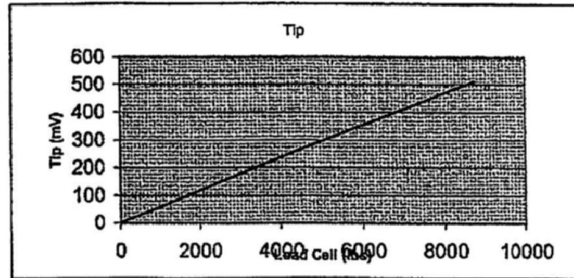
Device Type: Piezo Cone Penetrometer

Device Number: F7.5CKEW2/B1 1701-1831

Tip = 15 cm² = 0.0161 ft²

Tip + Friction (cone readings in mV)

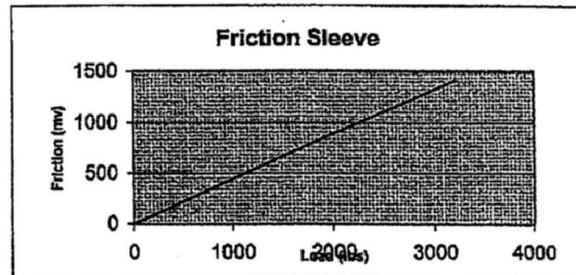
Load lbs	load tons	load tsf	Tip mV	Cal Factor
0	0	0	0	
600	0.3	18.63354	35.4	52.63712
5000	2.5	155.2795	296.2	52.42387
8750	4.35	270.1863	512.3	52.73987



Sleeve = 200 cm² = 0.2153 ft²

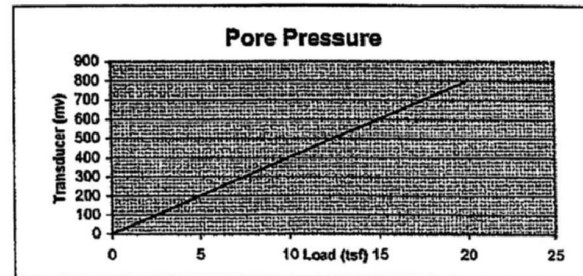
Friction Only (cone readings in mV)

Load lbs	load tons	load tsf	Friction	Cal Factor
0	0	0	0.2	
600	0.3	1.393405	265.4	0.5250
2100	1.05	4.876916	934.3	0.5220
3200	1.6	7.431491	1405.3	0.5288



Pore Pressure Transducer

Pressure (tsf)	Transducer Output (mV)
0	0
5	200.5
10	401.2
20	801.6



Calibration verified Interface 9820-000-1 Loadcell #113655 For Tip and Friction Calibration

Model #UPS3000CC SERIAL # A0813 for Pore pressure calibration

Loadcell used for calibration verification is traceable to primary standards at NIST and was calibrated by an A2LA accredited Laboratory.

Calibration verified by Dennis Stauffer

Date: 10/5/07

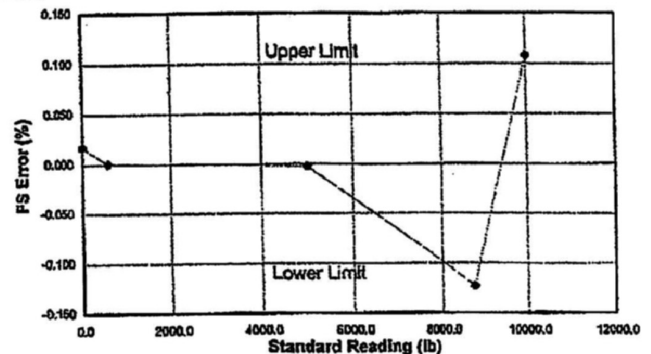
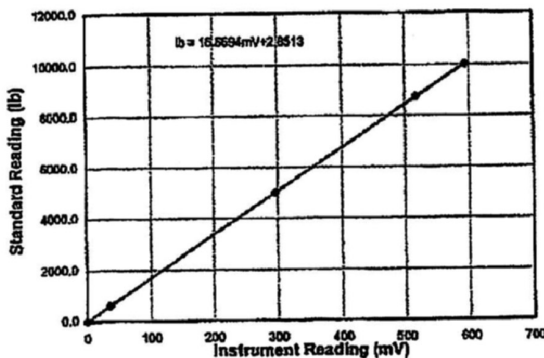
Checked by: Recep Yilmaz

Date: 10/5/07

HGL Instrument Verification

DATE: _____ Instrument No.: ft _____ Location: Houston LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. Reading Resolution of Instrument: 0.000001

Instrument Identification/Data		Instrument	Standard	Prediction	Abs. Error	Full Scale
Type	Cone Penetrometer_TIP	mV	lb	lb	lb	Error (%)
Manufacturer	Fugro	0.000000	0.0	2.9	2.9	0.02
Model Number	F7.5CKEW2/B1	35.400000	600.0	600.0	0.0	0.00
Serial Number	1701-1831	296.200000	5000.0	4999.6	0.4	0.00
HGL Instrument Number	ft	517.300000	8750.0	8729.4	20.6	-0.12
Excitation (V)		593.700000	10000.0	10018.2	18.2	0.11
Gain/Spn Setting	NA					
Full Range Output (V)						
Full Range/Capacity (lb)	16858					
Date Verified						
Date Due						
Service Status	In Service					
Accept. Abs. or FS Error (%)	0.1	☒ FS; ☐ Abs.				
Verification/Standard Equipment						
Type	Load Cell (A2AL APPROVED)					
Manufacturer	Interface					
Model Number	1211EX-10K-B					
Serial Number	113655					
HGL Instrument Number						
Date Verified						
Temperature	°C = °F					
Linear Regression, Uncertainty, & Error Summary						
Correlation Coeff. (R ²)	0.999990823					
Intercept (lb)	2.851328541					
Slope (lb/mV)	16.8693632					
Verification (Calib.) Factor	16.86936320					
Verification Factor Units	lb/mV					
Absolute Zero (V)						
Floating Zero (V)						
Combined Uncertainty (lb)	4.525449005					
Coverage Factor	2					
Expanded Uncertainty (lb)	9.050898011					
Max. Abs. or FS Error (%)	-0.12	☒ FS; ☐ Abs.				
		MTS	☐ Yes; ☒ No			



Uncertainty Budget Analysis For ft							
Source of Uncertainty	Value in lb	Distribution	Divisor	Type	Uncertainty (u _i)	u _i ²	Comments
Standard's Uncertainty		N	2.0000	B			
Abs. Error-STDEV ¹	4.5254	N	1.0000	A	4.5254	20.4797	
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000	
Repeatability ²		N	1.0000	A			
Resolution of Standard	#N/A	R	3.4641	B			
Combined Uncertainty	4.5254		Coverage Factor	2			for 95% confidence level.
Expanded Uncertainty (Best Measurement Capability) ³	9.051			lb			

(1) This equation follows the approach presented by A2LA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.

(2) This value is unique for type (model) of equipment.

(3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of k=2.

Verified By: AS

Input By: _____

Reviewed By: _____

Checked By: Ry

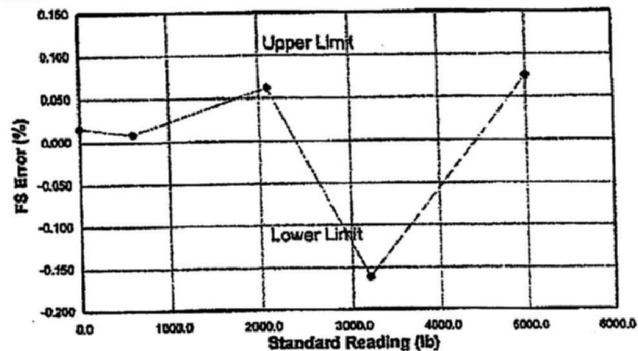
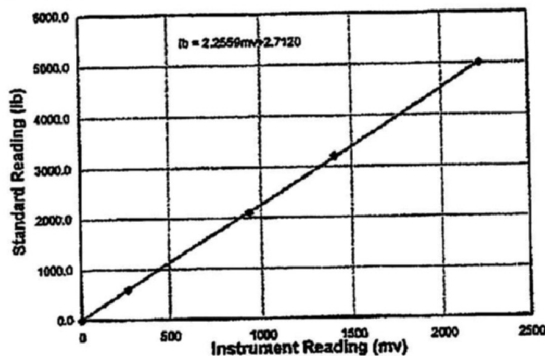
File: _____

Remarks: _____

HGL Instrument Verification

DATE: _____ Instrument No.: ft _____ Location: _____ LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. Reading Resolution of Instrument: 0.000001

Instrument Identification/Data		Instrument	Standard	Prediction	Abs. Error	Full Scale Error (%)
Type		mv	lb	lb	lb	
Type	Cone Penetrometer	0.000000	0.0	2.7	2.7	0.02
Manufacturer	Fugro	265.400000	600.0	601.4	1.4	0.01
Model Number	F7.6CKEW2/B1	934.300000	2100.0	2110.4	10.4	0.06
Serial Number	1701-1831	1405.300000	3200.0	3172.9	27.1	-0.16
HGL Instrument Number	ft	2220.850000	5000.0	5012.6	12.6	0.07
Excitation (V)						
Gain/Span Setting	NA					
Full Range Output (V)						
Full Range/Capacity (lb)	16858					
Date Verified						
Date Due						
Service Status	In Service					
Accept. Abs. or FS Error (%)	0.1 ☒ FS; ☐ Abs.					
Verification/Standard Equipment						
Type	Load Cell (A2AL APPROVED)					
Manufacturer	INTERFACE					
Model Number	1211EX-10K-B					
Serial Number	113665					
HGL Instrument Number						
Date Verified						
Temperature	°C = °F					
Linear Regression, Uncertainty, & Error Summary						
Correlation Coeff. (R ²)	0.999937691					
Intercept (lb)	2.711953603					
Slope (lb/mv)	2.255859638					
Verification (Calib.) Factor	2.25585964					
Verification Factor Units	lb/mv					
Absolute Zero (V)						
Floating Zero (V)						
Combined Uncertainty (lb)	4.602345851					
Coverage Factor	2					
Expanded Uncertainty (lb)	9.204691303					
Max. Abs. or FS Error (%)	-0.16 ☒ FS; ☐ Abs.					



Uncertainty Budget Analysis For ft						
Source of Uncertainty	Value in lb	Distribution	Divisor	Type	Uncertainty (u)	u ²
Standard's Uncertainty		N	2.0000	B		
Abs. Error-STDEV ¹	4.6023	N	1.0000	A	4.6023	21.1816
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000
Repeatability ²		N	1.0000	A		
Resolution of Standard	#N/A	R	3.4641	B		
Combined Uncertainty	4.6023					
Expanded Uncertainty (Best Measurement Capability) ³	9.205					
Coverage Factor					2	for 95% confidence level.

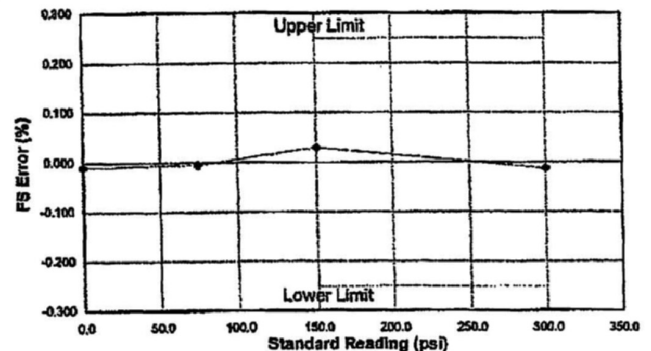
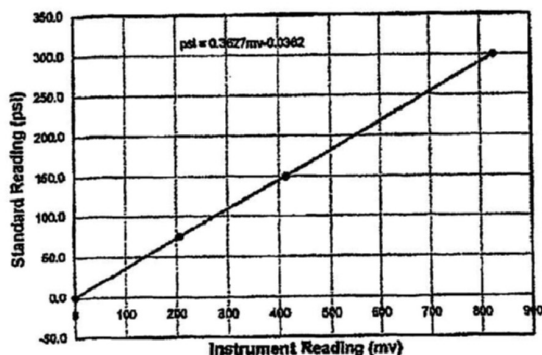
(1) This equation follows the approach presented by A2LA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.
 (2) This value is unique for type (model) of equipment.
 (3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of k=2.

Verified By: LC Input By: _____ Reviewed By: _____ Checked By: RY
 File: _____
 Remarks: _____

HGL Instrument Verification

DATE: _____ Instrument No.: pt _____ Location: _____ Houston _____ LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. _____ Reading Resolution of Instrument: 0.000001

Instrument Identification/Data		Instrument	Standard	Prediction	Abs. Error	Full Scale
Type	Cone Penetrometer	mv	psi	psi	psi	Error (%)
Manufacturer	Fugro	0.000000	0.0	0.0	0.0	-0.01
Model Number	F7.5CKEW2/B1	208.800000	75.0	75.0	0.0	-0.01
Serial Number	1701-1831-1233111	413.900000	150.0	150.1	0.1	0.03
HGL Instrument Number	pt	827.000000	300.0	300.0	0.0	-0.01
Excitation (V)						
Gain/Span Setting	NA					
Full Range Output (V)						
Full Range/Capacity (psi)	360					
Date Verified						
Date Due						
Service Status	In Service					
Accept. Abs. or FS Error (%)	0.25 ☒ FS; ☐ Abs.					
Verification/Standard Equipment						
Type	PT(ANSI/NCSL APPROVED)					
Manufacturer	Eaton					
Model Number	UPS3000CC					
Serial Number	A0813					
HGL Instrument Number						
Date Verified						
Temperature	°C = °F					
Linear Regression, Uncertainty, & Error Summary						
Correlation Coeff. (R ²)	0.999999702					
Intercept (psi)	-0.036235332					
Slope (psi/mv)	0.362744313					
Verification (Calib.) Factor	0.36274431					
Verification Factor Units	psi/mv					
Absolute Zero (V)						
Floating Zero (V)						
Combined Uncertainty (psi)	0.018078098					
Coverage Factor	2					
Expanded Uncertainty (psi)	0.036156198					
Max. Abs. or FS Error (%)	0.03 ☒ FS; ☐ Abs.					



Uncertainty Budget Analysis For pt							
Source of Uncertainty	Value in psi	Distribution	Divisor	Type	Uncertainty (u _i)	u _i ²	Comments
Standard's Uncertainty		N	2.0000	B			
Abs. Error-STDEV ¹	0.0181	N	1.0000	A	0.0181	0.0003	
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000	
Repeatability ²		N	1.0000	A			
Resolution of Standard	#N/A	R	3.4641	B			
Combined Uncertainty	0.0181						
Expanded Uncertainty (Best Measurement Capability) ³	0.036						
Coverage Factor					2	for 95% confidence level.	

(1) This equation follows the approach presented by ASCEA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.

(2) This value is unique for type (model) of equipment.

(3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of k=2.

Verified By: JS

Input By: _____

Reviewed By: _____

Checked By: Ry

Remarks: _____

CALIBRATION CERTIFICATE



APPLICANT FGI HOUSTON

Certificate number FC070496

Page 1 of 1

SUBMITTED A Piezo Cone Penetrometer

Manufacturer Fugro Engineers B.V.

Device type CONE, A15F7.5CKEW2/B, 50 bar (2.5 ton)

Serial number 1701-1832

The device contains an electronic data sheet which contains, amongst others, the characteristics of all the sensors inside the device. The data acquisition system calculates the measured value from these known characteristics. All calibration results are conform the values specified below.

Force calibration

Calibration reference : 548 FRE.001

Procedure : FEBV.CAL.PRO.003 KALIBRATIE KRACHT

Title of channel(s) : Cone and Cone+Fric.

Max. load 150 kN

Range	Calibration range From to	Sensitivity Deviation	Zero load output
1	0 25 kN	< 0.5 %	< 0.75 kN
Calibration uncertainty		0.3 %	0.008 kN

Pressure test :

Deviation from specified Alpha factor at 2.5 MPa	< 5 %
--	-------

Cone quality control values :

Max. deviation from reference	< 1 %
Max. Tip to Sleeve friction Crosstalk	< 1 %

Pressure calibration

Calibration reference : 3257-0001

Procedure : FEBV.CAL.PRO.004 KALIBRATIE DRUK

Title of channel : Pore 2

Max. load 12.5 Mpa

Range	Calibration range From	Sensitivity Deviation	Zero load output
1	0 2.5 MPa	< 1.0 %	< 0.002 MPa
Calibration uncertainty		0.6 %	0.003 MPa
Pore 2 transducer : Kistler 4043A50 SN : 1233112			

Calibration of the slope sensor

Calibration reference :

Procedure:FEBV.CAL.PRO.006 KALIBRATIE HELLING

Title of channel : Slope x

Range	Calibration range From	Sensitivity Deviation	Zero load output
1	0 15 deg	< 10 %	< 1.5 deg
Calibration uncertainty		1 %	0.5 deg

Typical values for this type of device

Cone diameter (mm)	43.7	Pore 2 position	2	Alpha factor	0.58
Cone area (square cm)	15	Sleeve length (mm)	144.7	Cone - Sleeve distance (mm)	14.4
Sleeve diameter (mm)	43.9	Sleeve area (square cm)	200	Cone - Pore 2 distance (mm)	6.0

TRACEABILITY The measurements have been executed using standards for which the traceability to primary and/or (inter)national standards has been demonstrated .

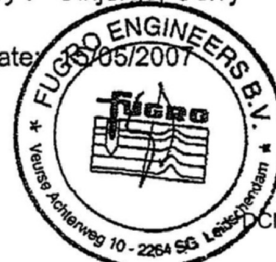
Calibrated by: Mouaouya, Mo

Approved by : Sinjorgo, Gerry

Calibration date: 15/05/2007

Approval date: 15/05/2007

Calibrate before: 15/05/2008



Calibration Verification Certificate



Device Type: Piezo Cone Penetrometer

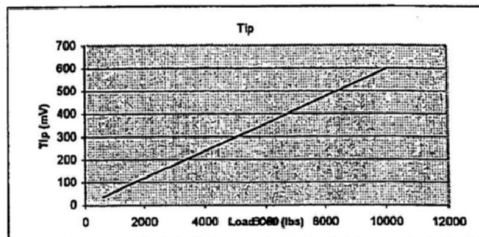
Device Number: F7.5CKEW2/V 1701-1832

TIP CALIBRATION

Tip area = 15 cm² = 0.0161 ft²

Tip readings in mV

Load lb	Load Tons	load/area tsf	Tip mV	TIP Cal Factor Mpa
0	0	0	0	0
610	0.305	18.9441	36.3	49.9751995
5130	2.565	159.3168	304.1	50.1686335
8550	4.275	265.528	506.9	50.1620354
10030	5.015	311.4907	596.4	50.0143495
15040	7.52	467.0807	892.2	50.1322208
20010	10.005	621.4286	1184.4	50.2435152

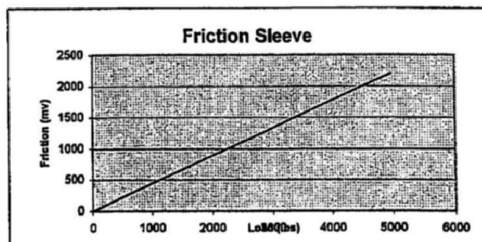


FRICTION CALIBRATION

Sleeve area = 200 cm² = 0.2153 ft²

Friction readings in mV

Load lb	Load Tons	load/area tsf	Friction mV	Friction Cal Factor Mpa
0	0	0	0	0
630	0.315	1.463075	279.8	0.50073277
1995	0.9975	4.63307	887.6	0.49984894
3350	1.675	7.779842	1488.4	0.50053946
4980	2.49	11.56526	2210	0.50112981
7520	3.76	17.464	3307.8	0.50558219



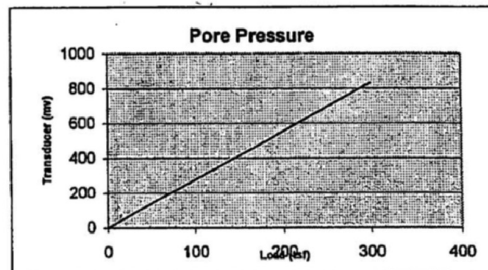
PORE PRESSURE TRANSDUCER CALIBRATION

Serial : 123312

Pore Pressure readings in mV

Pressure Pressure Transducer readings

psi	tsf	mV	P.Pres. Cal Factor Mpa
0	0	0	0
75	5.4	209.1	2.473016
150	10.8	413.8	2.49931196
300	21.6	833.8	2.48072749



Temperature Calibration (30 - 115 degrees F)

Temp (deg TIP (mV) FRIC (mV) PIEZO (mV)

30	-0.007	0.189	-0.047
50	-0.035	0.203	0.126
75	-0.049	0.291	0.140
100	-0.129	2.804	-2.391
115	-0.249	3.363	-2.932

	Deviation	mV	Mpa	% Full Scale
Tip		0.242	0.0121	0.0242
Friction		3.174	0.001587	0.31738
Piezo		3.058	0.007645	0.3058

TIP CALIBRATED BY GEOTAC (A2LA APPROVED) LOAD CELL:

Model 560K, Serial No. 129739

FRICTION CALIBRATED BY INTERFACE (A2LA APPROVED) LOAD CELL:

Model: 1211EX-10K-B, Serial : 113655

PORE PRESSURE TRANSDUCER CALIBRATED BY GE SENSING (AANSI/NC SL APPROVED)

Pressure Indicator Model: UPS3000CC, Serial : A0813

TEMPERATURE CALIBRATED BY HOUSTON PRECISION TYPE K THERMOCOUPLE (A2LA APPROVED)

Model # 8528-40, Serial # C95005824, ID # TD-001

Calibration Verified by: Dennis Stauffer

Date: 11/5/2007

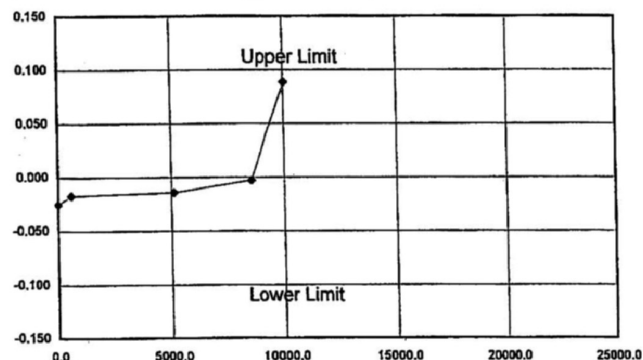
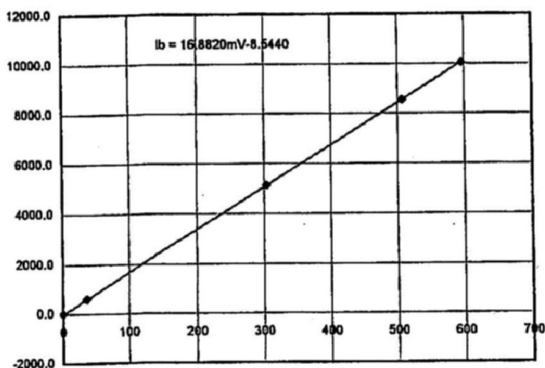
Checked By : Recep Yilmaz

Date: 11/5/2007

HGL Instrument Verification

DATE: 11/5/2007 Instrument No.: ft Location: Houston LVDT?: ☐ Yes; ☒ No
 Type Analysis: ☒ BF; ☐ NonBF; ☒ FS; ☐ Abs. Reading Resolution of Instrument: 0.000001

Instrument Identification/Data		Instrument	Standard	Prediction	Abs. Error	Full Scale
Type	Cone Penetrometer_TIP	mV	lb	lb	lb	Error (%)
Manufacturer	Fugro	0.000000	0.0	-8.5	8.5	-0.03
Model Number	F7.5CKEW2/B1	36.300000	610.0	604.3	5.7	-0.02
Serial Number	1701-1832 (Tip)	304.100000	5130.0	5125.3	4.7	-0.01
HGL Instrument Number	ft	506.900000	8550.0	8549.0	1.0	0.00
Excitation (V)		596.400000	10030.0	10059.9	29.9	0.09
Gain/Span Setting	NA	892.200000	15040.0	15053.6	13.6	0.04
Full Range Output (V)		1184.400000	20010.0	19986.5	23.5	-0.07
Full Range/Capacity (lb)	33716					
Date Verified	11/5/2007					
Date Due	11/4/2008					
Service Status	In Service					
Accept. Abs. or FS Error (%)	0.1	☒ FS; ☐ Abs.				
Verification/Standard Equipment						
Type	Load Cell (A2AL APPROVED)					
Manufacturer	Geotac					
Model Number	560K					
Serial Number	129739					
HGL Instrument Number						
Date Verified						
Temperature	°C = °F					
Linear Regression, Uncertainty, & Error Summary						
Correlation Coeff. (R ²)	0.999994562					
Intercept (lb)	-8.544049781					
Slope (lb/mV)	16.88202947					
Verification (Calib.) Factor	16.88202947					
Verification Factor Units	lb/mV					
Absolute Zero (V)						
Floating Zero (V)						
Combined Uncertainty (lb)	4.016393928					
Coverage Factor	2					
Expanded Uncertainty (lb)	8.032787857					
Max. Abs. or FS Error (%)	0.09	☒ FS; ☐ Abs.				
		MTS	☐ Yes; ☒ No			



Uncertainty Budget Analysis For ft							
Source of Uncertainty	Value in lb	Distribution	Divisor	Type	Uncertainty (u)	u ²	Comments
Standard's Uncertainty		N	2.0000	B			
Abs. Error-STDEV ¹	4.0164	N	1.0000	A	4.0164	16.1314	
Resolution of Instrument	0.0000	R	3.4641	B	0.0000	0.0000	
Repeatability ²		N	1.0000	A			
Resolution of Standard	#N/A	R	3.4641	B			
Combined Uncertainty	4.0164						
Coverage Factor	2						for 95% confidence level.
Expanded Uncertainty (Best Measurement Capability) ³	8.033			lb			

(1) This equation follows the approach presented by A2LA, not that typically used in uncertainty calculations; i.e., STDEV of the Mean.

(2) This value is unique for type (model) of equipment.

(3) This uncertainty represents an expanded uncertainty expressed as approximately the 95% confidence level using a coverage factor of k=2.

Verified By: MS

Input By: _____

Reviewed By: _____

Checked By: Ry

File: _____

Remarks: _____