



innovation in  
geotechnical  
instrumentation

# Calibration Record

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5  
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)  
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Downhole in  
CH-P-13-03 Deep  
@ 50m

## Vibrating Wire Piezometer

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.7  
Serial Number: VW26484 ✓  
Mfg Number: 1317112  
Range: 700.0 kPa  
Temperature: 23.2 °C  
Barometric Pressure: 1000.6 millibars  
Work Order Number: 202043  
Cable Length: 53 meters  
Cable Markings: 199963 m - 200014 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8861                    | 8862                     | 8862                      | 1.4                     | 0.20                   | 0.01                    |
| 140.0                  | 8111                    | 8111                     | 8111                      | 139.7                   | -0.05                  | -0.01                   |
| 280.0                  | 7356                    | 7356                     | 7356                      | 278.8                   | -0.18                  | -0.03                   |
| 419.9                  | 6595                    | 6595                     | 6595                      | 419.0                   | -0.14                  | 0.02                    |
| 559.9                  | 5830                    | 5831                     | 5831                      | 559.8                   | -0.01                  | 0.03                    |
| 700.0                  | 5063                    | 5063                     | 5063                      | 701.2                   | 0.17                   | -0.02                   |
| Max. Error (%):        |                         |                          |                           |                         | 0.20                   | 0.03                    |

Linear Calibration Factor: C.F. = 0.18423 kPa/B unit  
Regression Zero: At Calibration = 8869.1 B unit  
Temperature Correction Factor: Tk = 0.01149 kPa/°C rise

Polynomial Gage Factors (kPa) A: -6.8518E-07 B: -0.17469 C: 1601.9

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

|                        | Date (dd/mm/yy)  | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi)     |
|------------------------|------------------|------------------------|--------------|---------------|
| Shipped Zero Readings: | <u>16-Sep-13</u> | <u>8858</u>            | <u>22.5</u>  | <u>1010.2</u> |

Li, Lc = initial ( at installation) and current readings  
Ti, Tc = initial ( at installation) and current temperature, in °C  
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars  
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts  
B units = Hz<sup>2</sup> / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number.: ELL0130K



MIG0106B



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## Vibrating Wire Piezometer

Down hole in  
CH-P-13-04-Deep  
@ 35m bg.

Customer: AMEC Environment & Infrastructure - Burnaby  
Model: VW2100-0.7  
Serial Number: VW26289  
Mfg Number: 1316758  
Range: 700.0 kPa  
Temperature: 23.2 °C  
Barometric Pressure: 989.4 millibars  
Work Order Number: 202025  
Cable Length: 40 meters  
Cable Markings: 198978 m - 199017 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 9098                    | 9099                     | 9099                      | 0.9                     | 0.13                   | 0.02                    |
| 140.0                  | 8324                    | 8325                     | 8325                      | 139.7                   | -0.04                  | -0.02                   |
| 280.0                  | 7547                    | 7547                     | 7547                      | 279.2                   | -0.11                  | -0.03                   |
| 419.9                  | 6765                    | 6765                     | 6765                      | 419.5                   | -0.06                  | 0.03                    |
| 560.0                  | 5982                    | 5982                     | 5982                      | 559.9                   | -0.01                  | 0.01                    |
| 700.1                  | 5197                    | 5197                     | 5197                      | 700.8                   | 0.09                   | -0.01                   |
| Max. Error (%):        |                         |                          |                           |                         | 0.13                   | 0.03                    |

Linear Calibration Factor: C.F. = 0.17939 kPa/B unit  
Regression Zero: At Calibration = 9103.4 B unit  
Temperature Correction Factor: Tk = -0.05913 kPa/°C rise

Polynomial Gage Factors (kPa) A: -3.7843E-07 B: -0.17398 C: 1614.4

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

|                 |                        |              |           |
|-----------------|------------------------|--------------|-----------|
| Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
| 9-Sep-13        | 9087                   | 23.5         | 1018.0    |

Shipped Zero Readings:

Li, Lc = initial ( at installation) and current readings  
Ti, Tc = initial ( at installation) and current temperature, in °C  
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars  
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts  
B units = Hz<sup>2</sup> / 1000 ie: 1700Hz = 2890 B units

Technician: W. Mok

Date: 9-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number.: ELL0130K



MIG0106B



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## Vibrating Wire Piezometer

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.7  
Serial Number: **VW26487** ✓  
Mfg Number: 1317115  
Range: 700.0 kPa  
Temperature: 23.2 °C  
Barometric Pressure: 1000.6 millibars  
Work Order Number: 202043  
Cable Length: 53 meters  
Cable Markings: 200069 m - 200121 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8908                    | 8909                     | 8909                      | 1.5                     | 0.22                   | 0.02                    |
| 140.0                  | 8140                    | 8141                     | 8141                      | 139.6                   | -0.06                  | -0.02                   |
| 280.0                  | 7367                    | 7367                     | 7367                      | 278.6                   | -0.20                  | -0.03                   |
| 419.9                  | 6585                    | 6586                     | 6586                      | 419.1                   | -0.12                  | 0.05                    |
| 559.9                  | 5804                    | 5804                     | 5804                      | 559.6                   | -0.05                  | -0.01                   |
| 700.0                  | 5015                    | 5015                     | 5015                      | 701.4                   | 0.20                   | -0.01                   |
| Max. Error (%):        |                         |                          |                           |                         | 0.22                   | 0.05                    |

Linear Calibration Factor: C.F. = 0.17974 kPa/B unit  
Regression Zero: At Calibration = 8917.1 B unit  
Temperature Correction Factor: Tk = 0.1168 kPa/°C rise

Polynomial Gage Factors (kPa) A: -7.1003E-07 B: -0.16986 C: 1569.6

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

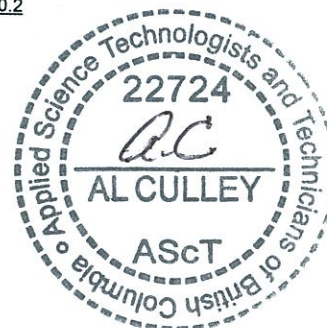
|                        | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|------------------------|-----------------|------------------------|--------------|-----------|
| Shipped Zero Readings: | 16-Sep-13       | 8909                   | 22.5         | 1010.2    |

Li, Lc = initial ( at installation) and current readings  
Ti, Tc = initial ( at installation) and current temperature, in °C  
Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars  
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts  
B units = Hz<sup>2</sup> / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim *SK*

Date: 16-Sep-13

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### Vibrating Wire Piezometer

BH ID# = CH-P-13-06

23m

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.35  
Serial Number: VW26479 ✓  
Mfg Number: 1322237  
Range: 350.0 kPa  
Temperature: 23.0 °C  
Barometric Pressure: 1000.0 millibars  
Work Order Number: 202043  
Cable Length: 23 meters  
Cable Markings: 200351 m - 200373 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8822                    | 8822                     | 8822                      | 0.5                     | 0.14                   | 0.04                    |
| 70.0                   | 8243                    | 8243                     | 8243                      | 69.7                    | -0.07                  | -0.05                   |
| 140.0                  | 7659                    | 7659                     | 7659                      | 139.6                   | -0.12                  | -0.03                   |
| 210.0                  | 7071                    | 7071                     | 7071                      | 209.9                   | -0.03                  | 0.06                    |
| 280.0                  | 6485                    | 6485                     | 6485                      | 280.0                   | -0.01                  | 0.02                    |
| 350.0                  | 5897                    | 5897                     | 5897                      | 350.3                   | 0.08                   | -0.02                   |
| Max. Error (%):        |                         |                          |                           |                         | 0.14                   | 0.06                    |

Linear Calibration Factor: C.F. = 0.11959 kPa/B unit  
Regression Zero: At Calibration = 8826.2 B unit  
Temperature Correction Factor: Tk = -0.04268 kPa/°C rise

Polynomial Gage Factors (kPa) A: -3.3021E-07 B: -0.11473 C: 1037.9

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = \text{C.F.} \cdot (\text{Li} - \text{Lc}) - [\text{Tk}(\text{Ti} - \text{Tc})] + [0.10(\text{Bi} - \text{Bc})]$

Polynomial:  $P(\text{kPa}) = \text{A}(\text{Lc})^2 + \text{B}\text{Lc} + \text{C} + \text{Tk}(\text{Tc} - \text{Ti}) - [0.10(\text{Bc} - \text{Bi})]$

|                        | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|------------------------|-----------------|------------------------|--------------|-----------|
| Shipped Zero Readings: | 16-Sep-13       | 8820                   | 22.2         | 1010.2    |

Li, Lc = initial ( at installation) and current readings

Ti, Tc = initial ( at installation) and current temperature, in °C

Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars

B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts

B units =  $\text{Hz}^2 / 1000$  ie: 1700Hz = 2890 B units

Technician: S. Kim

SK

Date: 16-Sep-13

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Document Number.: ELL0130K



MIG0106B



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CH-P-13-06

33m

### Vibrating Wire Piezometer

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.35  
Serial Number: VW26481 ✓  
Mfg Number: 1322239  
Range: 350.0 kPa  
Temperature: 23.0 °C  
Barometric Pressure: 1000.0 millibars  
Work Order Number: 202043  
Cable Length: 33 meters  
Cable Markings: 200261 m - 200293 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8809                    | 8809                     | 8809                      | 0.3                     | 0.07                   | 0.01                    |
| 70.0                   | 8203                    | 8203                     | 8203                      | 69.8                    | -0.05                  | -0.04                   |
| 140.0                  | 7592                    | 7592                     | 7592                      | 140.0                   | -0.01                  | 0.04                    |
| 210.0                  | 6983                    | 6984                     | 6984                      | 209.8                   | -0.05                  | 0.00                    |
| 280.0                  | 6373                    | 6373                     | 6373                      | 279.9                   | -0.03                  | -0.01                   |
| 350.0                  | 5760                    | 5761                     | 5761                      | 350.2                   | 0.06                   | 0.01                    |
| Max. Error (%):        |                         |                          |                           |                         | 0.07                   | 0.04                    |

Linear Calibration Factor: C.F. = 0.11480 kPa/B unit  
Regression Zero: At Calibration = 8811.2 B unit  
Temperature Correction Factor: Tk = -0.01181 kPa/°C rise

Polynomial Gage Factors (kPa) A: -1.6810E-07 B: -0.11235 C: 1002.8

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. \cdot (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

|                        | Date (dd/mm/yy)  | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi)     |
|------------------------|------------------|------------------------|--------------|---------------|
| Shipped Zero Readings: | <u>16-Sep-13</u> | <u>8806</u>            | <u>22.5</u>  | <u>1010.2</u> |

Li, Lc = initial (at installation) and current readings

Ti, Tc = initial (at installation) and current temperature, in °C

Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars

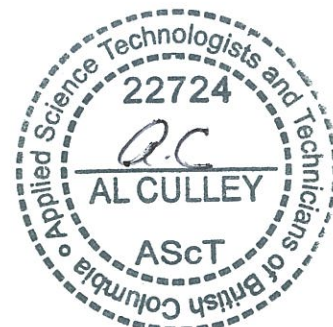
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts

B units =  $\text{Hz}^2 / 1000$  ie: 1700Hz = 2890 B units

Technician: S. Kim SK

Date: 16-Sep-13

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CH-P-13-06

43m

### Vibrating Wire Piezometer

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.7  
Serial Number: VW26483 ✓  
Mfg Number: 1316774  
Range: 700.0 kPa  
Temperature: 23.2 °C  
Barometric Pressure: 989.4 millibars  
Work Order Number: 202043  
Cable Length: 43 meters  
Cable Markings: 200175 m - 200217 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8981                    | 8982                     | 8982                      | -0.1                    | -0.01                  | 0.02                    |
| 140.0                  | 8215                    | 8216                     | 8216                      | 139.9                   | -0.01                  | -0.02                   |
| 280.0                  | 7449                    | 7449                     | 7449                      | 280.0                   | 0.00                   | -0.02                   |
| 419.9                  | 6682                    | 6682                     | 6682                      | 420.2                   | 0.04                   | 0.02                    |
| 560.0                  | 5915                    | 5916                     | 5916                      | 560.2                   | 0.03                   | 0.03                    |
| 700.1                  | 5152                    | 5152                     | 5152                      | 699.8                   | -0.05                  | -0.02                   |
| Max. Error (%):        |                         |                          |                           |                         | 0.05                   | 0.03                    |

Linear Calibration Factor: C.F. = 0.18275 kPa/B unit  
Regression Zero: At Calibration = 8981.1 B unit  
Temperature Correction Factor: Tk = -0.04979 kPa/°C rise

Polynomial Gage Factors (kPa) A: 9.6856E-08 B: -0.18412 C: 1646.0

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

|                        | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|------------------------|-----------------|------------------------|--------------|-----------|
| Shipped Zero Readings: | 16-Sep-13       | 8978                   | 22.7         | 1010.2    |

Li, Lc = initial (at installation) and current readings

Ti, Tc = initial (at installation) and current temperature, in °C

Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars

B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts

B units =  $\text{Hz}^2 / 1000$  ie: 1700Hz = 2890 B units

Technician: S. Kim SK

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number.: ELL0130K



MIG0106B





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### Vibrating Wire Piezometer

CH-P-13-06

53m

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.7  
Serial Number: VW26485  
Mfg Number: 1317113  
Range: 700.0 kPa  
Temperature: 23.2 °C  
Barometric Pressure: 1000.6 millibars  
Work Order Number: 202043  
Cable Length: 53 meters  
Cable Markings: 199910 m - 199961 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8723                    | 8724                     | 8724                      | 1.2                     | 0.18                   | 0.00                    |
| 140.0                  | 7992                    | 7992                     | 7992                      | 139.8                   | -0.03                  | 0.00                    |
| 280.0                  | 7257                    | 7257                     | 7257                      | 279.0                   | -0.15                  | 0.00                    |
| 419.9                  | 6518                    | 6518                     | 6518                      | 418.9                   | -0.14                  | 0.00                    |
| 559.9                  | 5775                    | 5775                     | 5775                      | 559.6                   | -0.04                  | 0.00                    |
| 700.0                  | 5027                    | 5027                     | 5027                      | 701.3                   | 0.18                   | 0.00                    |
| Max. Error (%):        |                         |                          |                           |                         | 0.18                   | 0.00                    |

Linear Calibration Factor: C.F. = 0.18937 kPa/B unit  
Regression Zero: At Calibration = 8730.1 B unit  
Temperature Correction Factor: Tk = 0.01399 kPa/°C rise

Polynomial Gage Factors (kPa) A: -6.9206E-07 B: -0.17986 C: 1621.6

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = \text{C.F.}(\text{Li}-\text{Lc}) - [\text{Tk}(\text{Ti}-\text{Tc})] + [0.10(\text{Bi}-\text{Bc})]$

Polynomial:  $P(\text{kPa}) = \text{A}(\text{Lo})^2 + \text{BLc} + \text{C} + \text{Tk}(\text{Tc}-\text{Ti}) - [0.10(\text{Bc}-\text{Bi})]$

|                        | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|------------------------|-----------------|------------------------|--------------|-----------|
| Shipped Zero Readings: | 16-Sep-13       | 8722                   | 22.5         | 1010.2    |

Li, Lc = initial ( at installation) and current readings

Ti, Tc = initial ( at installation) and current temperature, in °C

Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars

B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts

B units = Hz<sup>2</sup> / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



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CH-P-13-06

63m

## Vibrating Wire Piezometer

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.7  
Serial Number: VW26489 ✓  
Mfg Number: 1317117  
Range: 700.0 kPa  
Temperature: 23.2 °C  
Barometric Pressure: 1000.6 millibars  
Work Order Number: 202043  
Cable Length: 63 meters  
Cable Markings: 199846 m - 199908 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8866                    | 8867                     | 8867                      | 1.5                     | 0.21                   | 0.02                    |
| 140.0                  | 8102                    | 8103                     | 8103                      | 139.6                   | -0.06                  | -0.02                   |
| 280.0                  | 7333                    | 7333                     | 7333                      | 278.7                   | -0.18                  | -0.02                   |
| 419.9                  | 6557                    | 6558                     | 6558                      | 418.9                   | -0.14                  | 0.02                    |
| 559.9                  | 5778                    | 5779                     | 5779                      | 559.8                   | -0.02                  | 0.02                    |
| 700.0                  | 4996                    | 4996                     | 4996                      | 701.2                   | 0.18                   | -0.02                   |
| Max. Error (%):        |                         |                          |                           |                         | 0.21                   | 0.02                    |

Linear Calibration Factor: C.F. = 0.18079 kPa/B unit  
Regression Zero: At Calibration = 8874.7 B unit  
Temperature Correction Factor: Tk = 0.006013 kPa/°C rise

Polynomial Gage Factors (kPa) A: -6.8767E-07 B: -0.17126 C: 1572.7

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

|                        | Date (dd/mm/yy) | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi) |
|------------------------|-----------------|------------------------|--------------|-----------|
| Shipped Zero Readings: | 16-Sep-13       | 8866                   | 22.6         | 1010.2    |

Li, Lc = initial (at installation) and current readings

Ti, Tc = initial (at installation) and current temperature, in °C

Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars

B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts

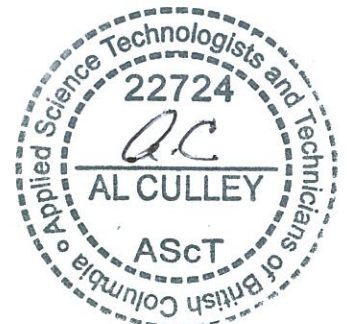
B units = Hz<sup>2</sup> / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim

SIC

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number.: ELL0130K







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# Calibration Record

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5  
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)  
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

## Vibrating Wire Piezometer

CH-P-13-02

13m

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.35  
Serial Number: VW26477 ✓  
Mfg Number: 1322235  
Range: 350.0 kPa  
Temperature: 23.0 °C  
Barometric Pressure: 1000.0 millibars  
Work Order Number: 202043  
Cable Length: 13 meters  
Cable Markings: 200374 m - 200386 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8838                    | 8839                     | 8839                      | 0.2                     | 0.05                   | 0.00                    |
| 70.0                   | 8245                    | 8245                     | 8245                      | 70.0                    | -0.01                  | 0.00                    |
| 140.0                  | 7650                    | 7651                     | 7651                      | 139.9                   | -0.03                  | 0.01                    |
| 210.0                  | 7056                    | 7056                     | 7056                      | 209.8                   | -0.06                  | -0.01                   |
| 280.0                  | 6459                    | 6460                     | 6460                      | 279.9                   | -0.02                  | 0.00                    |
| 350.0                  | 5862                    | 5862                     | 5862                      | 350.2                   | 0.06                   | 0.00                    |
| Max. Error (%):        |                         |                          |                           |                         | 0.06                   | 0.01                    |

Linear Calibration Factor: C.F. = 0.11760 kPa/B unit  
Regression Zero: At Calibration = 8840.0 B unit  
Temperature Correction Factor: Tk = -0.07083 kPa/°C rise

Polynomial Gage Factors (kPa) A: -1.6595E-07 B: -0.11516 C: 1030.8

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

|                        | Date (dd/mm/yy)  | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi)     |
|------------------------|------------------|------------------------|--------------|---------------|
| Shipped Zero Readings: | <u>16-Sep-13</u> | <u>8837</u>            | <u>22.9</u>  | <u>1010.2</u> |

Li, Lc = initial (at installation) and current readings

Ti, Tc = initial (at installation) and current temperature, in °C

Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars

B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts

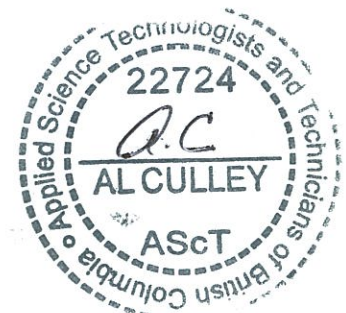
B units = Hz<sup>2</sup> / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim

SK

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number.: ELL0130K



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## Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

### Vibrating Wire Piezometer

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.35  
Serial Number: VW26478 ✓  
Mfg Number: 1322236  
Range: 350.0 kPa  
Temperature: 23.0 °C  
Barometric Pressure: 1000.0 millibars  
Work Order Number: 202043  
Cable Length: 23 meters  
Cable Markings: 200328 m - 200349 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

CH-P-13-02  
23m

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8863                    | 8864                     | 8864                      | 0.2                     | 0.05                   | 0.03                    |
| 70.0                   | 8315                    | 8315                     | 8315                      | 69.7                    | -0.09                  | -0.09                   |
| 140.0                  | 7758                    | 7758                     | 7758                      | 140.2                   | 0.07                   | 0.09                    |
| 210.0                  | 7208                    | 7208                     | 7208                      | 209.9                   | -0.03                  | -0.01                   |
| 280.0                  | 6655                    | 6656                     | 6656                      | 279.9                   | -0.03                  | -0.03                   |
| 350.0                  | 6101                    | 6101                     | 6101                      | 350.1                   | 0.04                   | 0.01                    |
| Max. Error (%):        |                         |                          |                           |                         | 0.09                   | 0.09                    |

Linear Calibration Factor: C.F. = 0.12667 kPa/B unit  
Regression Zero: At Calibration = 8865.0 B unit  
Temperature Correction Factor: Tk = -0.05049 kPa/°C rise

Polynomial Gage Factors (kPa) A: -8.8394E-08 B: -0.12535 C: 1118.1

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

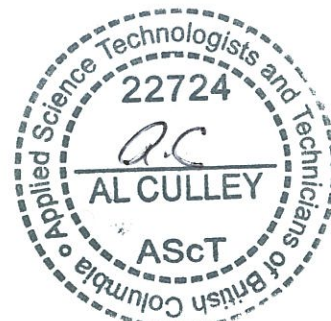
|                        | Date (dd/mm/yy)  | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi)     |
|------------------------|------------------|------------------------|--------------|---------------|
| Shipped Zero Readings: | <u>16-Sep-13</u> | <u>8859</u>            | <u>22.3</u>  | <u>1010.2</u> |

Li, Lc = initial (at installation) and current readings  
Ti, Tc = initial (at installation) and current temperature, in °C  
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars  
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts  
B units =  $\text{Hz}^2 / 1000$  ie:  $1700\text{Hz} = 2890 \text{ B units}$

Technician: S. Kim SK

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number: ELL0130K



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# Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

## Vibrating Wire Piezometer

CH-P-13-02

33m

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.35  
Serial Number: VW26480 ✓  
Mfg Number: 1322238  
Range: 350.0 kPa  
Temperature: 23.0 °C  
Barometric Pressure: 1000.0 millibars  
Work Order Number: 202043  
Cable Length: 33 meters  
Cable Markings: 200295 m - 200326 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8945                    | 8945                     | 8945                      | 0.1                     | 0.03                   | 0.00                    |
| 70.0                   | 8357                    | 8357                     | 8357                      | 70.0                    | -0.01                  | 0.00                    |
| 140.0                  | 7767                    | 7768                     | 7768                      | 140.0                   | 0.00                   | 0.03                    |
| 210.0                  | 7179                    | 7180                     | 7180                      | 209.8                   | -0.04                  | -0.02                   |
| 280.0                  | 6589                    | 6590                     | 6590                      | 279.9                   | -0.02                  | -0.01                   |
| 350.0                  | 5998                    | 5999                     | 5999                      | 350.1                   | 0.04                   | 0.01                    |
| Max. Error (%):        |                         |                          |                           |                         | 0.04                   | 0.03                    |

Linear Calibration Factor: C.F. = 0.11880 kPa/B unit  
Regression Zero: At Calibration = 8945.9 B unit  
Temperature Correction Factor: Tk = 0.01720 kPa/°C rise

Polynomial Gage Factors (kPa) A: -1.0388E-07 B: -0.11725 C: 1057.1

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

|                        | Date (dd/mm/yy)  | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi)     |
|------------------------|------------------|------------------------|--------------|---------------|
| Shipped Zero Readings: | <u>16-Sep-13</u> | <u>8944</u>            | <u>22.5</u>  | <u>1010.2</u> |

Li, Lc = initial (at installation) and current readings

Ti, Tc = initial (at installation) and current temperature, in °C

Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars

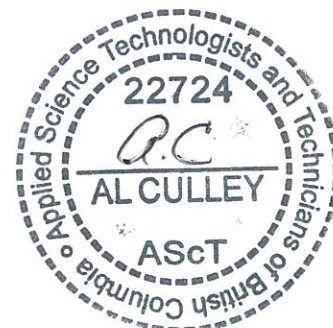
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts

B units =  $\text{Hz}^2 / 1000$  ie:  $1700\text{Hz} = 2890$  B units

Technician: S. Kim SK

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number.: ELL0130K



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# Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

## Vibrating Wire Piezometer

CH-P-13-02

43m

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.7  
Serial Number: VW26482 ✓  
Mfg Number: 1316773  
Range: 700.0 kPa  
Temperature: 23.2 °C  
Barometric Pressure: 989.4 millibars  
Work Order Number: 202043  
Cable Length: 43 meters  
Cable Markings: 200218 m - 200260 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8952                    | 8953                     | 8953                      | 1.2                     | 0.18                   | 0.00                    |
| 140.0                  | 8166                    | 8166                     | 8166                      | 139.7                   | -0.04                  | -0.01                   |
| 280.0                  | 7374                    | 7375                     | 7375                      | 279.1                   | -0.13                  | 0.01                    |
| 419.9                  | 6580                    | 6580                     | 6580                      | 418.9                   | -0.14                  | 0.00                    |
| 560.0                  | 5780                    | 5781                     | 5781                      | 559.7                   | -0.04                  | -0.01                   |
| 700.1                  | 4976                    | 4976                     | 4976                      | 701.3                   | 0.18                   | 0.00                    |
| Max. Error (%):        |                         |                          |                           |                         | 0.18                   | 0.01                    |

Linear Calibration Factor: C.F. = 0.17606 kPa/B unit  
Regression Zero: At Calibration = 8959.5 B unit  
Temperature Correction Factor: Tk = -0.07356 kPa/°C rise

Polynomial Gage Factors (kPa) A: -5.8096E-07 B: -0.16797 C: 1550.3

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

|                        | Date (dd/mm/yy)  | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi)     |
|------------------------|------------------|------------------------|--------------|---------------|
| Shipped Zero Readings: | <u>16-Sep-13</u> | <u>8947</u>            | <u>22.5</u>  | <u>1010.2</u> |

Li, Lc = initial ( at installation) and current readings

Ti, Tc = initial ( at installation) and current temperature, in °C

Bi, Bc = initial ( at installation) and current barometric pressure readings, in millibars

B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts

B units = Hz<sup>2</sup> / 1000 ie: 1700Hz = 2890 B units

Technician: S. Kim SK

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number.: ELL0130K





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## Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

### Vibrating Wire Piezometer

CH-P-13-02

53m.

Customer: AMEC Environment & Infrastructure - Edmonton  
Model: VW2100-0.7  
Serial Number: VW26486 ✓  
Mfg Number: 1317114  
Range: 700.0 kPa  
Temperature: 23.2 °C  
Barometric Pressure: 1000.6 millibars  
Work Order Number: 202043  
Cable Length: 53 meters  
Cable Markings: 200122 m - 200174 m  
Cable Colour Code: Red / Black (Coil) Green / White (Thermistor)  
Cable Type: EL380004  
Thermistor Type: 3 kΩ

| Applied Pressure (kPa) | First Reading (B units) | Second Reading (B units) | Average Reading (B units) | Calculated Linear (kPa) | Linearity Error (% FS) | Polynomial Error (% FS) |
|------------------------|-------------------------|--------------------------|---------------------------|-------------------------|------------------------|-------------------------|
| 0.0                    | 8932                    | 8933                     | 8933                      | 1.4                     | 0.20                   | 0.01                    |
| 140.0                  | 8176                    | 8176                     | 8176                      | 139.7                   | -0.05                  | -0.01                   |
| 280.0                  | 7415                    | 7415                     | 7415                      | 278.7                   | -0.18                  | -0.02                   |
| 419.9                  | 6647                    | 6648                     | 6648                      | 419.0                   | -0.13                  | 0.03                    |
| 559.9                  | 5878                    | 5878                     | 5878                      | 559.6                   | -0.04                  | 0.00                    |
| 700.0                  | 5102                    | 5103                     | 5103                      | 701.3                   | 0.19                   | -0.01                   |
| Max. Error (%):        |                         |                          |                           |                         | 0.20                   | 0.03                    |

Linear Calibration Factor: C.F. = 0.18274 kPa/B unit  
Regression Zero: At Calibration = 8940.3 B unit  
Temperature Correction Factor: Tk = -0.02849 kPa/°C rise

Polynomial Gage Factors (kPa) A: -7.0193E-07 B: -0.17289 C: 1600.4

Pressure is calculated with the following equations:

Linear:  $P(\text{kPa}) = C.F. \cdot (Li - Lc) - [Tk(Ti - Tc)] + [0.10(Bi - Bc)]$

Polynomial:  $P(\text{kPa}) = A(Lc)^2 + BLc + C + Tk(Tc - Ti) - [0.10(Bc - Bi)]$

|                        | Date (dd/mm/yy)  | VW Readout Pos. B (Li) | Temp °C (Ti) | Baro (Bi)     |
|------------------------|------------------|------------------------|--------------|---------------|
| Shipped Zero Readings: | <u>16-Sep-13</u> | <u>8932</u>            | <u>22.5</u>  | <u>1010.2</u> |

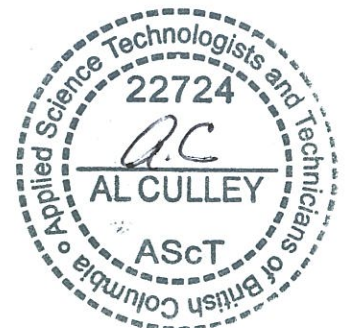
Li, Lc = initial (at installation) and current readings  
Ti, Tc = initial (at installation) and current temperature, in °C  
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars  
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts  
B units =  $\text{Hz}^2 / 1000$  ie:  $1700\text{Hz} = 2890$  B units

Technician: S. Kim

SK

Date: 16-Sep-13

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1



Document Number: ELL0130K



MIG0106B