



**CERTIFICATE OF ANALYSIS**  
 Complies with ISO Guide 34, ISO Guide 31,  
 ISO Guide 35, and ISO 9001  
**TRACEABLE® CERTIFIED REFERENCE MATERIAL**



This certificate indicates traceability to standards provided by (NIST) National Institute of Standards and Technology and/or a National Standards Laboratory.

|                          |                                                        |                                                                   |
|--------------------------|--------------------------------------------------------|-------------------------------------------------------------------|
| <b>Certificate No.:</b>  | <b>4161-8155488</b>                                    | <b>Amended Certificate<br/>Reference Certificate 4161-7959006</b> |
| <b>Description:</b>      | <b>Conductivity Standard 149,912 µS/cm</b>             |                                                                   |
| <b>Catalog Number:</b>   | <b>89030-246</b>                                       | <b>Lot: CC15295</b>                                               |
| <b>Certificate Date:</b> | <b>September 15, 2016</b>                              | <b>Expiration Date: September 15, 2017</b>                        |
| <b>Certified Value:</b>  | <b>149,912 µS/cm U = ±550 µS/cm (k=2) at 25°C</b>      |                                                                   |
| <b>Derived Values:</b>   | <b>149912 micromho/cm, 6.67 ohm-cm, 99941 PPM D.S.</b> |                                                                   |

Certification measurements are performed under ISO Guide 34, A2LA accreditation no. 1750.02 and are traceable to recognized national and international standards via an unbroken chain of comparisons. Electrical conductance is the reciprocal of electrical impedance. The International System of units (SI), derived unit of conductance, is Siemens (S), also referred to as (mhos) the reciprocal of ohms. The certified value is expressed in microsiemens per centimeter (µS/cm).

MEASUREMENT: Ten (10) 100 ml samples were measured from this lot. The conductivity of each sample was derived from a measurement of the impedance of the solution using a conductivity meter and calibrated cell. The cell and sample were temperature controlled by submersion in a water bath at 25°C ± 0.015°C.

UNCERTAINTY: The certified value is given as the average of the measured samples. The reported expanded uncertainty (U) is determined from the measurement variation from sample to sample, change due to shelf life, and from the uncertainty of the measurement process. The value of uncertainty is multiplied by k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%. Uncertainty is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM).

METHOD: The certified reference material is prepared and analyzed by Control Company. The certified reference material consists of a mixture of a dilute solution of less than 14% (by mass) potassium chloride (KCL), of less than 2% (by mass) propanol, and of less than 88% (by mass) deionized water in equilibrium with atmospheric carbon dioxide. Mixing was performed by circulation utilizing a proprietary method.

  
 Aaron Judice, Technical Manager

  
 Nicol Rodriguez, Quality Manager

**Traceability: Standards and Equipment Used**

| Description                    | Serial Number | Due Date | Traceable Reference |
|--------------------------------|---------------|----------|---------------------|
| Conductivity Probe (4W)/ Meter | 10124-F02     | 3/08/17  | TC26-7948973        |
| Digital Thermometer            | 140073819     | 2/03/17  | 4000-7392222        |
| Calibration Bath TC-337        | B5C477        |          |                     |

**Laboratory environment conditions:** 24.0°C 58%RH 1,015mb/hPa

**CONTROL COMPANY 12554 Old Galveston RD Suite B230 Webster TX 77598 USA**  
**Tel: (281) 482 1714 Fax: (281) 482 9448 sales@control3.com www.control3.com**

Control Company is an ISO Guide 34:2009 Certified Reference Material (CRM) Producer Accredited by American Association for Laboratory Accreditation (A2LA Certificate No. 1750.02). This certificate fulfills the requirements of ISO Guide 31:2000 (Reference Materials - Contents of Certificates and Labels), ISO Guide 34:2009 "Quality System Guidelines for the Production of Reference Materials", and ISO Guide 35:2006 "Certification of Reference Materials - General and Statistical Principles". Control Company is an ISO/IEC 17025:2005 Calibration Laboratory Accredited by American Association for Laboratory Accreditation (A2LA Certificate No. 1750.01). Control Company is ISO 9001:2008 certified by DNV GL (Certificate No. CERT-01805-2006-AQ-HOU-RvA). TRACEABLE® is a registered trademark of Control 3 Inc.



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**PACKAGING:** This material is available in both a 460 ml bottle and a 100 ml One-Shot™.

**INTENDED USE:** The certified reference material is intended for the calibration of conductivity cell constants, for conductivity measurement, for the validation of analytical methods, and for the preparation of working reference standards.

**INSTRUCTIONS FOR USE:** The certified reference material should be open for the minimum time. Rinse the cell in a small amount of the certified reference material and discard. The recommended sample size for measurement is 100 ml. Discard the standard after use and under the following circumstances: if the expiration date is past due, four months after opening, or if any color, turbidity, or visible microbiological growth become evident. Standards which have been opened are not protected from growth. Do not return used solution to this standard. Contaminates and evaporation have a significant effect on conductivity. Keep the standard closed. Keep the standard stored at a stable temperature. Select a standard as near as possible to that of the unknown solution to be measured. Do not standardize at 10,000 uS and then measure unknowns at 100 uS. Reference any accompanying instructions shipped with this product.

Temperature has a significant effect on conductivity. For measurements at a temperature other than 25°C, refer to the temperature correction table provided. This product should be used as near as possible to 25°C.

**HOMOGENEITY:** Ten (10) 100 ml samples were selected for analytical control. Results from different samples showed no statistically significant differences, nor was there any correlation between values obtained and the bottling sequence. Bottle-to-bottle (One-Shot™ to One-Shot™) variations of the samples measured are included as a part of the calculated measurement uncertainty stated on page 1 of this certificate. A minimum sample size of 100 ml should be used to maintain the certified value and the associated statement of uncertainty. This standard as formulated is considered infinitely soluble.

**STABILITY, SHELF LIFE:** The expiration date stated on page 1 indicates the period of time which the certified reference material in a properly packaged, unopened, unused, and stored under environmentally controlled and monitored conditions remains within the specified uncertainty range.

**EXPIRATION DATE:** The date after which a certified reference material should be discarded.

**STORAGE:** Store below 40°C and above 0°C.

**SHIPPING:** Ship below 50°C and above 0°C.

**MAINTENANCE OF CERTIFICATION:** Control Company monitors representative samples from this lot over the period of its certification. If a change occurs that affects the certification before the expiration date, Control Company posts amended certificates at [www.control3.com/crmupdate.htm](http://www.control3.com/crmupdate.htm).

**MSDS INFORMATION:** Please refer to the Material Safety Data sheet for information regarding this certified reference material at [www.control3.com](http://www.control3.com) (Search MSDS). Use only the first four digits of the certificate number to locate the MSDS.

**QUALITY STANDARD DOCUMENTATION:**

ISO Guide 34:2009 General Requirements for the Competence of Reference Material Producers, accredited A2LA Certificate Number 1750.02.

ISO Guide 31:2000 Reference Materials - Contents of Certificates and Labels.

ISO Guide 35:2006 Certification of Reference Materials - General and Statistical Principals.

ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories, accredited A2LA Certificate Number 1750.01.

ANSI/NCSL Z540-1:1994 Calibration Laboratories and Measuring and Test Equipment-General Requirements.

ISO 9001:2008 Quality Management System Registration - DNV GL Certificate Number CERT-01805-2006-AQ-HOU-RvA

**SUPPORTED METHODS:** This certified reference material meets test requirements for Federal, State, and local agencies, CAP, CLSI, ACS, and CLIA. Traceable® Certified Reference Material complies with and is essential for use in these official methods: AOAC 973.40, EPA 120.1, Standard Method 2510 (APHA, AWWA, WEF), ISO 7888, DIN 38404, ASTM D1125, USGS I-1780, USP 645, OIML R56, IUPAC, and for A2LA/NVLAP accreditations /ISO 9000 certifications. Material may be used to calibrate all conductivity meters and to determine all conductivity cell constants.

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Temperature Correction Information 1.707 %

If your conductivity meter allows you to set a temperature coefficient (temperature correction) then the underlined number shown above is the best approximation for this specific analysis for this specific Traceable® Certified Reference Material. For more precise measurements use the chart. Use the chart below only for making absolute measurements. That is, measurements without any automatic temperature correction (temperature coefficient set to 0). The chart below displays derived values.

Using a thermometer, measure the temperature of this certified reference material. Shown on the chart is temperature (in the far left column) in whole degrees. Shown across the top row is temperature in tenths of a degree. Locate the measured temperature in whole numbers on the far left column, and then follow across the row to the temperature in tenths of a degree. At the intersection is the certified reference material value at that specific temperature. Standardize your meter using that value. Example: Measured temperature is 25.0°C. Find 25°C in the far left column, find the row 0.0°C. Where 25°C and 0.0°C intersect, read the value in microsiemens/cm.

**Temperature Correction Chart in microsiemens/cm**

|      | 0.0°C  | 0.1°C  | 0.2°C  | 0.3°C  | 0.4°C  | 0.5°C  | 0.6°C  | 0.7°C  | 0.8°C  | 0.9°C  |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 15°C | 124646 | 124894 | 125143 | 125392 | 125640 | 125889 | 126138 | 126387 | 126636 | 126885 |
| 16°C | 127134 | 127384 | 127633 | 127883 | 128132 | 128382 | 128632 | 128882 | 129132 | 129382 |
| 17°C | 129632 | 129882 | 130133 | 130383 | 130634 | 130884 | 131135 | 131386 | 131637 | 131888 |
| 18°C | 132139 | 132390 | 132642 | 132893 | 133145 | 133396 | 133648 | 133900 | 134151 | 134403 |
| 19°C | 134655 | 134907 | 135160 | 135412 | 135664 | 135917 | 136170 | 136422 | 136675 | 136928 |
| 20°C | 137181 | 137434 | 137687 | 137940 | 138194 | 138447 | 138701 | 138954 | 139208 | 139462 |
| 21°C | 139716 | 139970 | 140224 | 140478 | 140732 | 140987 | 141241 | 141496 | 141750 | 142005 |
| 22°C | 142260 | 142515 | 142770 | 143025 | 143280 | 143535 | 143791 | 144046 | 144302 | 144557 |
| 23°C | 144813 | 145069 | 145325 | 145581 | 145837 | 146093 | 146350 | 146606 | 146862 | 147119 |
| 24°C | 147376 | 147632 | 147889 | 148146 | 148403 | 148660 | 148918 | 149175 | 149432 | 149690 |
| 25°C | 149912 | 150205 | 150463 | 150721 | 150979 | 151237 | 151495 | 151753 | 152012 | 152270 |
| 26°C | 152529 | 152787 | 153046 | 153305 | 153564 | 153823 | 154082 | 154341 | 154600 | 154860 |
| 27°C | 155119 | 155379 | 155638 | 155898 | 156158 | 156418 | 156678 | 156938 | 157198 | 157459 |
| 28°C | 157719 | 157979 | 158240 | 158501 | 158761 | 159022 | 159283 | 159544 | 159805 | 160067 |
| 29°C | 160328 | 160589 | 160851 | 161112 | 161374 | 161636 | 161898 | 162160 | 162422 | 162684 |
| 30°C | 162946 | 163209 | 163471 | 163734 | 163996 | 164259 | 164522 | 164785 | 165048 | 165311 |
| 31°C | 165574 | 165837 | 166100 | 166364 | 166627 | 166891 | 167155 | 167419 | 167683 | 167947 |
| 32°C | 168211 | 168475 | 168739 | 169004 | 169268 | 169533 | 169797 | 170062 | 170327 | 170592 |
| 33°C | 170857 | 171122 | 171387 | 171652 | 171918 | 172183 | 172449 | 172715 | 172980 | 173246 |
| 34°C | 173512 | 173778 | 174044 | 174311 | 174577 | 174843 | 175110 | 175376 | 175643 | 175910 |
| 35°C | 176177 | 176444 | 176711 | 176978 | 177245 | 177513 | 177780 | 178048 | 178315 | 178583 |

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