



**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>4178-8151738</b>	<b>Amended Certificate</b>
		<b>Reference Certificate 4178-7901524</b>
<b>Description:</b>	<b>Conductivity Standard 10,001 µS/cm</b>	
<b>Catalog Number:</b>	<b>4178</b>	<b>Lot: CC15220</b>
<b>Certificate Date:</b>	<b>August 20, 2016</b>	<b>Expiration Date: August 20, 2017</b>
<b>Certified Value:</b>	<b>10,001 µS/cm U = ±41 µS/cm (k=2) at 25°C</b>	
<b>Derived Values:</b>	<b>10001 micromho/cm, 100.0 ohm-cm, 6667 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 0.1% (by mass) potassium chloride (KCL), of less than 1% (by mass) propanol, and of less than 99% (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	876-11-003	9/09/16	TC25-7501962
Digital Thermometer	111879346	4/06/17	4000-7560797
Calibration Bath TC-337	B5C477		

**Laboratory environment conditions:** 26.0°C 54%RH 1,017mb/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 1.922 %

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
02°C	5715	5733	5751	5769	5787	5805	5822	5840	5858	5876
03°C	5894	5912	5930	5948	5966	5984	6002	6020	6038	6056
04°C	6075	6093	6111	6129	6147	6165	6183	6201	6219	6237
05°C	6255	6273	6292	6310	6328	6346	6364	6382	6400	6419
06°C	6437	6455	6473	6491	6509	6528	6546	6564	6582	6601
07°C	6619	6637	6655	6674	6692	6710	6728	6747	6765	6783
08°C	6801	6820	6838	6856	6875	6893	6911	6930	6948	6966
09°C	6985	7003	7021	7040	7058	7077	7095	7113	7132	7150
10°C	7169	7187	7205	7224	7242	7261	7279	7298	7316	7335
11°C	7353	7372	7390	7409	7427	7446	7464	7483	7501	7520
12°C	7538	7557	7575	7594	7612	7631	7650	7668	7687	7705
13°C	7724	7743	7761	7780	7798	7817	7836	7854	7873	7892
14°C	7910	7929	7948	7966	7985	8004	8022	8041	8060	8079
15°C	8097	8116	8135	8153	8172	8191	8210	8228	8247	8266
16°C	8285	8304	8322	8341	8360	8379	8398	8417	8435	8454
17°C	8473	8492	8511	8530	8548	8567	8586	8605	8624	8643
18°C	8662	8681	8700	8719	8738	8756	8775	8794	8813	8832
19°C	8851	8870	8889	8908	8927	8946	8965	8984	9003	9022
20°C	9041	9060	9079	9098	9118	9137	9156	9175	9194	9213
21°C	9232	9251	9270	9289	9308	9328	9347	9366	9385	9404
22°C	9423	9442	9462	9481	9500	9519	9538	9558	9577	9596
23°C	9615	9634	9654	9673	9692	9711	9731	9750	9769	9788
24°C	9808	9827	9846	9866	9885	9904	9924	9943	9962	9982
25°C	10001	10020	10040	10059	10078	10098	10117	10136	10156	10175
26°C	10195	10214	10233	10253	10272	10292	10311	10331	10350	10370
27°C	10389	10408	10428	10447	10467	10486	10506	10525	10545	10564
28°C	10584	10604	10623	10643	10662	10682	10701	10721	10740	10760
29°C	10780	10799	10819	10838	10858	10878	10897	10917	10937	10956
30°C	10976	10995	11015	11035	11055	11074	11094	11114	11133	11153
31°C	11173	11192	11212	11232	11252	11271	11291	11311	11331	11350
32°C	11370	11390	11410	11430	11449	11469	11489	11509	11529	11548
33°C	11568	11588	11608	11628	11648	11667	11687	11707	11727	11747
34°C	11767	11787	11807	11827	11847	11866	11886	11906	11926	11946
35°C	11966	11986	12006	12026	12046	12066	12086	12106	12126	12146

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