



**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.

**Amended Certificate**  
**Reference Certificate 4178-7895599**

**Certificate No.:** 4178-8153602

**Description:** Conductivity Standard 9,997  $\mu\text{S}/\text{cm}$

**Catalog Number:** 4178 **Lot:** CC15199

**Certificate Date:** August 19, 2016 **Expiration Date:** August 19, 2017

**Certified Value:** 9,997  $\mu\text{S}/\text{cm}$  **U =  $\pm 42 \mu\text{S}/\text{cm}$  (k=2) at 25°C**

**Derived Values:** 9997 micromho/cm, 100.0 ohm-cm, 6665 PPM D.S.


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 ( $\mu\text{S}/\text{cm}$ ).

**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  $\pm$  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:** 25.0°C 52%RH 1,019mb/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	5713	5730	5748	5766	5784	5802	5820	5838	5856	5874
03°C	5892	5910	5928	5946	5964	5982	6000	6018	6036	6054
04°C	6072	6090	6108	6126	6144	6162	6180	6199	6217	6235
05°C	6253	6271	6289	6307	6325	6343	6362	6380	6398	6416
06°C	6434	6452	6471	6489	6507	6525	6543	6561	6580	6598
07°C	6616	6634	6653	6671	6689	6707	6726	6744	6762	6780
08°C	6799	6817	6835	6854	6872	6890	6909	6927	6945	6964
09°C	6982	7000	7019	7037	7055	7074	7092	7111	7129	7147
10°C	7166	7184	7203	7221	7239	7258	7276	7295	7313	7332
11°C	7350	7369	7387	7406	7424	7443	7461	7480	7498	7517
12°C	7535	7554	7572	7591	7609	7628	7646	7665	7684	7702
13°C	7721	7739	7758	7777	7795	7814	7833	7851	7870	7888
14°C	7907	7926	7944	7963	7982	8000	8019	8038	8057	8075
15°C	8094	8113	8131	8150	8169	8188	8206	8225	8244	8263
16°C	8282	8300	8319	8338	8357	8376	8394	8413	8432	8451
17°C	8470	8488	8507	8526	8545	8564	8583	8602	8621	8639
18°C	8658	8677	8696	8715	8734	8753	8772	8791	8810	8829
19°C	8848	8867	8886	8905	8924	8943	8962	8981	9000	9019
20°C	9038	9057	9076	9095	9114	9133	9152	9171	9190	9209
21°C	9228	9247	9267	9286	9305	9324	9343	9362	9381	9400
22°C	9420	9439	9458	9477	9496	9515	9535	9554	9573	9592
23°C	9611	9631	9650	9669	9688	9708	9727	9746	9765	9785
24°C	9804	9823	9842	9862	9881	9900	9920	9939	9958	9978
25°C	9997	10016	10036	10055	10074	10094	10113	10132	10152	10171
26°C	10191	10210	10229	10249	10268	10288	10307	10326	10346	10365
27°C	10385	10404	10424	10443	10463	10482	10502	10521	10541	10560
28°C	10580	10599	10619	10638	10658	10677	10697	10717	10736	10756
29°C	10775	10795	10814	10834	10854	10873	10893	10913	10932	10952
30°C	10971	10991	11011	11030	11050	11070	11089	11109	11129	11149
31°C	11168	11188	11208	11227	11247	11267	11287	11306	11326	11346
32°C	11366	11385	11405	11425	11445	11465	11484	11504	11524	11544
33°C	11564	11583	11603	11623	11643	11663	11683	11703	11722	11742
34°C	11762	11782	11802	11822	11842	11862	11882	11902	11922	11941
35°C	11961	11981	12001	12021	12041	12061	12081	12101	12121	12141

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