



**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>4068-8156586</b>	<b>Amended Certificate</b>
		<b>Reference Certificate 4068-8019213</b>
<b>Description:</b>	<b>Conductivity Standard 10,003 µS/cm</b>	
<b>Catalog Number:</b>	<b>4068</b>	<b>Lot: CC15375</b>
<b>Certificate Date:</b>	<b>October 6, 2016</b>	<b>Expiration Date: October 6, 2017</b>
<b>Certified Value:</b>	<b>10,003 µS/cm U = ±42 µS/cm (k=2) at 25°C</b>	
<b>Derived Values:</b>	<b>10003 micromho/cm, 100.0 ohm-cm, 6669 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	3/08/17	TC25-7948971
Digital Thermometer	111879346	4/06/17	4000-7560797
Calibration Bath TC-337	B5C477		

**Laboratory environment conditions:** 25.0°C 52%RH 1,012mb/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	5716	5734	5752	5770	5788	5806	5824	5842	5860	5878
03°C	5896	5914	5932	5950	5968	5986	6004	6022	6040	6058
04°C	6076	6094	6112	6130	6148	6166	6184	6202	6220	6238
05°C	6257	6275	6293	6311	6329	6347	6365	6384	6402	6420
06°C	6438	6456	6474	6493	6511	6529	6547	6565	6584	6602
07°C	6620	6638	6657	6675	6693	6711	6730	6748	6766	6784
08°C	6803	6821	6839	6858	6876	6894	6913	6931	6949	6968
09°C	6986	7004	7023	7041	7060	7078	7096	7115	7133	7152
10°C	7170	7188	7207	7225	7244	7262	7281	7299	7318	7336
11°C	7355	7373	7392	7410	7429	7447	7466	7484	7503	7521
12°C	7540	7558	7577	7595	7614	7633	7651	7670	7688	7707
13°C	7725	7744	7763	7781	7800	7819	7837	7856	7875	7893
14°C	7912	7931	7949	7968	7987	8005	8024	8043	8061	8080
15°C	8099	8118	8136	8155	8174	8193	8211	8230	8249	8268
16°C	8286	8305	8324	8343	8362	8381	8399	8418	8437	8456
17°C	8475	8494	8512	8531	8550	8569	8588	8607	8626	8645
18°C	8664	8683	8701	8720	8739	8758	8777	8796	8815	8834
19°C	8853	8872	8891	8910	8929	8948	8967	8986	9005	9024
20°C	9043	9062	9081	9100	9119	9138	9158	9177	9196	9215
21°C	9234	9253	9272	9291	9310	9329	9349	9368	9387	9406
22°C	9425	9444	9464	9483	9502	9521	9540	9559	9579	9598
23°C	9617	9636	9656	9675	9694	9713	9733	9752	9771	9790
24°C	9810	9829	9848	9868	9887	9906	9926	9945	9964	9984
25°C	10003	10022	10042	10061	10080	10100	10119	10138	10158	10177
26°C	10197	10216	10236	10255	10274	10294	10313	10333	10352	10372
27°C	10391	10411	10430	10450	10469	10489	10508	10528	10547	10567
28°C	10586	10606	10625	10645	10664	10684	10703	10723	10743	10762
29°C	10782	10801	10821	10841	10860	10880	10899	10919	10939	10958
30°C	10978	10998	11017	11037	11057	11076	11096	11116	11135	11155
31°C	11175	11195	11214	11234	11254	11274	11293	11313	11333	11353
32°C	11372	11392	11412	11432	11452	11471	11491	11511	11531	11551
33°C	11571	11590	11610	11630	11650	11670	11690	11710	11729	11749
34°C	11769	11789	11809	11829	11849	11869	11889	11909	11929	11949
35°C	11969	11989	12009	12029	12049	12069	12089	12109	12129	12149

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