



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 4068-7901388

Certificate No.: 4068-8156508

Description: Conductivity Standard 9,993 $\mu\text{S}/\text{cm}$

Catalog Number: 1235C74 **Lot:** CC15217

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

Certified Value: 9,993 $\mu\text{S}/\text{cm}$ **U = $\pm 41 \mu\text{S}/\text{cm}$ (k=2) at 25°C**

Derived Values: 9993 micromho/cm, 100.1 ohm-cm, 6662 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 44%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.

MSDS INFORMATION: Please refer to the Material Safety Data sheet for information regarding this certified reference material at 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	5710	5728	5746	5764	5782	5800	5818	5836	5854	5872
03°C	5890	5908	5926	5944	5962	5980	5998	6016	6034	6052
04°C	6070	6088	6106	6124	6142	6160	6178	6196	6214	6232
05°C	6250	6268	6287	6305	6323	6341	6359	6377	6395	6413
06°C	6432	6450	6468	6486	6504	6522	6541	6559	6577	6595
07°C	6613	6632	6650	6668	6686	6705	6723	6741	6759	6778
08°C	6796	6814	6833	6851	6869	6887	6906	6924	6942	6961
09°C	6979	6997	7016	7034	7053	7071	7089	7108	7126	7144
10°C	7163	7181	7200	7218	7237	7255	7273	7292	7310	7329
11°C	7347	7366	7384	7403	7421	7440	7458	7477	7495	7514
12°C	7532	7551	7569	7588	7606	7625	7643	7662	7681	7699
13°C	7718	7736	7755	7774	7792	7811	7829	7848	7867	7885
14°C	7904	7923	7941	7960	7979	7997	8016	8035	8053	8072
15°C	8091	8109	8128	8147	8166	8184	8203	8222	8241	8259
16°C	8278	8297	8316	8335	8353	8372	8391	8410	8429	8447
17°C	8466	8485	8504	8523	8542	8561	8579	8598	8617	8636
18°C	8655	8674	8693	8712	8731	8749	8768	8787	8806	8825
19°C	8844	8863	8882	8901	8920	8939	8958	8977	8996	9015
20°C	9034	9053	9072	9091	9110	9129	9148	9167	9186	9206
21°C	9225	9244	9263	9282	9301	9320	9339	9358	9377	9397
22°C	9416	9435	9454	9473	9492	9512	9531	9550	9569	9588
23°C	9608	9627	9646	9665	9684	9704	9723	9742	9761	9781
24°C	9800	9819	9838	9858	9877	9896	9916	9935	9954	9974
25°C	9993	10012	10032	10051	10070	10090	10109	10128	10148	10167
26°C	10186	10206	10225	10245	10264	10284	10303	10322	10342	10361
27°C	10381	10400	10420	10439	10459	10478	10498	10517	10537	10556
28°C	10576	10595	10615	10634	10654	10673	10693	10712	10732	10751
29°C	10771	10791	10810	10830	10849	10869	10889	10908	10928	10947
30°C	10967	10987	11006	11026	11046	11065	11085	11105	11124	11144
31°C	11164	11183	11203	11223	11243	11262	11282	11302	11322	11341
32°C	11361	11381	11401	11420	11440	11460	11480	11500	11519	11539
33°C	11559	11579	11599	11618	11638	11658	11678	11698	11718	11738
34°C	11758	11777	11797	11817	11837	11857	11877	11897	11917	11937
35°C	11957	11977	11997	12017	12036	12056	12076	12096	12116	12136

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