



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 4178-8028850

Certificate No.: 4178-8151875

Description: Conductivity Standard 10,009 µS/cm

Catalog Number: 4178 **Lot:** CC15391

Certificate Date: October 11, 2016 **Expiration Date:** October 11, 2017

Certified Value: 10,009 µS/cm U = ±42 µS/cm (k=2) at 25°C

Derived Values: 10009 micromho/cm, 99.9 ohm-cm, 6673 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 (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 48%RH 1,021mb/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	5719	5737	5755	5773	5791	5809	5827	5845	5863	5881
03°C	5899	5917	5935	5953	5971	5989	6007	6025	6043	6061
04°C	6079	6097	6116	6134	6152	6170	6188	6206	6224	6242
05°C	6260	6278	6297	6315	6333	6351	6369	6387	6406	6424
06°C	6442	6460	6478	6496	6515	6533	6551	6569	6588	6606
07°C	6624	6642	6661	6679	6697	6715	6734	6752	6770	6789
08°C	6807	6825	6844	6862	6880	6898	6917	6935	6954	6972
09°C	6990	7009	7027	7045	7064	7082	7101	7119	7137	7156
10°C	7174	7193	7211	7230	7248	7267	7285	7303	7322	7340
11°C	7359	7377	7396	7414	7433	7452	7470	7489	7507	7526
12°C	7544	7563	7581	7600	7619	7637	7656	7674	7693	7711
13°C	7730	7749	7767	7786	7805	7823	7842	7861	7879	7898
14°C	7917	7935	7954	7973	7991	8010	8029	8048	8066	8085
15°C	8104	8122	8141	8160	8179	8198	8216	8235	8254	8273
16°C	8291	8310	8329	8348	8367	8386	8404	8423	8442	8461
17°C	8480	8499	8518	8536	8555	8574	8593	8612	8631	8650
18°C	8669	8688	8707	8726	8745	8763	8782	8801	8820	8839
19°C	8858	8877	8896	8915	8934	8953	8972	8991	9010	9030
20°C	9049	9068	9087	9106	9125	9144	9163	9182	9201	9220
21°C	9239	9259	9278	9297	9316	9335	9354	9373	9393	9412
22°C	9431	9450	9469	9488	9508	9527	9546	9565	9584	9604
23°C	9623	9642	9661	9681	9700	9719	9738	9758	9777	9796
24°C	9816	9835	9854	9874	9893	9912	9931	9951	9970	9990
25°C	10009	10028	10048	10067	10086	10106	10125	10145	10164	10183
26°C	10203	10222	10242	10261	10281	10300	10319	10339	10358	10378
27°C	10397	10417	10436	10456	10475	10495	10514	10534	10553	10573
28°C	10592	10612	10632	10651	10671	10690	10710	10729	10749	10769
29°C	10788	10808	10827	10847	10867	10886	10906	10926	10945	10965
30°C	10985	11004	11024	11044	11063	11083	11103	11122	11142	11162
31°C	11182	11201	11221	11241	11261	11280	11300	11320	11340	11359
32°C	11379	11399	11419	11439	11458	11478	11498	11518	11538	11558
33°C	11577	11597	11617	11637	11657	11677	11697	11717	11737	11756
34°C	11776	11796	11816	11836	11856	11876	11896	11916	11936	11956
35°C	11976	11996	12016	12036	12056	12076	12096	12116	12136	12156

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