



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.

Certificate No.: 4178-8161357 **Amended Certificate**
Reference Certificate 4178-7781247

Description: Conductivity Standard 10,053 $\mu\text{S}/\text{cm}$

Catalog Number: 09-328-9, 11794246 **Lot:** CC15087

Certificate Date: July 8, 2016 **Expiration Date:** July 8, 2017

Certified Value: 10,053 $\mu\text{S}/\text{cm}$ $U = \pm 41 \mu\text{S}/\text{cm} (k=2)$ at 25°C


Derived Values: 10053 micromho/cm, 99.5 ohm-cm, 6702 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 $\pm 0.015^\circ\text{C}$.

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 47%RH 1,015mb/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	5745	5763	5781	5799	5817	5835	5853	5871	5889	5907
03°C	5925	5943	5961	5979	5997	6015	6034	6052	6070	6088
04°C	6106	6124	6142	6161	6179	6197	6215	6233	6251	6270
05°C	6288	6306	6324	6343	6361	6379	6397	6415	6434	6452
06°C	6470	6488	6507	6525	6543	6562	6580	6598	6617	6635
07°C	6653	6672	6690	6708	6727	6745	6763	6782	6800	6818
08°C	6837	6855	6874	6892	6910	6929	6947	6966	6984	7003
09°C	7021	7039	7058	7076	7095	7113	7132	7150	7169	7187
10°C	7206	7224	7243	7261	7280	7299	7317	7336	7354	7373
11°C	7391	7410	7428	7447	7466	7484	7503	7521	7540	7559
12°C	7577	7596	7615	7633	7652	7671	7689	7708	7727	7745
13°C	7764	7783	7802	7820	7839	7858	7876	7895	7914	7933
14°C	7951	7970	7989	8008	8027	8045	8064	8083	8102	8121
15°C	8139	8158	8177	8196	8215	8234	8252	8271	8290	8309
16°C	8328	8347	8366	8385	8404	8422	8441	8460	8479	8498
17°C	8517	8536	8555	8574	8593	8612	8631	8650	8669	8688
18°C	8707	8726	8745	8764	8783	8802	8821	8840	8859	8878
19°C	8897	8916	8935	8955	8974	8993	9012	9031	9050	9069
20°C	9088	9107	9127	9146	9165	9184	9203	9222	9242	9261
21°C	9280	9299	9318	9338	9357	9376	9395	9415	9434	9453
22°C	9472	9492	9511	9530	9549	9569	9588	9607	9627	9646
23°C	9665	9685	9704	9723	9743	9762	9781	9801	9820	9839
24°C	9859	9878	9898	9917	9936	9956	9975	9995	10014	10033
25°C	10053	10072	10092	10111	10131	10150	10170	10189	10209	10228
26°C	10248	10267	10287	10306	10326	10345	10365	10384	10404	10423
27°C	10443	10463	10482	10502	10521	10541	10561	10580	10600	10619
28°C	10639	10659	10678	10698	10718	10737	10757	10777	10796	10816
29°C	10836	10855	10875	10895	10914	10934	10954	10974	10993	11013
30°C	11033	11053	11072	11092	11112	11132	11152	11171	11191	11211
31°C	11231	11251	11270	11290	11310	11330	11350	11370	11390	11409
32°C	11429	11449	11469	11489	11509	11529	11549	11569	11588	11608
33°C	11628	11648	11668	11688	11708	11728	11748	11768	11788	11808
34°C	11828	11848	11868	11888	11908	11928	11948	11968	11988	12008
35°C	12028	12049	12069	12089	12109	12129	12149	12169	12189	12209

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