



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.: 4162-8155233 **Amended Certificate**
Reference Certificate 4162-7969597

Description: Conductivity Standard 199,477 $\mu\text{S/cm}$

Catalog Number: 4162 **Lot:** CC15303

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

Certified Value: 199,477 $\mu\text{S/cm}$ $U = \pm 520 \mu\text{S/cm (k=2)}$ at 25°C

Derived Values: 199477 micromho/cm, 5.01 ohm-cm, 132985 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 ($\mu\text{S/cm}$).

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 18% (by mass) potassium chloride (KCL), of less than 2% (by mass) propanol, and of less than 84% (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	10124-F02	3/08/17	TC26-7948973
Digital Thermometer	111879346	4/06/17	4000-7560797
Calibration Bath TC-337	B5C477		

Laboratory environment conditions: 25.0°C 48%RH 1,011mb/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

1.649 %

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
15°C	166898	167215	167533	167851	168169	168487	168805	169123	169442	169760
16°C	170079	170398	170717	171036	171355	171675	171994	172314	172634	172954
17°C	173274	173595	173915	174236	174556	174877	175198	175520	175841	176162
18°C	176484	176806	177128	177450	177772	178094	178417	178739	179062	179385
19°C	179708	180031	180354	180678	181001	181325	181649	181973	182297	182621
20°C	182946	183270	183595	183920	184245	184570	184896	185221	185547	185872
21°C	186198	186524	186850	187177	187503	187830	188156	188483	188810	189137
22°C	189465	189792	190120	190448	190775	191103	191432	191760	192088	192417
23°C	192746	193074	193403	193733	194062	194391	194721	195051	195380	195710
24°C	196041	196371	196701	197032	197363	197693	198024	198356	198687	199018
25°C	199477	199682	200013	200345	200678	201010	201342	201675	202007	202340
26°C	202673	203006	203340	203673	204007	204340	204674	205008	205342	205677
27°C	206011	206346	206680	207015	207350	207685	208020	208356	208691	209027
28°C	209363	209699	210035	210371	210708	211044	211381	211718	212055	212392
29°C	212729	213067	213404	213742	214080	214418	214756	215094	215432	215771
30°C	216110	216448	216787	217126	217466	217805	218145	218484	218824	219164
31°C	219504	219844	220185	220525	220866	221207	221548	221889	222230	222572
32°C	222913	223255	223597	223939	224281	224623	224965	225308	225650	225993
33°C	226336	226679	227023	227366	227709	228053	228397	228741	229085	229429
34°C	229774	230118	230463	230808	231153	231498	231843	232188	232534	232879
35°C	233225	233571	233917	234263	234610	234956	235303	235650	235997	236344

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