



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.: 4179-8153731 **Amended Certificate**
Reference Certificate 4179-7884489

Description: Conductivity Standard 99,943 $\mu\text{S/cm}$

Catalog Number: 23226-654 **Lot:** CC15180

Certificate Date: August 16, 2016 **Expiration Date:** August 16, 2017

Certified Value: 99,943 $\mu\text{S/cm}$ **U = $\pm 370 \mu\text{S/cm}$ (k=2) at 25°C**

Derived Values: 99943 micromho/cm, 10.01 ohm-cm, 66629 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 8% (by mass) potassium chloride (KCL), of less than 2% (by mass) propanol, and of less than 94% (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	9/09/16	TC26-7501964
Digital Thermometer	140073819	2/03/17	4000-7392222
Calibration Bath TC-337	B5C477		

Laboratory environment conditions: 25.0°C 53%RH 1,019mb/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

1.780 %

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	60628	60791	60953	61116	61278	61441	61603	61766	61929	62092
03°C	62255	62418	62581	62745	62908	63071	63235	63398	63562	63725
04°C	63889	64053	64217	64381	64545	64709	64873	65038	65202	65366
05°C	65531	65695	65860	66025	66190	66354	66519	66684	66849	67015
06°C	67180	67345	67511	67676	67842	68007	68173	68339	68504	68670
07°C	68836	69002	69169	69335	69501	69667	69834	70000	70167	70334
08°C	70500	70667	70834	71001	71168	71335	71502	71670	71837	72004
09°C	72172	72339	72507	72675	72842	73010	73178	73346	73514	73682
10°C	73851	74019	74187	74356	74524	74693	74861	75030	75199	75368
11°C	75537	75706	75875	76044	76213	76383	76552	76722	76891	77061
12°C	77231	77400	77570	77740	77910	78080	78250	78421	78591	78761
13°C	78932	79102	79273	79444	79614	79785	79956	80127	80298	80469
14°C	80641	80812	80983	81155	81326	81498	81669	81841	82013	82185
15°C	82357	82529	82701	82873	83045	83217	83390	83562	83735	83907
16°C	84080	84253	84426	84599	84772	84945	85118	85291	85464	85638
17°C	85811	85985	86158	86332	86506	86679	86853	87027	87201	87375
18°C	87550	87724	87898	88073	88247	88422	88596	88771	88946	89121
19°C	89296	89471	89646	89821	89996	90171	90347	90522	90698	90873
20°C	91049	91225	91400	91576	91752	91928	92104	92281	92457	92633
21°C	92810	92986	93163	93339	93516	93693	93870	94047	94224	94401
22°C	94578	94755	94932	95110	95287	95465	95642	95820	95998	96176
23°C	96354	96532	96710	96888	97066	97244	97423	97601	97780	97958
24°C	98137	98316	98494	98673	98852	99031	99210	99389	99569	99748
25°C	99943	100107	100286	100466	100646	100825	101005	101185	101365	101545
26°C	101725	101906	102086	102266	102447	102627	102808	102989	103169	103350
27°C	103531	103712	103893	104074	104255	104436	104618	104799	104981	105162
28°C	105344	105526	105707	105889	106071	106253	106435	106617	106800	106982
29°C	107164	107347	107529	107712	107895	108077	108260	108443	108626	108809
30°C	108992	109175	109359	109542	109725	109909	110092	110276	110460	110644
31°C	110827	111011	111195	111379	111564	111748	111932	112117	112301	112486
32°C	112670	112855	113040	113224	113409	113594	113779	113965	114150	114335
33°C	114520	114706	114891	115077	115263	115448	115634	115820	116006	116192
34°C	116378	116564	116750	116937	117123	117310	117496	117683	117870	118056
35°C	118243	118430	118617	118804	118991	119178	119366	119553	119741	119928

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