



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.: 4162-8155222 **Amended Certificate**
Reference Certificate 4162-7973794

Description: Conductivity Standard 198,527 $\mu\text{S}/\text{cm}$

Catalog Number: 89030-248 **Lot:** CC15317

Certificate Date: September 21, 2016 **Expiration Date:** September 21, 2017

Certified Value: 198,527 $\mu\text{S}/\text{cm}$ $U = \pm 520 \mu\text{S}/\text{cm} (k=2)$ at 25°C


Derived Values: 198527 micromho/cm, 5.04 ohm-cm, 132351 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 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 53%RH 1,014mb/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	166103	166419	166735	167051	167368	167684	168001	168318	168635	168952
16°C	169269	169586	169904	170222	170539	170857	171175	171494	171812	172130
17°C	172449	172768	173087	173406	173725	174045	174364	174684	175003	175323
18°C	175643	175964	176284	176605	176925	177246	177567	177888	178209	178530
19°C	178852	179174	179495	179817	180139	180462	180784	181106	181429	181752
20°C	182075	182398	182721	183044	183368	183691	184015	184339	184663	184987
21°C	185311	185636	185961	186285	186610	186935	187260	187586	187911	188237
22°C	188562	188888	189214	189541	189867	190193	190520	190847	191173	191500
23°C	191828	192155	192482	192810	193138	193466	193794	194122	194450	194778
24°C	195107	195436	195765	196093	196423	196752	197081	197411	197741	198070
25°C	198527	198731	199061	199391	199722	200052	200383	200714	201045	201377
26°C	201708	202040	202371	202703	203035	203367	203699	204032	204364	204697
27°C	205030	205363	205696	206029	206363	206696	207030	207364	207698	208032
28°C	208366	208700	209035	209369	209704	210039	210374	210710	211045	211380
29°C	211716	212052	212388	212724	213060	213396	213733	214070	214406	214743
30°C	215080	215418	215755	216092	216430	216768	217106	217444	217782	218120
31°C	218459	218797	219136	219475	219814	220153	220493	220832	221172	221512
32°C	221851	222192	222532	222872	223213	223553	223894	224235	224576	224917
33°C	225258	225600	225941	226283	226625	226967	227309	227652	227994	228337
34°C	228679	229022	229365	229708	230052	230395	230739	231082	231426	231770
35°C	232114	232459	232803	233148	233492	233837	234182	234527	234873	235218

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