



CERTIFICATE OF ANALYSIS
Complies with ISO Guide 34, ISO Guide 31,
ISO Guide 35, ISO/IEC 17025, ANSI/NCSL Z540-1, 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.: 4068-6994852 **Amended Certificate**
Reference Certificate 4068-6406190

Description: Conductivity Standard 10,000 $\mu\text{S/cm}$

Catalog Number: 23226-625 **Lot:** CC13332

Certificate Date: December 11, 2014 **Expiration Date:** December 11, 2015

Certified Value: 10,000 $\mu\text{S/cm}$ **U = $\pm 18 \mu\text{S/cm}$ (k=2) at 25°C**

Derived Values: 10000 micromho/cm, 100.0 ohm-cm, 6667 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 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	3/18/15	TC25-6219775
Digital Thermometer	111879346	4/03/15	4000-5835949
Temperature Calibration Bath TC-191	A42238		

Laboratory environment conditions: 25.0°C 31%RH 1,026mb/hPa

Control Company -- 4455 Rex Road -- Friendswood, TX 77546
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	5714	5732	5750	5768	5786	5804	5822	5840	5858	5876
03°C	5894	5912	5930	5948	5966	5984	6002	6020	6038	6056
04°C	6074	6092	6110	6128	6146	6164	6182	6200	6219	6237
05°C	6255	6273	6291	6309	6327	6345	6363	6382	6400	6418
06°C	6436	6454	6472	6491	6509	6527	6545	6563	6582	6600
07°C	6618	6636	6655	6673	6691	6709	6728	6746	6764	6782
08°C	6801	6819	6837	6856	6874	6892	6911	6929	6947	6966
09°C	6984	7002	7021	7039	7057	7076	7094	7113	7131	7149
10°C	7168	7186	7205	7223	7242	7260	7278	7297	7315	7334
11°C	7352	7371	7389	7408	7426	7445	7463	7482	7500	7519
12°C	7537	7556	7575	7593	7612	7630	7649	7667	7686	7705
13°C	7723	7742	7760	7779	7798	7816	7835	7854	7872	7891
14°C	7909	7928	7947	7966	7984	8003	8022	8040	8059	8078
15°C	8096	8115	8134	8153	8171	8190	8209	8228	8246	8265
16°C	8284	8303	8322	8340	8359	8378	8397	8416	8434	8453
17°C	8472	8491	8510	8529	8548	8567	8585	8604	8623	8642
18°C	8661	8680	8699	8718	8737	8756	8775	8794	8812	8831
19°C	8850	8869	8888	8907	8926	8945	8964	8983	9002	9021
20°C	9040	9059	9079	9098	9117	9136	9155	9174	9193	9212
21°C	9231	9250	9269	9288	9308	9327	9346	9365	9384	9403
22°C	9422	9442	9461	9480	9499	9518	9537	9557	9576	9595
23°C	9614	9633	9653	9672	9691	9710	9730	9749	9768	9787
24°C	9807	9826	9845	9865	9884	9903	9923	9942	9961	9981
25°C	10000	10019	10039	10058	10077	10097	10116	10135	10155	10174
26°C	10194	10213	10232	10252	10271	10291	10310	10330	10349	10369
27°C	10388	10407	10427	10446	10466	10485	10505	10524	10544	10563
28°C	10583	10602	10622	10642	10661	10681	10700	10720	10739	10759
29°C	10779	10798	10818	10837	10857	10877	10896	10916	10935	10955
30°C	10975	10994	11014	11034	11053	11073	11093	11112	11132	11152
31°C	11172	11191	11211	11231	11250	11270	11290	11310	11329	11349
32°C	11369	11389	11409	11428	11448	11468	11488	11508	11527	11547
33°C	11567	11587	11607	11627	11646	11666	11686	11706	11726	11746
34°C	11766	11786	11806	11825	11845	11865	11885	11905	11925	11945
35°C	11965	11985	12005	12025	12045	12065	12085	12105	12125	12145

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