



**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.

**Amended Certificate**  
**Reference Certificate 4179-7914120**

**Certificate No.:** 4179-8154449

**Description:** Conductivity Standard 99,980 µS/cm

**Catalog Number:** EF4417G **Lot:** CC15241

**Certificate Date:** August 29, 2016 **Expiration Date:** August 29, 2017

**Certified Value:** 99,980 µS/cm U = ±370 µS/cm (k=2) at 25°C

**Derived Values:** 99980 micromho/cm, 10.00 ohm-cm, 66653 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 (µS/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 ± 0.015°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 47%RH 1,017mb/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](http://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](http://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	60651	60813	60976	61138	61301	61463	61626	61789	61952	62115
03°C	62278	62441	62604	62768	62931	63095	63258	63422	63585	63749
04°C	63913	64077	64241	64405	64569	64733	64897	65062	65226	65391
05°C	65555	65720	65884	66049	66214	66379	66544	66709	66874	67039
06°C	67205	67370	67536	67701	67867	68032	68198	68364	68530	68696
07°C	68862	69028	69194	69360	69527	69693	69860	70026	70193	70360
08°C	70526	70693	70860	71027	71194	71362	71529	71696	71863	72031
09°C	72198	72366	72534	72702	72869	73037	73205	73373	73541	73710
10°C	73878	74046	74215	74383	74552	74720	74889	75058	75227	75396
11°C	75565	75734	75903	76072	76242	76411	76581	76750	76920	77089
12°C	77259	77429	77599	77769	77939	78109	78279	78450	78620	78791
13°C	78961	79132	79302	79473	79644	79815	79986	80157	80328	80499
14°C	80670	80842	81013	81185	81356	81528	81700	81871	82043	82215
15°C	82387	82559	82731	82904	83076	83248	83421	83593	83766	83939
16°C	84111	84284	84457	84630	84803	84976	85149	85323	85496	85669
17°C	85843	86017	86190	86364	86538	86712	86885	87060	87234	87408
18°C	87582	87756	87931	88105	88280	88454	88629	88804	88979	89154
19°C	89329	89504	89679	89854	90029	90205	90380	90556	90731	90907
20°C	91083	91258	91434	91610	91786	91962	92139	92315	92491	92668
21°C	92844	93021	93197	93374	93551	93728	93904	94081	94259	94436
22°C	94613	94790	94968	95145	95323	95500	95678	95856	96033	96211
23°C	96389	96567	96745	96924	97102	97280	97459	97637	97816	97994
24°C	98173	98352	98531	98710	98889	99068	99247	99426	99606	99785
25°C	99980	100144	100324	100503	100683	100863	101043	101223	101403	101583
26°C	101763	101943	102124	102304	102485	102665	102846	103027	103207	103388
27°C	103569	103750	103931	104113	104294	104475	104657	104838	105020	105201
28°C	105383	105565	105747	105928	106110	106292	106475	106657	106839	107022
29°C	107204	107386	107569	107752	107934	108117	108300	108483	108666	108849
30°C	109032	109216	109399	109583	109766	109950	110133	110317	110501	110685
31°C	110868	111052	111237	111421	111605	111789	111974	112158	112343	112527
32°C	112712	112897	113081	113266	113451	113636	113822	114007	114192	114377
33°C	114563	114748	114934	115120	115305	115491	115677	115863	116049	116235
34°C	116421	116607	116794	116980	117167	117353	117540	117726	117913	118100
35°C	118287	118474	118661	118848	119035	119223	119410	119597	119785	119972

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