Designation: D 3505 – 96

AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Density or Relative Density of Pure Liquid Chemicals[1]

This standard is issued under the fixed designation D 3505; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method describes a simplified procedure for the measurement of density or relative density of pure liquid chemicals for which accurate temperature expansion functions are known. It is restricted to liquids having vapor pressures not exceeding 600 mm Hg (0.8 atm) at the equilibration temperature, and having viscosities not exceeding 15 cSt at 20°C (60°F).

1.2 Means are provided for reporting results in the following units:

Density g/cm^3 at 20°C
Density g/ml at 20°C
Relative density 20°C/4°C
Relative density 60°F/60°F (15.56°C/15.56°C)
Commercial density, lb (in air)/U.S. gal at 60°F
Commercial density, lb (in air)/U.K. gal at 60°F.

NOTE 1—This test method is based on the old definition of 1 L = 1.000028 dm^3 (1 mL = 1.000028 cm^3). In 1964 the General Conference on Weights and Measures withdrew this definition of the litre and declared that the word "litre" was a special name for the cubic decimetre, thus making 1 mL = 1 cm^3 exactly.

NOTE 2—An alternative method for determining relative density of pure liquid chemicals is Test Method D 4052.

1.3 The following applies to all specified limits in this test method: for purposes of determining conformance with this test method, an observed value or a calculated value shall be rounded off "to the nearest unit" in the last right-hand digit used in expressing the specification limit, in accordance with the rounding-off method of Practice E 29.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific hazard statements are given in 7.1.

2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water[2]
D 1555 Test Method for Calculation of Volume and Weight of Industrial Aromatic Hydrocarbons[3]
D 3437 Practice for Sampling and Handling Liquid Cyclic Products[3]
D 4052 Test Method for Density and Relative Density of Liquids by Digital Density Meter[4]
E 1 Specification of ASTM Thermometers[5]
E 12 Terminology Relating to Density and Specific Gravity of Solids, Liquids, and Gases[6]
E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[7]

2.2 *Other Document:*

OSHA Regulations, 29 CFR, paragraphs 1910.1000 and 1910.1200[8]

3. Terminology

3.1 *Definitions:*

3.1.1 *density*—the mass of material per unit volume at a given temperature called the "reference temperature." Weight corrected to a standard acceleration of gravity and corrected for the buoyant effect of air is used to measure mass. This method specifies the use of a beam balance to determine weight so that no correction for variation in acceleration of gravity is necessary. When a torsion or spring balance is used, such correction must be applied.

3.1.2 *relative density*—the ratio of the density of the material at reference temperature" *t*" to the density of pure water, in consistent units, at reference temperature t_2. It is common practice to use reference temperature t_1 equal to t_2.

3.1.2.1 Since the mass of water at 4°C is very close to 1 g/mL or 1 g/cm^3, it is common practice to set the reference temperature t_2 for water at 4°C. When this is done and the density of the material is given in grams per millilitre, or grams per cubic centimetre, the value of density is very nearly identical to the value for relative density. Thus, density at 20°C

[1] This test method is under the jurisdiction of ASTM Committee D-16 on Aromatic Hydrocarbons and Related Chemicals and is the direct responsibility of Subcommittee D16.0E on Instrumental Analysis.

Current edition approved Jan. 10, 1996. Published March 1996. Originally published as D 3505 – 76. Last previous edition D 3505 – 91.

[2] *Annual Book of ASTM Standards*, Vol 11.01.
[3] *Annual Book of ASTM Standards*, Vol 06.04.
[4] *Annual Book of ASTM Standards*, Vol 05.02.
[5] *Annual Book of ASTM Standards*, Vol 14.03.
[6] *Annual Book of ASTM Standards*, Vol 15.05.
[7] *Annual Book of ASTM Standards*, Vol 14.02.
[8] Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

in g/cm^3 or g/mL, is nearly identical with relative density 20°C/4°C.

3.1.3 *commercial density*—weight per unit volume without correcting for the buoyant effect of air and is limited in this document to pounds (in air) per U.S. gallon at 60°F, or pounds in air per U.K. gallon at 60°F. This is the density most commonly used in commercial transactions in the petroleum and coal chemicals industry in the United States and Canada.

3.2 The definitions included in Terminology E 12 are applicable to this test method.

4. Summary of Test Method

NOTE 3—See Appendix for details on the method and derivation of formulas.

4.1 For materials listed in Table 1 the sample is drawn into a weighed and calibrated bicapillary pycnometer. The filler pycnometer is allowed to come to equilibrium at any convenient temperature between 10 and 30°C (50 and 86°F). The equilibrium temperature is measured to the nearest 0.02°C. The weight is determined using a beam balance. The density, relative density, or commercial density at the desired reference temperature is then calculated from the sample weight, a calibration factor proportional to an equal volume of water, and a multiplier which corrects for the buoyancy of air and the change in volume of the pycnometer and the sample due to deviation from the chosen reference temperature.

TABLE I, PART I 20° C Reference Temperature Multiplier, F20, for use in Computing Density, 12.1

CHOOSE A MULTIPLIER FOR THE MATERIAL BEING MEASURED CORRESPONDING TO THE BATH TEMPERATURE AT WHICH THE PYCNOMETER EQUILIBRATED.

TEMP DEGC	BENZENE	TOLUENE	MIXED XYLENES	O-XYLENE	M-XYLENE	P-XYLENE	STYRENE	CYCLO-HEXANE
10.0	0.98822	0.98941	0.99028	0.99052	0.99028	0.99011	0.99029	0.98912
10.2	0.98845	0.98962	0.99047	0.99070	0.99047	0.99030	0.99048	0.98933
10.4	0.98868	0.98983	0.99066	0.99089	0.99066	0.99049	0.99066	0.98953
10.6	0.98891	0.99003	0.99085	0.99107	0.99085	0.99069	0.99085	0.98973
10.8	0.98914	0.99024	0.99104	0.99126	0.99104	0.99088	0.99104	0.98993
11.0	0.98937	0.99045	0.99123	0.99144	0.99123	0.99107	0.99123	0.99013
11.2	0.98960	0.99066	0.99142	0.99163	0.99142	0.99126	0.99142	0.99034
11.4	0.98982	0.99086	0.99161	0.99181	0.99161	0.99146	0.99161	0.99054
11.6	0.99005	0.99107	0.99179	0.99200	0.99179	0.99165	0.99180	0.99075
11.8	0.99028	0.99128	0.99198	0.99218	0.99198	0.99184	0.99199	0.99095
12.0	0.99051	0.99148	0.99217	0.99237	0.99217	0.99204	0.99218	0.99116
12.2	0.99074	0.99169	0.99236	0.99255	0.99236	0.99223	0.99237	0.99136
12.4	0.99097	0.99190	0.99255	0.99274	0.99255	0.99242	0.99256	0.99157
12.6	0.99120	0.99211	0.99274	0.99292	0.99274	0.99262	0.99275	0.99178
12.8	0.99144	0.99231	0.99293	0.99311	0.99293	0.99281	0.99294	0.99199
13.0	0.99167	0.99252	0.99312	0.99329	0.99312	0.99300	0.99313	0.99220
13.2	0.99190	0.99273	0.99331	0.99348	0.99331	0.99320	0.99332	0.99240
13.4	0.99213	0.99294	0.99350	0.99367	0.99350	0.99339	0.99351	0.99261
13.6	0.99236	0.99315	0.99369	0.99385	0.99369	0.99358	0.99370	0.99282
13.8	0.99259	0.99335	0.99389	0.99404	0.99389	0.99376	0.99390	0.99303
14.0	0.99282	0.99356	0.99408	0.99422	0.99408	0.99397	0.99409	0.99325
14.2	0.99305	0.99377	0.99427	0.99441	0.99427	0.99417	0.99428	0.99346
14.4	0.99329	0.99398	0.99446	0.99460	0.99446	0.99436	0.99447	0.99367
14.6	0.99352	0.99419	0.99465	0.99478	0.99465	0.99456	0.99466	0.99388
14.8	0.99375	0.99440	0.99484	0.99497	0.99484	0.99475	0.99485	0.99410
15.0	0.99398	0.99461	0.99503	0.99516	0.99503	0.99495	0.99504	0.99431
15.2	0.99421	0.99481	0.99522	0.99534	0.99522	0.99514	0.99523	0.99452
15.4	0.99445	0.99502	0.99541	0.99553	0.99541	0.99534	0.99542	0.99474
15.6	0.99468	0.99523	0.99561	0.99572	0.99561	0.99553	0.99562	0.99496
15.8	0.99491	0.99544	0.99580	0.99590	0.99580	0.99573	0.99581	0.99517
16.0	0.99515	0.99565	0.99599	0.99609	0.99599	0.99592	0.99600	0.99539
16.2	0.99538	0.99586	0.99618	0.99628	0.99618	0.99612	0.99619	0.99561
16.4	0.99561	0.99607	0.99637	0.99646	0.99637	0.99631	0.99638	0.99582
16.6	0.99585	0.99628	0.99657	0.99665	0.99657	0.99651	0.99658	0.99604
16.8	0.99608	0.99649	0.99676	0.99684	0.99676	0.99670	0.99677	0.99626
17.0	0.99632	0.99670	0.99695	0.99703	0.99695	0.99690	0.99696	0.99648
17.2	0.99655	0.99691	0.99714	0.99721	0.99714	0.99710	0.99715	0.99670
17.4	0.99679	0.99712	0.99734	0.99740	0.99734	0.99729	0.99734	0.99692
17.6	0.99702	0.99733	0.99753	0.99759	0.99753	0.99749	0.99754	0.99715
17.8	0.99726	0.99754	0.99772	0.99778	0.99772	0.99768	0.99773	0.99737
18.0	0.99749	0.99775	0.99791	0.99797	0.99791	0.99788	0.99792	0.99759
18.2	0.99773	0.99796	0.99811	0.99815	0.99811	0.99808	0.99811	0.99781
18.4	0.99796	0.99817	0.99830	0.99834	0.99830	0.99827	0.99831	0.99804
18.6	0.99820	0.99838	0.99849	0.99853	0.99849	0.99847	0.99850	0.99826
18.8	0.99843	0.99859	0.99869	0.99872	0.99869	0.99867	0.99869	0.99849
19.0	0.99867	0.99880	0.99888	0.99891	0.99888	0.99886	0.99888	0.99871
19.2	0.99890	0.99901	0.99907	0.99910	0.99907	0.99906	0.99908	0.99894
19.4	0.99914	0.99922	0.99927	0.99928	0.99927	0.99926	0.99927	0.99917
19.6	0.99938	0.99943	0.99946	0.99947	0.99946	0.99946	0.99946	0.99939
19.8	0.99961	0.99964	0.99966	0.99966	0.99966	0.99965	0.99966	0.99962
20.0	0.99985	0.99985	0.99985	0.99985	0.99985	0.99985	0.99985	0.99985

TABLE I, PART I *Continued*

CHOOSE A MULTIPLIER FOR THE MATERIAL BEING MEASURED CORRESPONDING TO THE BATH TEMPERATURE AT WHICH THE PYCNOMETER EQUILIBRATED.

TEMP DEGC	BENZENE	TOLUENE	MIXED XYLENES	O-XYLENE	M-XYLENE	P-XYLENE	STYRENE	CYCLO-HEXANE
20.0	0.99985	0.99985	0.99985	0.99985	0.99985	0.99985	0.99985	0.99985
20.2	1.00009	1.00006	1.00004	1.00004	1.00004	1.00005	1.00004	1.00008
20.4	1.00032	1.00027	1.00024	1.00023	1.00024	1.00025	1.00024	1.00031
20.6	1.00056	1.00048	1.00043	1.00042	1.00043	1.00044	1.00043	1.00054
20.8	1.00080	1.00069	1.00063	1.00061	1.00063	1.00064	1.00062	1.00077
21.0	1.00104	1.00091	1.00082	1.00080	1.00082	1.00084	1.00082	1.00100
21.2	1.00128	1.00112	1.00102	1.00099	1.00102	1.00104	1.00101	1.00124
21.4	1.00151	1.00133	1.00121	1.00118	1.00121	1.00124	1.00121	1.00147
21.6	1.00175	1.00154	1.00141	1.00137	1.00141	1.00143	1.00140	1.00170
21.8	1.00199	1.00175	1.00160	1.00156	1.00160	1.00163	1.00159	1.00194
22.0	1.00223	1.00196	1.00180	1.00175	1.00180	1.00183	1.00179	1.00217
22.2	1.00247	1.00218	1.00199	1.00194	1.00199	1.00203	1.00198	1.00241
22.4	1.00271	1.00239	1.00219	1.00213	1.00219	1.00223	1.00218	1.00264
22.6	1.00295	1.00260	1.00238	1.00232	1.00238	1.00243	1.00237	1.00288
22.8	1.00319	1.00281	1.00258	1.00251	1.00258	1.00263	1.00257	1.00312
23.0	1.00342	1.00302	1.00278	1.00270	1.00278	1.00283	1.00276	1.00336
23.2	1.00366	1.00324	1.00297	1.00289	1.00297	1.00303	1.00296	1.00360
23.4	1.00390	1.00345	1.00317	1.00308	1.00317	1.00322	1.00315	1.00383
23.6	1.00414	1.00366	1.00336	1.00327	1.00336	1.00342	1.00335	1.00408
23.8	1.00438	1.00387	1.00356	1.00346	1.00356	1.00362	1.00354	1.00432
24.0	1.00462	1.00409	1.00376	1.00365	1.00376	1.00382	1.00374	1.00456
24.2	1.00487	1.00430	1.00395	1.00384	1.00395	1.00402	1.00393	1.00480
24.4	1.00511	1.00451	1.00415	1.00403	1.00415	1.00422	1.00413	1.00504
24.6	1.00535	1.00473	1.00435	1.00422	1.00435	1.00442	1.00432	1.00529
24.8	1.00559	1.00494	1.00454	1.00442	1.00454	1.00462	1.00452	1.00553
25.0	1.00583	1.00515	1.00474	1.00461	1.00474	1.00482	1.00471	1.00577
25.2	1.00607	1.00537	1.00494	1.00480	1.00494	1.00502	1.00491	1.00602
25.4	1.00631	1.00558	1.00514	1.00499	1.00514	1.00522	1.00511	1.00627
25.6	1.00656	1.00579	1.00533	1.00518	1.00533	1.00542	1.00530	1.00651
25.8	1.00680	1.00601	1.00553	1.00537	1.00553	1.00563	1.00550	1.00676
26.0	1.00704	1.00622	1.00573	1.00557	1.00573	1.00583	1.00569	1.00701
26.2	1.00728	1.00643	1.00593	1.00576	1.00593	1.00603	1.00589	1.00726
26.4	1.00753	1.00665	1.00612	1.00595	1.00612	1.00623	1.00609	1.00751
26.6	1.00777	1.00686	1.00632	1.00614	1.00632	1.00643	1.00628	1.00775
26.8	1.00801	1.00707	1.00652	1.00634	1.00652	1.00663	1.00648	1.00801
27.0	1.00825	1.00729	1.00672	1.00653	1.00672	1.00683	1.00667	1.00826
27.2	1.00850	1.00750	1.00692	1.00672	1.00692	1.00703	1.00687	1.00851
27.4	1.00874	1.00772	1.00711	1.00691	1.00711	1.00724	1.00707	1.00875
27.6	1.00899	1.00793	1.00731	1.00711	1.00731	1.00744	1.00726	1.00900
27.8	1.00923	1.00815	1.00751	1.00730	1.00751	1.00764	1.00746	1.00927
28.0	1.00947	1.00836	1.00771	1.00749	1.00771	1.00784	1.00766	1.00953
28.2	1.00972	1.00858	1.00791	1.00769	1.00791	1.00804	1.00786	1.00978
28.4	1.00996	1.00879	1.00811	1.00788	1.00811	1.00825	1.00805	1.01004
28.6	1.01021	1.00901	1.00831	1.00807	1.00831	1.00845	1.00825	1.01029
28.8	1.01045	1.00922	1.00851	1.00827	1.00851	1.00865	1.00845	1.01055
29.0	1.01070	1.00944	1.00871	1.00846	1.00871	1.00885	1.00864	1.01081
29.2	1.01094	1.00965	1.00891	1.00866	1.00891	1.00906	1.00884	1.01107
29.4	1.01119	1.00987	1.00911	1.00885	1.00911	1.00926	1.00904	1.01133
29.6	1.01143	1.01008	1.00931	1.00904	1.00931	1.00946	1.00924	1.01159
29.8	1.01168	1.01030	1.00951	1.00924	1.00951	1.00966	1.00944	1.01185
30.0	1.01192	1.01051	1.00971	1.00943	1.00971	1.00987	1.00963	1.01211

TABLE I, PART II 60° F Reference Temperature Multiplier, F60, for use in Computing Density, 12.1

CHOOSE A MULTIPLIER FOR THE MATERIAL BEING MEASURED CORRESPONDING TO THE BATH TEMPERATURE AT WHICH THE PYCNOMETER EQUILIBRATED.

TEMP DEGC	BENZENE	TOLUENE	MIXED XYLENES	O-XYLENE	M-XYLENE	P-XYLENE	STYRENE	CYCLO-HEXANE
10.0	0.99341	0.99405	0.99454	0.99467	0.99454	0.99444	0.99454	0.99403
10.2	0.99364	0.99426	0.99473	0.99485	0.99473	0.99464	0.99473	0.99424
10.4	0.99387	0.99446	0.99492	0.99504	0.99492	0.99483	0.99492	0.99444
10.6	0.99410	0.99467	0.99511	0.99523	0.99511	0.99502	0.99511	0.99464
10.8	0.99433	0.99488	0.99530	0.99541	0.99530	0.99522	0.99530	0.99485
11.0	0.99456	0.99509	0.99549	0.99560	0.99549	0.99541	0.99549	0.99505
11.2	0.99479	0.99530	0.99568	0.99578	0.99568	0.99560	0.99568	0.99525
11.4	0.99502	0.99550	0.99587	0.99597	0.99587	0.99580	0.99587	0.99546
11.6	0.99525	0.99571	0.99606	0.99615	0.99606	0.99599	0.99606	0.99567
11.8	0.99548	0.99592	0.99625	0.99634	0.99625	0.99619	0.99625	0.99587
12.0	0.99571	0.99613	0.99644	0.99653	0.99644	0.99638	0.99644	0.99608
12.2	0.99594	0.99634	0.99663	0.99671	0.99663	0.99657	0.99663	0.99629
12.4	0.99617	0.99655	0.99682	0.99690	0.99682	0.99677	0.99682	0.99649
12.6	0.99640	0.99675	0.99701	0.99708	0.99701	0.99696	0.99701	0.99670
12.8	0.99664	0.99696	0.99721	0.99727	0.99721	0.99716	0.99721	0.99691
13.0	0.99687	0.99717	0.99740	0.99746	0.99740	0.99735	0.99740	0.99712
13.2	0.99710	0.99738	0.99759	0.99764	0.99759	0.99755	0.99759	0.99733
13.4	0.99733	0.99759	0.99778	0.99783	0.99778	0.99774	0.99778	0.99754
13.6	0.99756	0.99780	0.99797	0.99802	0.99797	0.99794	0.99797	0.99775
13.8	0.99780	0.99801	0.99816	0.99820	0.99816	0.99813	0.99816	0.99796
14.0	0.99803	0.99822	0.99835	0.99839	0.99835	0.99833	0.99835	0.99818
14.2	0.99826	0.99843	0.99854	0.99858	0.99854	0.99852	0.99855	0.99839
14.4	0.99850	0.99863	0.99874	0.99876	0.99874	0.99872	0.99874	0.99860
14.6	0.99873	0.99884	0.99893	0.99895	0.99893	0.99891	0.99893	0.99882
14.8	0.99896	0.99905	0.99912	0.99914	0.99912	0.99911	0.99912	0.99903
15.0	0.99920	0.99926	0.99931	0.99933	0.99931	0.99930	0.99931	0.99925
15.2	0.99943	0.99947	0.99950	0.99951	0.99950	0.99950	0.99950	0.99946
15.4	0.99966	0.99968	0.99970	0.99970	0.99970	0.99969	0.99970	0.99968
15.6	0.99990	0.99989	0.99989	0.99989	0.99989	0.99989	0.99989	0.99989
15.8	1.00013	1.00010	1.00008	1.00008	1.00008	1.00009	1.00008	1.00011
16.0	1.00037	1.00031	1.00027	1.00026	1.00027	1.00028	1.00027	1.00033
16.2	1.00060	1.00052	1.00047	1.00045	1.00047	1.00048	1.00047	1.00055
16.4	1.00084	1.00073	1.00066	1.00064	1.00066	1.00067	1.00066	1.00077
16.6	1.00107	1.00094	1.00085	1.00083	1.00085	1.00087	1.00085	1.00099
16.8	1.00131	1.00115	1.00105	1.00102	1.00105	1.00107	1.00105	1.00121
17.0	1.00154	1.00136	1.00124	1.00120	1.00124	1.00126	1.00124	1.00143
17.2	1.00178	1.00158	1.00143	1.00139	1.00143	1.00146	1.00143	1.00165
17.4	1.00201	1.00179	1.00163	1.00158	1.00163	1.00166	1.00162	1.00187
17.6	1.00225	1.00200	1.00182	1.00177	1.00182	1.00186	1.00182	1.00210
17.8	1.00249	1.00221	1.00201	1.00196	1.00201	1.00205	1.00201	1.00232
18.0	1.00272	1.00242	1.00221	1.00215	1.00221	1.00225	1.00220	1.00254
18.2	1.00296	1.00263	1.00240	1.00234	1.00240	1.00245	1.00240	1.00277
18.4	1.00319	1.00284	1.00259	1.00252	1.00259	1.00264	1.00259	1.00299
18.6	1.00343	1.00305	1.00279	1.00271	1.00279	1.00284	1.00278	1.00322
18.8	1.00367	1.00326	1.00298	1.00290	1.00298	1.00304	1.00296	1.00344
19.0	1.00391	1.00348	1.00318	1.00309	1.00318	1.00324	1.00317	1.00367
19.2	1.00414	1.00369	1.00337	1.00328	1.00337	1.00344	1.00337	1.00390
19.4	1.00438	1.00390	1.00357	1.00347	1.00357	1.00363	1.00356	1.00413
19.6	1.00462	1.00411	1.00376	1.00366	1.00376	1.00383	1.00375	1.00435
19.8	1.00486	1.00432	1.00396	1.00385	1.00396	1.00403	1.00395	1.00458
20.0	1.00509	1.00453	1.00415	1.00404	1.00415	1.00423	1.00414	1.00481

TABLE I, PART II *Continued*

CHOOSE A MULTIPLIER FOR THE MATERIAL BEING MEASURED CORRESPONDING TO THE BATH TEMPERATURE AT WHICH THE PYCNOMETER EQUILIBRATED.

TEMP DEGC	BENZENE	TOLUENE	MIXED XYLENES	O-XYLENE	M-XYLENE	P-XYLENE	STYRENE	CYCLO-HEXANE
20.0	1.00509	1.00453	1.00415	1.00404	1.00415	1.00423	1.00414	1.00481
20.2	1.00533	1.00474	1.00435	1.00423	1.00435	1.00443	1.00434	1.00504
20.4	1.00557	1.00496	1.00454	1.00442	1.00454	1.00463	1.00453	1.00527
20.6	1.00581	1.00517	1.00474	1.00461	1.00474	1.00482	1.00472	1.00551
20.8	1.00605	1.00538	1.00493	1.00480	1.00493	1.00502	1.00492	1.00574
21.0	1.00629	1.00559	1.00513	1.00499	1.00513	1.00522	1.00511	1.00597
21.2	1.00653	1.00581	1.00532	1.00518	1.00532	1.00542	1.00531	1.00621
21.4	1.00677	1.00602	1.00552	1.00537	1.00552	1.00562	1.00550	1.00644
21.6	1.00701	1.00623	1.00572	1.00556	1.00572	1.00582	1.00570	1.00668
21.8	1.00725	1.00644	1.00591	1.00575	1.00591	1.00602	1.00589	1.00691
22.0	1.00749	1.00666	1.00611	1.00594	1.00611	1.00622	1.00609	1.00715
22.2	1.00773	1.00687	1.00630	1.00613	1.00630	1.00642	1.00628	1.00738
22.4	1.00797	1.00708	1.00650	1.00632	1.00650	1.00662	1.00648	1.00762
22.6	1.00821	1.00730	1.00670	1.00652	1.00670	1.00682	1.00667	1.00786
22.8	1.00845	1.00751	1.00689	1.00671	1.00689	1.00702	1.00687	1.00810
23.0	1.00869	1.00772	1.00709	1.00690	1.00709	1.00722	1.00707	1.00834
23.2	1.00893	1.00794	1.00729	1.00709	1.00729	1.00742	1.00726	1.00858
23.4	1.00917	1.00815	1.00748	1.00728	1.00748	1.00762	1.00746	1.00882
23.6	1.00941	1.00836	1.00768	1.00747	1.00768	1.00782	1.00765	1.00906
23.8	1.00965	1.00858	1.00788	1.00767	1.00788	1.00802	1.00785	1.00930
24.0	1.00990	1.00879	1.00808	1.00786	1.00808	1.00822	1.00805	1.00954
24.2	1.01014	1.00900	1.00827	1.00805	1.00827	1.00842	1.00824	1.00979
24.4	1.01038	1.00922	1.00847	1.00824	1.00847	1.00862	1.00844	1.01003
24.6	1.01062	1.00943	1.00867	1.00843	1.00867	1.00882	1.00863	1.01028
24.8	1.01086	1.00965	1.00887	1.00863	1.00887	1.00902	1.00883	1.01052
25.0	1.01111	1.00986	1.00906	1.00882	1.00906	1.00922	1.00903	1.01077
25.2	1.01135	1.01007	1.00926	1.00901	1.00926	1.00943	1.00922	1.01101
25.4	1.01159	1.01029	1.00946	1.00920	1.00946	1.00963	1.00942	1.01126
25.6	1.01184	1.01050	1.00966	1.00940	1.00966	1.00983	1.00962	1.01151
25.8	1.01208	1.01072	1.00986	1.00959	1.00986	1.01003	1.00981	1.01176
26.0	1.01232	1.01093	1.01006	1.00978	1.01006	1.01023	1.01001	1.01201
26.2	1.01257	1.01115	1.01025	1.00997	1.01025	1.01043	1.01021	1.01226
26.4	1.01281	1.01136	1.01045	1.01017	1.01045	1.01064	1.01040	1.01251
26.6	1.01305	1.01158	1.01065	1.01036	1.01065	1.01084	1.01060	1.01276
26.8	1.01330	1.01179	1.01085	1.01055	1.01085	1.01104	1.01080	1.01301
27.0	1.01354	1.01201	1.01105	1.01075	1.01105	1.01124	1.01099	1.01326
27.2	1.01379	1.01222	1.01125	1.01094	1.01125	1.01144	1.01119	1.01352
27.4	1.01403	1.01244	1.01145	1.01113	1.01145	1.01165	1.01139	1.01377
27.6	1.01428	1.01265	1.01165	1.01133	1.01165	1.01185	1.01159	1.01402
27.8	1.01452	1.01287	1.01185	1.01152	1.01185	1.01205	1.01178	1.01428
28.0	1.01477	1.01308	1.01205	1.01172	1.01205	1.01225	1.01198	1.01454
28.2	1.01501	1.01330	1.01225	1.01191	1.01225	1.01246	1.01218	1.01479
28.4	1.01526	1.01352	1.01245	1.01210	1.01245	1.01266	1.01238	1.01505
28.6	1.01551	1.01373	1.01265	1.01230	1.01265	1.01286	1.01258	1.01531
28.8	1.01575	1.01395	1.01285	1.01249	1.01285	1.01307	1.01278	1.01557
29.0	1.01600	1.01416	1.01305	1.01269	1.01305	1.01327	1.01297	1.01583
29.2	1.01624	1.01438	1.01325	1.01288	1.01325	1.01347	1.01317	1.01609
29.4	1.01649	1.01460	1.01345	1.01308	1.01345	1.01368	1.01337	1.01635
29.6	1.01674	1.01481	1.01365	1.01327	1.01365	1.01388	1.01357	1.01661
29.8	1.01699	1.01503	1.01385	1.01347	1.01385	1.01408	1.01377	1.01687
30.0	1.01723	1.01524	1.01405	1.01366	1.01405	1.01429	1.01397	1.01714

4.2 For liquids not listed in Table 1, the sample is equilibrated at the desired reference temperature, usually 20°C or 60°F (15.56°C), the density, relative density, or commercial density is then calculated from the sample weight, a calibration factor proportional to an equal volume of water and a term which corrects for the buoyancy of air. In the case of volatile