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Standard
ASTM Butadiene Measurement Tables[1]

This standard is issued under the fixed designation D1550; 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.

1. Scope

1.1 The ASTM Butadiene Measurement Tables are for use in the calculation of quantities of butadiene. The accompanying Tables 1-4 cover the normal operating ranges for the reduction of observed specific gravity and volume to 15.6/15.6 °C (60/60 °F) and for the calculation of weight-volume relationships of butadiene.

1.2 These tables are applicable to both butadiene and butadiene concentrates (minimum of 60 % butadiene).

NOTE 1—These tables replace the existing tables in the National Institute of Standards and Technology *Letter Circulars LC-736* and *LC-757* and the Rubber Reserve Corp., Butadiene Laboratory Manual.

1.3 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1250 Guide for Use of the Petroleum Measurement Tables

3. Significance and Use

3.1 Accurate knowledge of the weight and volume of butadiene is necessary for the orderly manufacture, storage, transfer, and sale of the material. These tables are suitable for use in these and similar aspects of butadiene commerce.

[1] These tables are under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and are the direct responsibility of Subcommittee D02.02.07 on Temperature Determination (API MPMS Chapter 7.0).

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

TABLE 1 REDUCTION OF OBSERVED SPECIFIC GRAVITY TO SPECIFIC GRAVITY 15.6/15.6 °C (60/60 °F)

This table gives values of specific gravity 15.6/15.6 °C (60/60 °F) corresponding to specific gravities observed with a glass hydrometer at temperatures other than 60 °F. The expression "Observed Specific Gravity" appears in this table because it is the term most generally used in industry. For specific gravities determined by hydrometer, a more exact expression would be "hydrometer indication at the observed temperature." This hydrometer indication differs slightly from the true specific gravity at the observed temperature owing to the expansion or contraction of the glass hydrometer when its temperature differs from its calibration temperature of 60 °F.

It is generally impracticable to determine a specific gravity at exactly 15.6 °C (60 °F) although it is at this temperature only that strictly correct results are obtained with a standard glass hydrometer. In converting an observed specific gravity at the observed temperature *t* F (hydrometer indication of specific gravity *t*/60 °F) to the corresponding 60/60 °F value, two corrections are possible. The first arises from the change in volume of the glass hydrometer with temperature, and the second arises from the change in volume of the butadiene. This table takes into account only the change in volume of the butadiene because the change in volume of the hydrometer is insignificant in comparison with the accuracy of the values for the change in volume of the butadiene.

This table must be entered with specific gravities measured with a glass hydrometer calibrated at 15.6/15.6 °C (60/60 °F)

Example—If the specific gravity observed on a hydrometer in butadiene at 40 °F is 0.642, what is its specific gravity 60/60 °F?

Enter the table in the column for "Observed Specific Gravity," headed 0.640, and note that against an "Observed Temperature" of 40 °F, the corresponding specific gravity 60/60 °F is	0.627
Likewise, note that for 0.645 specific gravity opposite 40 °F, the corresponding specific gravity 60/60 °F is	0.632
This represents an increase of 0.005 in specific gravity 60/60 °F for an increase of 0.005 in the value at 40 °F. Therefore, by simple proportion, an increase in the specific gravity value noted at 40 °F from 0.640 to 0.642 increases the corresponding specific gravity 60/60 °F by 0.4 × 0.005 or	0.002
Then, the specific gravity 60/60 °F corresponding to the observed specific gravity of 0.642 at 40 °F is 0.627 + 0.002 or	0.629

TABLE 1 Reduction of Observed Specific Gravity to Specific Gravity 15.6/15.6°C (60/60°F)

18.3–43.0 °C (65–110 °F) 0.585–0.615

Observed Temperature °F[A]	Observed Specific Gravity						
	0.585	0.590	0.595	0.600	0.605	0.610	0.615
	Corresponding Specific Gravity 60/60 °F						
65	...	...	...	...	...	...	...
66	...	...	...	...	...	...	...
67	...	...	...	...	...	...	...
68	...	...	...	...	...	...	0.621
69	...	...	...	...	...	...	0.621
	...						
70	...	...	...	...	...	...	0.622
71	...	...	...	...	...	...	0.623
72	...	...	...	...	...	...	0.623
73	...	...	...	...	...	...	0.624
74	...	...	...	...	...	...	0.625
75	...	...	...	...	...	0.621	0.625
76	...	...	...	...	...	0.621	0.626
77	...	...	...	...	...	0.622	0.627
78	...	...	...	...	...	0.623	0.627
79	...	...	...	...	...	0.623	0.628
80	...	...	...	...	...	0.624	0.629
81	...	...	...	...	...	0.625	0.629
82	...	...	...	...	0.621	0.625	0.630
83	...	...	...	...	0.621	0.626	0.631
84	...	...	...	...	0.622	0.627	0.631
85	...	...	...	...	0.623	0.627	0.632
86	...	...	...	...	0.623	0.628	0.633
87	...	...	...	...	0.624	0.629	0.633
88	...	...	...	...	0.625	0.629	0.634
89	...	...	...	0.621	0.625	0.630	...
90	...	...	...	0.622	0.626	0.631	...
91	...	...	...	0.622	0.627	0.631	...
92	...	...	...	0.623	0.627	0.632	...
93	...	...	...	0.624	0.628	0.633	...
94	...	...	...	0.624	0.629	0.633	...
95	...	...	...	0.625	0.629	0.634	...
96	...	...	0.621	0.625	0.630	0.634	...
97	...	...	0.622	0.626	0.631	...	...
98	...	...	0.622	0.627	0.631	...	...
99	...	...	0.623	0.627	0.632	...	...
100	...	...	0.624	0.628	0.632	...	...
101	...	...	0.624	0.629	0.633	...	...
102	...	0.621	0.625	0.629	0.634	...	...
103	...	0.621	0.626	0.630	0.634	...	...
104	...	0.622	0.626	0.631	...	...	...
105	...	0.623	0.627	0.631	...	...	...
106	...	0.623	0.628	0.632	...	...	...
107	...	0.624	0.628	0.633	...	...	...
108	...	0.625	0.629	0.633	...	...	...
109	0.621	0.625	0.629	0.634	...	...	...
110	0.622	0.626	0.630	0.634	...	...	...

TABLE 1 Reduction of Observed Specific Gravity to Specific Gravity 15.6/15.6°C (60/60°F)

–9.4 to + 10.0 °C (15–50 °F) 0.620–0.650

Observed Temperature, °F[A]	Observed Specific Gravity						
	0.620	0.625	0.630	0.635	0.640	0.645	0.650
	Corresponding Specific Gravity 60/60 °F						
15	...	...	...	...	...	...	...
16	...	...	...	...	...	...	0.621
17	...	...	...	...	...	...	0.621
18	...	...	...	...	...	...	0.622
19	...	...	...	...	...	...	0.623
20	...	...	...	...	...	...	0.623
21	...	...	...	...	...	...	0.624
22	...	...	...	...	...	...	0.625
23	...	...	...	...	...	...	0.625
24	...	...	...	...	...	0.621	0.626
25	...	...	...	...	...	0.621	0.627
26	...	...	...	...	...	0.622	0.628
27	...	...	...	...	...	0.623	0.628
28	...	...	...	...	...	0.624	0.629
29	...	...	...	...	...	0.624	0.630
30	...	...	...	...	...	0.625	0.630
31	...	...	...	...	...	0.626	0.631
32	...	...	...	...	0.621	0.626	0.632
33	...	...	...	...	0.622	0.627	0.632
34	...	...	...	...	0.622	0.628	0.633
35	...	...	...	...	0.623	0.628	0.634
36	...	...	...	...	0.624	0.629	0.634
37	...	...	...	...	0.625	0.630	...
38	...	...	...	...	0.625	0.630	...
39	...	...	...	0.621	0.626	0.631	...
40	...	...	...	0.621	0.627	0.632	...
41	...	...	...	0.622	0.627	0.632	...
42	...	...	...	0.623	0.628	0.633	...
43	...	...	...	0.624	0.629	0.634	...
44	...	...	...	0.624	0.629	0.634	...
45	...	...	...	0.625	0.630	...	...
46	...	...	...	0.626	0.631	...	...
47	...	...	0.621	0.626	0.631	...	...
48	...	...	0.622	0.627	0.632	...	...
49	...	...	0.623	0.628	0.633	...	...
50	...	...	0.623	0.628	0.633	...	...