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DEPARTMENT OF COMMERCE  
BUREAU OF STANDARDS

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SUPPLEMENT TO CIRCULAR 19

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MASTER SCALES FOR THE GRADUATION OF HYDROMETERS

The accompanying tables were prepared for the use of hydrometer makers in the graduation of hydrometer scales to indicate percentages of ethyl alcohol by weight at 20° C or by volume at 60° F, and they give the proportional length of any part of the hydrometer scale, assuming that the entire scale has a length of 1000 mm<sup>1</sup> and that the hydrometer stem is of uniform cross section. For example, if it is required to construct a hydrometer scale having a certain range the spacing of the graduations of the scale should be made proportional to the differences of the lengths shown in the table for that range.

These tables were prepared from the alcoholometric tables published in Circular No. 19, 3d edition. The original work on which the tables are based is described in detail in the Bulletin of the Bureau of Standards, Vol. 9, p. 328 (Reprint No. 197). The indications of hydrometers graduated in accordance with these master scales will be on the basis officially adopted by the Bureau of Standards. Hydrometers may also be graduated to indicate percentages of "proof spirit," according to the official tables of the United States Bureau of Internal Revenue (adopted 1913), by the use of the accompanying master scale intended for the graduation of hydrometers to indicate percentages of alcohol by volume at 60° F. The percentage of proof spirit is in every case twice the percentage of alcohol by volume. For example, 25 per cent alcohol by volume is equivalent to 50 per cent proof spirit; 50 per cent alcohol by volume is equivalent to 100 per cent proof spirit. The spacing of the graduations for proof spirit hydrometers can therefore be taken directly from Table 2, the per cent alcohol by volume being multiplied by 2 in each case to give the equivalent per cent proof spirit.

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<sup>1</sup> Any other convenient unit may be employed; the tabulated lengths will then be in that unit.

TABLE 1.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Weight at 20° C

[Total length of scale 1000 mm]

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
0.0	0.00	5.0	33.78	10.0	62.96	15.0	89.50	20.0	115.45
.1	0.71	.1	34.40	.1	63.51	.1	90.00	.1	115.99
.2	1.42	.2	35.02	.2	64.06	.2	90.50	.2	116.53
.3	2.13	.3	35.64	.3	64.61	.3	91.00	.3	117.07
.4	2.84	.4	36.26	.4	65.16	.4	91.50	.4	117.61
.5	3.55	.5	36.87	.5	65.71	.5	91.99	.5	118.15
.6	4.26	.6	37.48	.6	66.26	.6	92.48	.6	118.69
.7	4.97	.7	38.08	.7	66.81	.7	92.98	.7	119.23
.8	5.68	.8	38.68	.8	67.36	.8	93.43	.8	119.78
.9	6.38	.9	39.28	.9	67.91	.9	93.98	.9	120.33
1.0	7.08	6.0	39.88	11.0	68.45	16.0	94.49	21.0	120.88
.1	7.78	.1	40.48	.1	68.99	.1	95.00	.1	121.43
.2	8.48	.2	41.08	.2	69.53	.2	95.51	.2	121.98
.3	9.18	.3	41.68	.3	70.07	.3	96.02	.3	122.53
.4	9.88	.4	42.28	.4	70.61	.4	96.53	.4	123.08
.5	10.58	.5	42.88	.5	71.15	.5	97.04	.5	123.63
.6	11.28	.6	43.47	.6	71.69	.6	97.55	.6	124.18
.7	11.97	.7	44.06	.7	72.23	.7	98.06	.7	124.73
.8	12.66	.8	44.65	.8	72.77	.8	98.57	.8	125.28
.9	13.35	.9	45.24	.9	73.31	.9	99.08	.9	125.83
2.0	14.04	7.0	45.82	12.0	73.84	17.0	99.60	22.0	126.38
.1	14.73	.1	46.40	.1	74.37	.1	100.12	.1	126.94
.2	15.42	.2	46.98	.2	74.90	.2	100.64	.2	127.50
.3	16.11	.3	47.56	.3	75.43	.3	101.16	.3	128.06
.4	16.80	.4	48.14	.4	75.96	.4	101.68	.4	128.62
.5	17.49	.5	48.72	.5	76.49	.5	102.20	.5	129.19
.6	18.18	.6	49.30	.6	77.02	.6	102.72	.6	129.76
.7	18.87	.7	49.88	.7	77.55	.7	103.24	.7	130.33
.8	19.55	.8	50.46	.8	78.08	.8	103.76	.8	130.90
.9	20.22	.9	51.04	.9	78.61	.9	104.28	.9	131.47
3.0	20.89	8.0	51.62	13.0	79.13	18.0	104.80	23.0	132.04
.1	21.56	.1	52.19	.1	79.65	.1	105.32	.1	132.61
.2	22.22	.2	52.76	.2	80.17	.2	105.85	.2	133.18
.3	22.88	.3	53.33	.3	80.69	.3	106.38	.3	133.75
.4	23.54	.4	53.90	.4	81.21	.4	106.91	.4	134.32
.5	24.20	.5	54.47	.5	81.73	.5	107.44	.5	134.89
.6	24.85	.6	55.04	.6	82.25	.6	107.97	.6	135.46
.7	25.50	.7	55.61	.7	82.77	.7	108.50	.7	136.03
.8	26.15	.8	56.18	.8	83.29	.8	109.03	.8	136.60
.9	26.80	.9	56.75	.9	83.81	.9	109.56	.9	137.18
4.0	27.45	9.0	57.32	14.0	84.33	19.0	110.09	24.0	137.76
.1	28.09	.1	57.89	.1	84.85	.1	110.62	.1	138.34
.2	28.73	.2	58.46	.2	85.37	.2	111.15	.2	138.92
.3	29.37	.3	59.03	.3	85.89	.3	111.68	.3	139.50
.4	30.01	.4	59.60	.4	86.41	.4	112.21	.4	140.09
.5	30.64	.5	60.17	.5	86.93	.5	112.75	.5	140.68
.6	31.27	.6	60.73	.6	87.45	.6	113.29	.6	141.27
.7	31.90	.7	61.29	.7	87.97	.7	113.83	.7	141.86
.8	32.53	.8	61.85	.8	88.49	.8	114.37	.8	142.45
.9	33.16	.9	62.41	.9	89.00	.9	114.91	.9	143.04
5.0	33.78	10.0	62.96	15.0	89.50	20.0	115.45	25.0	143.53

TABLE 1.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Weight at 20° C.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
25.0	143.63	30.0	175.93	35.0	213.09	40.0	254.74	45.0	300.41
.1	144.22	.1	176.63	.1	213.88	.1	255.62	.1	301.85
.2	144.82	.2	177.33	.2	214.67	.2	256.50	.2	302.29
.3	145.42	.3	178.03	.3	215.46	.3	257.38	.3	302.73
.4	146.02	.4	178.73	.4	216.26	.4	258.26	.4	303.23
.5	146.62	.5	179.43	.5	217.06	.5	259.14	.5	304.17
.6	147.23	.6	180.13	.6	217.86	.6	260.02	.6	305.12
.7	147.84	.7	180.84	.7	218.66	.7	260.90	.7	305.07
.8	148.45	.8	181.55	.8	219.46	.8	261.79	.8	307.02
.9	149.06	.9	182.26	.9	220.26	.9	262.68	.9	307.97
26.0	149.67	31.0	182.97	36.0	221.06	41.0	263.57	46.0	309.88
.1	150.28	.1	183.68	.1	221.86	.1	264.46	.1	310.84
.2	150.90	.2	184.40	.2	222.67	.2	265.35	.2	311.80
.3	151.52	.3	185.12	.3	223.48	.3	266.24	.3	312.76
.4	152.14	.4	185.85	.4	224.29	.4	267.14	.4	313.72
.5	152.77	.5	186.58	.5	225.10	.5	268.04	.5	314.68
.6	153.40	.6	187.31	.6	225.91	.6	268.94	.6	315.64
.7	154.03	.7	188.04	.7	226.73	.7	269.84	.7	316.60
.8	154.66	.8	188.77	.8	227.55	.8	270.74	.8	317.56
.9	155.29	.9	189.51	.9	228.37	.9	271.64	.9	318.52
27.0	155.93	32.0	190.25	37.0	229.19	42.0	272.55	47.0	319.49
.1	156.57	.1	190.99	.1	230.01	.1	273.46	.1	320.46
.2	157.21	.2	191.73	.2	230.84	.2	274.37	.2	321.43
.3	157.85	.3	192.47	.3	231.67	.3	275.28	.3	322.40
.4	158.49	.4	193.21	.4	232.50	.4	276.19	.4	323.37
.5	159.14	.5	193.95	.5	233.34	.5	277.11	.5	324.34
.6	159.79	.6	194.69	.6	234.18	.6	278.03	.6	325.31
.7	160.44	.7	195.44	.7	235.02	.7	278.95	.7	326.28
.8	161.09	.8	196.19	.8	235.86	.8	279.87	.8	327.25
.9	161.74	.9	196.94	.9	236.70	.9	280.79	.9	328.22
28.0	162.40	33.0	197.69	38.0	237.54	43.0	281.71	48.0	329.19
.1	163.06	.1	198.45	.1	238.38	.1	282.63	.1	330.16
.2	163.72	.2	199.21	.2	239.23	.2	283.55	.2	331.14
.3	164.38	.3	199.97	.3	240.08	.3	284.48	.3	332.12
.4	165.04	.4	200.73	.4	240.93	.4	285.41	.4	333.10
.5	165.70	.5	201.49	.5	241.78	.5	286.34	.5	334.09
.6	166.37	.6	202.25	.6	242.63	.6	287.27	.6	335.08
.7	167.04	.7	203.01	.7	243.49	.7	288.20	.7	336.07
.8	167.71	.8	203.77	.8	244.35	.8	289.13	.8	337.06
.9	168.38	.9	204.53	.9	245.21	.9	290.07	.9	338.05
29.0	169.06	34.0	205.30	39.0	246.07	44.0	291.01	49.0	339.04
.1	169.74	.1	206.07	.1	246.93	.1	291.95	.1	340.03
.2	170.42	.2	206.84	.2	247.79	.2	292.89	.2	341.02
.3	171.10	.3	207.61	.3	248.65	.3	293.83	.3	342.01
.4	171.78	.4	208.38	.4	249.51	.4	294.77	.4	343.00
.5	172.47	.5	209.16	.5	250.38	.5	295.71	.5	343.99
.6	173.16	.6	209.94	.6	251.25	.6	296.65	.6	344.98
.7	173.85	.7	210.72	.7	252.12	.7	297.59	.7	345.97
.8	174.54	.8	211.51	.8	252.99	.8	298.53	.8	346.96
.9	175.23	.9	212.30	.9	253.86	.9	299.47	.9	347.96
30.0	175.93	35.0	213.09	40.0	254.74	45.0	300.41	50.0	348.96

TABLE 1.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Weight at 20° C.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
50.0	348.96	55.0	400.41	60.0	454.11	65.0	510.19	70.0	568.65
.1	349.96	.1	401.46	.1	455.21	.1	511.34	.1	569.85
.2	350.96	.2	402.52	.2	456.31	.2	512.49	.2	571.05
.3	351.96	.3	403.58	.3	457.41	.3	513.64	.3	572.25
.4	352.96	.4	404.64	.4	458.51	.4	514.79	.4	573.45
.5	353.97	.5	405.70	.5	459.61	.5	515.94	.5	574.65
.6	354.98	.6	406.76	.6	460.71	.6	517.09	.6	575.85
.7	355.99	.7	407.82	.7	461.82	.7	518.24	.7	577.05
.8	357.01	.8	408.88	.8	462.93	.8	519.39	.8	578.25
.9	358.03	.9	409.94	.9	464.04	.9	520.54	.9	579.46
51.0	359.05	56.0	411.00	61.0	465.15	66.0	521.70	71.0	580.67
.1	360.07	.1	412.06	.1	466.26	.1	522.86	.1	581.88
.2	361.09	.2	413.12	.2	467.37	.2	524.02	.2	583.09
.3	362.11	.3	414.18	.3	468.48	.3	525.18	.3	584.30
.4	363.13	.4	415.24	.4	469.59	.4	526.34	.4	585.51
.5	364.15	.5	416.31	.5	470.70	.5	527.50	.5	586.72
.6	365.17	.6	417.38	.6	471.81	.6	528.66	.6	587.93
.7	366.19	.7	418.45	.7	472.92	.7	529.82	.7	589.14
.8	367.22	.8	419.52	.8	474.03	.8	530.98	.8	590.35
.9	368.25	.9	420.59	.9	475.14	.9	532.14	.9	591.56
52.0	369.28	57.0	421.66	62.0	476.25	67.0	533.30	72.0	592.77
.1	370.31	.1	422.73	.1	477.37	.1	534.46	.1	593.99
.2	371.34	.2	423.80	.2	478.49	.2	535.62	.2	595.21
.3	372.37	.3	424.87	.3	479.61	.3	536.79	.3	596.43
.4	373.40	.4	425.94	.4	480.73	.4	537.96	.4	597.65
.5	374.43	.5	427.01	.5	481.85	.5	539.13	.5	598.87
.6	375.46	.6	428.08	.6	482.97	.6	540.30	.6	600.09
.7	376.49	.7	429.15	.7	484.09	.7	541.47	.7	601.31
.8	377.52	.8	430.22	.8	485.21	.8	542.64	.8	602.53
.9	378.55	.9	431.29	.9	486.33	.9	543.81	.9	603.75
53.0	379.58	58.0	432.37	63.0	487.46	68.0	544.98	73.0	604.98
.1	380.61	.1	433.45	.1	488.59	.1	546.15	.1	606.21
.2	381.64	.2	434.53	.2	489.72	.2	547.32	.2	607.44
.3	382.67	.3	435.61	.3	490.85	.3	548.49	.3	608.67
.4	383.70	.4	436.69	.4	491.98	.4	549.66	.4	609.90
.5	384.73	.5	437.77	.5	493.11	.5	550.84	.5	611.13
.6	385.76	.6	438.85	.6	494.24	.6	552.02	.6	612.36
.7	386.80	.7	439.93	.7	495.37	.7	553.20	.7	613.59
.8	387.84	.8	441.02	.8	496.50	.8	554.38	.8	614.82
.9	388.88	.9	442.11	.9	497.64	.9	555.56	.9	616.05
54.0	389.92	59.0	443.20	64.0	498.78	59.0	556.74	74.0	617.29
.1	390.96	.1	444.29	.1	499.92	.1	557.92	.1	618.53
.2	392.01	.2	445.38	.2	501.06	.2	559.10	.2	619.77
.3	393.06	.3	446.47	.3	502.20	.3	560.29	.3	621.01
.4	394.11	.4	447.56	.4	503.34	.4	561.48	.4	622.25
.5	395.16	.5	448.65	.5	504.48	.5	562.67	.5	623.49
.6	396.21	.6	449.74	.6	505.62	.6	563.86	.6	624.73
.7	397.26	.7	450.83	.7	506.76	.7	565.05	.7	625.98
.8	398.31	.8	451.92	.8	507.90	.8	566.25	.8	627.23
.9	399.36	.9	453.01	.9	509.04	.9	567.45	.9	628.48
55.0	400.41	60.0	454.11	65.0	510.19	70.0	568.65	75.0	629.73

TABLE 1.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Weight at 20° C.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
75.0	629.73	80.0	693.50	85.0	760.69	90.0	832.76	95.0	911.46
.1	630.98	.1	694.81	.1	762.08	.1	834.26	.1	913.12
.2	632.23	.2	696.12	.2	763.47	.2	835.76	.2	914.78
.3	633.48	.3	697.43	.3	764.86	.3	837.27	.3	916.44
.4	634.73	.4	698.74	.4	766.25	.4	838.78	.4	918.11
.5	635.98	.5	700.06	.5	767.65	.5	840.29	.5	919.79
.6	637.23	.6	701.38	.6	769.05	.6	841.80	.6	921.47
.7	638.48	.7	702.70	.7	770.45	.7	843.32	.7	923.16
.8	639.73	.8	704.02	.8	771.85	.8	844.84	.8	924.85
.9	640.98	.9	705.34	.9	773.25	.9	846.37	.9	926.54
76.0	642.23	81.0	706.66	86.0	774.66	91.0	847.90	96.0	928.24
.1	643.48	.1	707.98	.1	776.07	.1	849.43	.1	929.94
.2	644.73	.2	709.30	.2	777.48	.2	850.96	.2	931.64
.3	645.99	.3	710.62	.3	778.89	.3	852.50	.3	933.35
.4	647.25	.4	711.95	.4	780.30	.4	854.04	.4	935.06
.5	648.51	.5	713.28	.5	781.72	.5	855.58	.5	936.78
.6	649.77	.6	714.61	.6	783.14	.6	857.12	.6	938.50
.7	651.03	.7	715.94	.7	784.56	.7	858.67	.7	940.22
.8	652.29	.8	717.27	.8	785.98	.8	860.22	.8	941.95
.9	653.55	.9	718.60	.9	787.40	.9	861.77	.9	943.68
77.0	654.81	82.0	719.94	87.0	788.83	92.0	863.33	97.0	945.42
.1	656.08	.1	721.23	.1	790.26	.1	864.89	.1	947.17
.2	657.35	.2	722.62	.2	791.70	.2	866.46	.2	948.92
.3	658.62	.3	723.96	.3	793.14	.3	868.03	.3	950.68
.4	659.90	.4	725.30	.4	794.58	.4	869.61	.4	952.44
.5	661.18	.5	726.64	.5	796.02	.5	871.19	.5	954.21
.6	662.46	.6	727.98	.6	797.46	.6	872.77	.6	955.98
.7	663.74	.7	729.32	.7	798.91	.7	874.35	.7	957.76
.8	665.02	.8	730.66	.8	800.36	.8	875.93	.8	959.55
.9	666.30	.9	732.00	.9	801.81	.9	877.52	.9	961.34
78.0	667.58	83.0	733.35	88.0	803.26	93.0	879.11	98.0	963.14
.1	668.86	.1	734.70	.1	804.71	.1	880.70	.1	964.94
.2	670.14	.2	736.05	.2	806.16	.2	882.29	.2	966.75
.3	671.43	.3	737.40	.3	807.61	.3	883.88	.3	968.56
.4	672.72	.4	738.76	.4	809.07	.4	885.48	.4	970.38
.5	674.01	.5	740.12	.5	810.53	.5	887.08	.5	972.20
.6	675.30	.6	741.48	.6	811.99	.6	888.68	.6	974.02
.7	676.59	.7	742.84	.7	813.45	.7	890.29	.7	975.85
.8	677.88	.8	744.20	.8	814.92	.8	891.90	.8	977.58
.9	679.17	.9	745.56	.9	816.39	.9	893.51	.9	979.51
79.0	680.47	84.0	746.92	89.0	817.86	94.0	895.12	99.0	981.35
.1	681.77	.1	748.29	.1	819.34	.1	896.74	.1	983.19
.2	683.07	.2	749.66	.2	820.82	.2	898.36	.2	985.03
.3	684.37	.3	751.03	.3	822.30	.3	899.98	.3	986.88
.4	685.67	.4	752.40	.4	823.79	.4	901.61	.4	988.74
.5	686.97	.5	753.78	.5	825.28	.5	903.24	.5	990.60
.6	688.27	.6	755.16	.6	826.77	.6	904.88	.6	992.47
.7	689.57	.7	756.54	.7	828.26	.7	906.52	.7	994.35
.8	690.88	.8	757.92	.8	829.75	.8	908.16	.8	996.23
.9	692.19	.9	759.30	.9	831.26	.9	909.81	.9	998.11
80.0	693.50	85.0	760.69	90.0	832.76	95.0	911.45	100.0	1,000.00

TABLE 2.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Volume at 60° F

[Total length of scale 1000 mm]

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
0.0	0.00	5.0	27.84	10.0	52.30	15.0	74.47	20.0	94.90
.1	0.58	.1	28.37	.1	52.76	.1	74.89	.1	95.30
.2	1.16	.2	28.90	.2	53.22	.2	75.31	.2	95.70
.3	1.73	.3	29.43	.3	53.68	.3	75.73	.3	96.10
.4	2.31	.4	29.96	.4	54.14	.4	76.15	.4	96.50
.5	2.89	.5	30.48	.5	54.60	.5	76.57	.5	96.90
.6	3.47	.6	31.00	.6	55.06	.6	76.99	.6	97.30
.7	4.04	.7	31.51	.7	55.52	.7	77.41	.7	97.70
.8	4.62	.8	32.02	.8	55.98	.8	77.83	.8	98.11
.9	5.20	.9	32.53	.9	56.44	.9	78.25	.9	98.51
1.0	5.78	6.0	33.04	11.0	56.90	16.0	78.67	21.0	98.92
.1	6.36	.1	33.55	.1	57.36	.1	79.09	.1	99.33
.2	6.93	.2	34.05	.2	57.82	.2	79.51	.2	99.74
.3	7.50	.3	34.55	.3	58.28	.3	79.93	.3	100.15
.4	8.07	.4	35.05	.4	58.74	.4	80.35	.4	100.56
.5	8.64	.5	35.55	.5	59.20	.5	80.77	.5	100.97
.6	9.21	.6	36.05	.6	59.65	.6	81.19	.6	101.38
.7	9.78	.7	36.55	.7	60.10	.7	81.60	.7	101.79
.8	10.35	.8	37.05	.8	60.55	.8	82.01	.8	102.20
.9	10.92	.9	37.55	.9	61.00	.9	82.42	.9	102.61
2.0	11.49	7.0	38.05	12.0	61.45	17.0	82.83	22.0	103.02
.1	12.05	.1	38.54	.1	61.90	.1	83.24	.1	103.43
.2	12.61	.2	39.03	.2	62.35	.2	83.65	.2	103.84
.3	13.17	.3	39.52	.3	62.79	.3	84.06	.3	104.25
.4	13.73	.4	40.01	.4	63.23	.4	84.47	.4	104.66
.5	14.29	.5	40.50	.5	63.67	.5	84.88	.5	105.08
.6	14.85	.6	40.98	.6	64.11	.6	85.28	.6	105.50
.7	15.41	.7	41.46	.7	64.55	.7	85.69	.7	105.92
.8	15.97	.8	41.94	.8	64.99	.8	86.09	.8	106.34
.9	16.52	.9	42.42	.9	65.43	.9	86.49	.9	106.76
3.0	17.07	8.0	42.89	13.0	65.87	18.0	86.89	23.0	107.18
.1	17.62	.1	43.36	.1	66.31	.1	87.29	.1	107.60
.2	18.17	.2	43.83	.2	66.74	.2	87.69	.2	108.02
.3	18.72	.3	44.30	.3	67.17	.3	88.09	.3	108.44
.4	19.27	.4	44.77	.4	67.60	.4	88.50	.4	108.86
.5	19.82	.5	45.24	.5	68.03	.5	88.90	.5	109.28
.6	20.37	.6	45.72	.6	68.46	.6	89.30	.6	109.70
.7	20.91	.7	46.20	.7	68.89	.7	89.70	.7	110.12
.8	21.45	.8	46.67	.8	69.32	.8	90.10	.8	110.54
.9	21.99	.9	47.14	.9	69.75	.9	90.50	.9	110.96
4.0	22.53	9.0	47.61	14.0	70.18	19.0	90.90	24.0	111.38
.1	23.07	.1	48.08	.1	70.61	.1	91.30	.1	111.81
.2	23.60	.2	48.55	.2	71.04	.2	91.70	.2	112.24
.3	24.13	.3	49.02	.3	71.47	.3	92.10	.3	112.67
.4	24.66	.4	49.49	.4	71.90	.4	92.50	.4	113.10
.5	25.19	.5	49.96	.5	72.33	.5	92.90	.5	113.53
.6	25.72	.6	50.43	.6	72.76	.6	93.30	.6	113.96
.7	26.25	.7	50.90	.7	73.19	.7	93.70	.7	114.39
.8	26.78	.8	51.37	.8	73.62	.8	94.10	.8	114.82
.9	27.31	.9	51.84	.9	74.05	.9	94.50	.9	115.25
5.0	27.84	10.0	52.30	15.0	74.47	20.0	94.90	25.0	115.68

TABLE 2.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Volume at 60° F.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
25.0	115.68	30.0	138.27	35.0	164.35	40.0	195.12	45.0	230.59
.1	116.11	.1	138.75	.1	164.92	.1	195.79	.1	231.35
.2	116.54	.2	139.23	.2	165.49	.2	196.46	.2	232.11
.3	116.97	.3	139.71	.3	166.06	.3	197.13	.3	232.87
.4	117.40	.4	140.20	.4	166.63	.4	197.80	.4	233.63
.5	117.83	.5	140.69	.5	167.20	.5	198.47	.5	234.39
.6	118.27	.6	141.18	.6	167.78	.6	199.14	.6	235.16
.7	118.71	.7	141.67	.7	168.36	.7	199.82	.7	235.93
.8	119.15	.8	142.16	.8	168.94	.8	200.50	.8	236.71
.9	119.59	.9	142.65	.9	169.53	.9	201.18	.9	237.49
26.0	120.03	31.0	143.14	36.0	170.12	41.0	201.86	46.0	238.28
.1	120.47	.1	143.63	.1	170.71	.1	202.55	.1	239.06
.2	120.91	.2	144.12	.2	171.30	.2	203.24	.2	239.84
.3	121.35	.3	144.61	.3	171.89	.3	203.93	.3	240.62
.4	121.79	.4	145.10	.4	172.48	.4	204.62	.4	241.40
.5	122.23	.5	145.59	.5	173.08	.5	205.31	.5	242.18
.6	122.67	.6	146.09	.6	173.68	.6	206.00	.6	242.97
.7	123.12	.7	146.59	.7	174.28	.7	206.70	.7	243.76
.8	123.57	.8	147.11	.8	174.88	.8	207.40	.8	244.55
.9	124.02	.9	147.63	.9	175.48	.9	208.10	.9	245.34
27.0	124.47	32.0	148.15	37.0	176.08	42.0	208.80	47.0	246.14
.1	124.92	.1	148.67	.1	176.69	.1	209.50	.1	246.94
.2	125.37	.2	149.19	.2	177.30	.2	210.20	.2	247.74
.3	125.82	.3	149.71	.3	177.91	.3	210.90	.3	248.54
.4	126.27	.4	150.23	.4	178.52	.4	211.60	.4	249.35
.5	126.72	.5	150.75	.5	179.13	.5	212.31	.5	250.16
.6	127.17	.6	151.27	.6	179.75	.6	213.02	.6	250.97
.7	127.62	.7	151.79	.7	180.37	.7	213.73	.7	251.79
.8	128.07	.8	152.31	.8	180.99	.8	214.44	.8	252.61
.9	128.52	.9	152.84	.9	181.62	.9	215.15	.9	253.43
28.0	128.98	33.0	153.37	38.0	182.25	43.0	215.87	48.0	254.25
.1	129.44	.1	153.90	.1	182.88	.1	216.59	.1	255.07
.2	129.90	.2	154.43	.2	183.51	.2	217.31	.2	255.89
.3	130.36	.3	154.96	.3	184.14	.3	218.03	.3	256.71
.4	130.82	.4	155.50	.4	184.77	.4	218.75	.4	257.53
.5	131.28	.5	156.04	.5	185.40	.5	219.48	.5	258.36
.6	131.74	.6	156.58	.6	186.03	.6	220.21	.6	259.19
.7	132.20	.7	157.12	.7	186.67	.7	220.94	.7	260.02
.8	132.66	.8	157.66	.8	187.31	.8	221.67	.8	260.85
.9	133.12	.9	158.21	.9	187.95	.9	222.40	.9	261.69
29.0	133.58	34.0	158.76	39.0	188.59	44.0	223.14	49.0	262.53
.1	134.04	.1	159.31	.1	189.23	.1	223.88	.1	263.37
.2	134.51	.2	159.86	.2	189.88	.2	224.62	.2	264.21
.3	134.98	.3	160.42	.3	190.53	.3	225.36	.3	265.05
.4	135.45	.4	160.98	.4	191.18	.4	226.10	.4	265.89
.5	135.92	.5	161.54	.5	191.83	.5	226.84	.5	266.74
.6	136.39	.6	162.10	.6	192.48	.6	227.59	.6	267.59
.7	136.86	.7	162.66	.7	193.13	.7	228.34	.7	268.44
.8	137.33	.8	163.22	.8	193.79	.8	229.09	.8	269.30
.9	137.80	.9	163.78	.9	194.45	.9	229.84	.9	270.16
30.0	138.27	35.0	164.35	40.0	195.12	45.0	230.59	50.0	271.02

TABLE 2.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Volume at 60° F.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
50.0	271.02	55.0	315.94	60.0	365.01	65.0	418.40	70.0	476.10
.1	271.88	.1	316.88	.1	366.04	.1	419.50	.1	477.31
.2	272.74	.2	317.82	.2	367.07	.2	420.60	.2	478.52
.3	273.60	.3	318.76	.3	368.10	.3	421.71	.3	479.73
.4	274.47	.4	319.70	.4	369.13	.4	422.82	.4	480.94
.5	275.34	.5	320.65	.5	370.16	.5	423.93	.5	482.15
.6	276.21	.6	321.60	.6	371.20	.6	425.05	.6	483.36
.7	277.08	.7	322.55	.7	372.24	.7	426.17	.7	484.57
.8	277.95	.8	323.50	.8	373.28	.8	427.29	.8	485.78
.9	278.82	.9	324.45	.9	374.32	.9	428.41	.9	487.00
51.0	279.70	56.0	325.40	61.0	375.36	66.0	429.54	71.0	488.22
.1	280.58	.1	326.35	.1	376.40	.1	430.67	.1	489.45
.2	281.46	.2	327.31	.2	377.44	.2	431.80	.2	490.68
.3	282.34	.3	328.27	.3	378.49	.3	432.93	.3	491.91
.4	283.22	.4	329.23	.4	379.54	.4	434.06	.4	493.14
.5	284.10	.5	330.19	.5	380.60	.5	435.19	.5	494.37
.6	284.98	.6	331.15	.6	381.66	.6	436.32	.6	495.60
.7	285.87	.7	332.11	.7	382.72	.7	437.46	.7	496.84
.8	286.76	.8	333.07	.8	383.78	.8	438.60	.8	498.08
.9	287.65	.9	334.03	.9	384.84	.9	439.75	.9	499.32
52.0	288.54	57.0	334.99	62.0	385.91	67.0	440.90	72.0	500.56
.1	289.43	.1	335.95	.1	386.98	.1	442.05	.1	501.80
.2	290.32	.2	336.92	.2	388.05	.2	443.20	.2	503.05
.3	291.21	.3	337.89	.3	389.12	.3	444.35	.3	504.30
.4	292.10	.4	338.87	.4	390.19	.4	445.50	.4	505.56
.5	292.99	.5	339.85	.5	391.26	.5	446.65	.5	506.82
.6	293.89	.6	340.83	.6	392.33	.6	447.80	.6	508.08
.7	294.79	.7	341.81	.7	393.40	.7	448.95	.7	509.34
.8	295.69	.8	342.79	.8	394.47	.8	450.11	.8	510.60
.9	296.59	.9	343.78	.9	395.55	.9	451.26	.9	511.86
53.0	297.50	58.0	344.78	63.0	396.63	68.0	452.42	73.0	513.13
.1	298.41	.1	345.78	.1	397.71	.1	453.58	.1	514.40
.2	299.32	.2	346.78	.2	398.79	.2	454.74	.2	515.67
.3	300.23	.3	347.78	.3	399.87	.3	455.91	.3	516.94
.4	301.14	.4	348.78	.4	400.95	.4	457.08	.4	518.21
.5	302.05	.5	349.78	.5	402.03	.5	458.25	.5	519.48
.6	302.96	.6	350.78	.6	403.11	.6	459.43	.6	520.76
.7	303.87	.7	351.78	.7	404.19	.7	460.61	.7	522.04
.8	304.78	.8	352.78	.8	405.27	.8	461.79	.8	523.32
.9	305.70	.9	353.79	.9	406.36	.9	462.98	.9	524.60
54.0	306.62	59.0	354.80	64.0	407.45	69.0	464.17	74.0	525.89
.1	307.55	.1	355.81	.1	408.54	.1	465.36	.1	527.18
.2	308.48	.2	356.82	.2	409.63	.2	466.55	.2	528.47
.3	309.41	.3	357.84	.3	410.72	.3	467.74	.3	529.76
.4	310.34	.4	358.86	.4	411.81	.4	468.93	.4	531.05
.5	311.27	.5	359.88	.5	412.90	.5	470.12	.5	532.34
.6	312.20	.6	360.90	.6	414.00	.6	471.31	.6	533.63
.7	313.13	.7	361.92	.7	415.10	.7	472.50	.7	534.92
.8	314.06	.8	362.95	.8	416.20	.8	473.70	.8	536.21
.9	315.00	.9	363.98	.9	417.30	.9	474.90	.9	537.51
55.0	315.94	60.0	365.01	65.0	418.40	70.0	476.10	75.0	538.81



TABLE 2.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Volume at 60° F.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
75.0	538.81	80.0	607.33	85.0	682.71	90.0	767.67	95.0	868.34
.1	540.12	.1	608.77	.1	684.31	.1	769.50	.1	870.60
.2	541.43	.2	610.21	.2	685.91	.2	771.33	.2	872.87
.3	542.74	.3	611.65	.3	687.52	.3	773.16	.3	875.15
.4	544.05	.4	613.09	.4	689.13	.4	774.99	.4	877.44
.5	545.37	.5	614.53	.5	690.74	.5	776.83	.5	879.74
.6	546.69	.6	615.97	.6	692.36	.6	778.68	.6	882.05
.7	548.01	.7	617.42	.7	693.98	.7	780.54	.7	884.37
.8	549.33	.8	618.87	.8	695.60	.8	782.41	.8	886.71
.9	550.66	.9	620.33	.9	697.23	.9	784.29	.9	889.06
76.0	552.00	81.0	621.79	86.0	698.86	91.0	786.18	96.0	891.43
.1	553.34	.1	623.26	.1	700.50	.1	788.08	.1	893.82
.2	554.68	.2	624.73	.2	702.14	.2	789.98	.2	896.22
.3	556.02	.3	626.20	.3	703.79	.3	791.88	.3	898.62
.4	557.36	.4	627.67	.4	705.44	.4	793.78	.4	901.03
.5	558.70	.5	629.14	.5	707.10	.5	795.69	.5	903.45
.6	560.05	.6	630.62	.6	708.76	.6	797.62	.6	905.89
.7	561.40	.7	632.10	.7	710.42	.7	799.57	.7	908.34
.8	562.75	.8	633.58	.8	712.08	.8	801.52	.8	910.80
.9	564.10	.9	635.07	.9	713.74	.9	803.49	.9	913.27
77.0	565.45	82.0	636.56	87.0	715.41	92.0	805.46	97.0	915.75
.1	566.81	.1	638.05	.1	717.08	.1	807.44	.1	918.25
.2	568.17	.2	639.54	.2	718.75	.2	809.42	.2	920.77
.3	569.53	.3	641.03	.3	720.43	.3	811.40	.3	923.31
.4	570.89	.4	642.53	.4	722.11	.4	813.39	.4	925.88
.5	572.25	.5	644.03	.5	723.80	.5	815.38	.5	928.46
.6	573.62	.6	645.54	.6	725.50	.6	817.38	.6	931.05
.7	574.99	.7	647.05	.7	727.20	.7	819.40	.7	933.66
.8	576.37	.8	648.57	.8	728.90	.8	821.42	.8	936.28
.9	577.75	.9	650.09	.9	730.60	.9	823.45	.9	938.93
78.0	579.13	83.0	651.61	88.0	732.31	93.0	825.49	98.0	941.61
.1	580.52	.1	653.13	.1	734.02	.1	827.54	.1	944.33
.2	581.92	.2	654.65	.2	735.74	.2	829.60	.2	947.06
.3	583.32	.3	656.18	.3	737.46	.3	831.67	.3	949.80
.4	584.72	.4	657.71	.4	739.19	.4	833.74	.4	952.56
.5	586.12	.5	659.24	.5	740.93	.5	835.82	.5	955.35
.6	587.52	.6	660.77	.6	742.68	.6	837.90	.6	958.16
.7	588.92	.7	662.31	.7	744.43	.7	840.00	.7	961.00
.8	590.32	.8	663.85	.8	746.19	.8	842.12	.8	963.86
.9	591.72	.9	665.40	.9	747.95	.9	844.25	.9	966.74
79.0	593.12	84.0	666.96	89.0	749.72	94.0	846.40	99.0	969.64
.1	594.53	.1	668.52	.1	751.49	.1	848.56	.1	972.56
.2	595.94	.2	670.08	.2	753.27	.2	850.73	.2	975.52
.3	597.35	.3	671.64	.3	755.05	.3	852.90	.3	978.50
.4	598.77	.4	673.21	.4	756.84	.4	855.08	.4	981.50
.5	600.19	.5	674.79	.5	758.64	.5	857.26	.5	984.52
.6	601.61	.6	676.37	.6	760.45	.6	859.46	.6	987.55
.7	603.04	.7	677.95	.7	762.25	.7	861.67	.7	990.61
.8	604.47	.8	679.53	.8	764.05	.8	863.88	.8	993.71
.9	605.90	.9	681.12	.9	765.86	.9	866.10	.9	996.84
80.0	607.33	85.0	692.71	90.0	767.67	95.0	868.34	100.0	1,000.00

