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Recommended Practice

Manometer Tables

ISA-RP2.1 — Manometer Tables

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FOREWORD

This Recommended Practice has been prepared as a part of the service of ISA toward a goal of uniformity in the field of instrumentation. To be of real value this report should not be static, but should be subjected to periodic review. Toward this end the Society welcomes all comments and criticisms, and asks that they be addressed to the Standards and Practices Board Secretary, ISA, 67 Alexander Drive, P.O. Box 12277, Research Triangle Park, North Carolina 27709, e-mail: standards@isa.org.

This report was prepared and revised by the 8D-RP2 Committee of the Production Processes Standards Division on Manometer Tables, chaired by W. G. Brombacher, Consultant, National Bureau of Standards, Washington, D.C.

The assistance of those who aided in the preparation of this Recommended Practice by answering questionnaires, offering suggestions, and in other ways is gratefully acknowledged.

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This Revision, under the direction of W. G. Brombacher, 8D-RP2 Committee Chairman, has been prepared to include changes by the National Bureau of Standards since the date of last publication (1952).

Contents

1 Scope

1.1 This report presents abbreviations and fundamental conversion factors commonly used in manometry, recommended definitions of pressure in terms of a column of mercury and water, and for a large number of liquids, tables of pressures indicated by, or equivalent to, heights of columns at various temperatures. These data have the object of facilitating and standardizing the use of manometers and U-tubes as direct pressure indicating instruments or in the calibration of pressure recorders and controllers.

1.2 A discussion is included of the more frequent or more important sources of error in manometric measurements, together with correction tables for mercury and water columns. To conform to general practice in this country, English units of measurements are largely used (i.e., pounds, inches, etc.) and with several exceptions, decimals are used to denote parts of units, rather than octonary fractions.

1.3 In particular, it will be seen that conversion factors for kerosine, gage oil, alcohol, dibromobenzene, dibromoethane, and acetylene tetrabromide are given only to obtain equivalent water columns at 60°F. Further, no conversion data are presented for benzol, butyl collosolve, carbitol, *n*butyl phthalate, or halowax oil. The filling in of these omissions will have to await demonstrated need.

2 Manometer tables

2.1 Discussion of standards of manometers

For a more complete discussion on mercury manometers, see "Mercury barometers and manometers," Nat. Bur. of Standards Monograph No. 8, 1960.

Standards. The pressure in terms of height of a column of liquid is given by the fundamental relation

$$P = Dhg \qquad (1)$$

where P is the pressure in absolute units, as dynes/sq cm or poundals/sq in.

D is the density of the liquid in grams/cu cm or lb/cu in.

h is the height of the column from horizontal surface to horizontal surface of the menisci in cm or in.

g is the acceleration of gravity in cm/sec^2 or in./sec^2

P/g is the pressure in grams/sq cm or psi

If the height of the column of a liquid is used as a unit of pressure,

$$h = \frac{P}{Dg} \qquad (2)$$

from which it is evident that some value of the density of the liquid and of gravity must be selected as standard for greater convenience, preferably the same by everyone. The standard density will be considered only for water and mercury, and is more conveniently set in terms of the temperature of the liquid, rather than in terms of density.

At its meeting of September 7,1947, the Recommended Practices Committee approved as a recommended practice the following standards:

a) Standard conditions for a mercury column used as unit of pressure:

Gravity: 980.665 cm/sec^2 = 32.1740 ft/sec^2

Temperature: 0°C (32°F)

760 mm of mercury (= 29.9213 in. of mercury)

= a pressure of one atmosphere

b) Standard conditions for a water column used as a unit of pressure:

Gravity: 980.665 cm/sec^2 = 32.1740 ft/sec^2

Temperature: 20°C (68°F)

407.513 in. of water (= 1035.08 cm of water)

= a pressure of one atmosphere

The value of standard gravity given above is an international standard accepted in engineering and physics and therefore is applicable for all columns of all liquids in addition to water and mercury if used as a pressure unit. It should be noted that meteorologists in 1953 adopted internationally this value, previously having used the value 980.62 cm/sec^2.

The pressure of one atmosphere internationally defined for fixed points on the International Temperature scale is 1013.250 millibars. This value has been rather universally accepted. This pressure is equivalent to that exerted by a column of mercury 760 mm high, having a density of 13.5951 grams/cm^3 and subjected to a gravitational acceleration of 980.665 cm/sec^2. A mm or cm or inch of mercury of differential or absolute pressure is defined as a submultiple of the atmosphere above defined. However, at high pressures correction for compressibility may have to be applied.

For convenience, mercury manometers are often calibrated to indicate the height of the mercury column in terms of mercury at 0°C when the manometer is at another temperature.

The definition of a unit height of a water column at 20°C as a unit of pressure is a recommended practice, made in an effort to eventually obtain national standardization. It is obviously worth while to standardize on a single pressure unit, but it is realized that changes from other units now used may cause serious inconvenience. Use of the proposed unit is advocated in fields where no standard has been defined. Three manometer temperatures, 15°C (59°F), 60°F (15.56°C), and 20°C (68°F), are now used on a national scale to define the unit of pressure as the height of a water column. In aeronautics, 15°C is used; The American Gas Association, and perhaps other societies, uses 60°F; and in orifice flowmeter work, 20°C is commonly used. The temperature used to define the pressure does not affect other conditions desired as standard, as for example, volume of gas flow measured in terms of the gas at 60°F and 29.92 inches of mercury. Some have suggested the maximum density of water (3.98°C) as the unit. This temperature is far from normal laboratory temperatures and will require the application of temperature corrections in many cases where none would be necessary with 20°C as the standard. The proposal is attractive, however.

It is intended that the definition apply to distilled water, free from absorbed gases. It is easier to eliminate absorbed gases than to determine the amount present. In mercury, absorbed gases

give no trouble. Lack of purity fouls the mercury meniscus long before there is a significant change in density.

No action on standards for liquids other than water and mercury was taken, since these other liquids are not often used as standards of pressure.

3 Errors of liquid column manometers

3.1 The errors in the indications of manometers are: (a) scale errors, (b) temperature errors, (c) gravity errors, (d) capillary errors, (e) compressibility, and (f) effect of absorbed gases. Of these, corrections are ordinarily applied only for the scale, temperature, and gravity errors. The other errors are corrected for only precise work or under special conditions of use.

3.2 Scale errors. After a manometer reading has been corrected for temperature and gravity error, and for such of the other errors as are warranted, there usually remains a residual error which may be called the scale error. This can be determined only by calibration against a standard instrument. If corrections are made only for the temperature and gravity errors, the scale error will include (a) errors in graduating the scale, and (b) the effect of capillarity, and perhaps of compressibility and of absorbed gases. Under (a) will be included to a high degree of accuracy the error introduced when the scale is graduated true at one temperature and is assumed correct at another temperature. Further, when the effects under (b) are included under the scale error, only the variation in these effects need to be accounted for.

In general, the procedure of calibrating manometers is such that correction for scale error should be applied first in applying corrections to a manometer reading.

3.3 Temperature Errors. Since the densities of liquids vary with temperature, any deviation in manometer temperature from that selected as standard for the pressure unit will introduce an error in the manometer indication. Further, since the scale expands or contracts with changes in its temperature, an additional error is introduced. An expansion of the scale reduces the reading of the manometer held at constant pressure and conversely an expansion of the liquid increases the reading; the two expansions tend to balance one another, but the effect of the expansion of the liquid is usually much larger.

Temperature corrections are given by the following relations:

$$H_o = H_t + C \tag{3}$$

$$C = \frac{s(t - t_s) - m(t - t_o)}{1 + m(t - t_o)} H_t \tag{4}$$

where
- H_o is the height of the liquid column at the standard temperature
- H_t is the indicated height of the liquid column at temperature t, corrected for scale errors
- C is the temperature correction
- s is the coefficient of linear expansion of the scale
- m is the coefficient of cubical expansion of the liquid
- t is the manometer temperature
- t_s is the temperature at which the scale indicates the true height

t_o is the standard temperature at which the height of the liquid column is in terms of a pressure unit.

When the correction is negative in sign, the correction is subtracted from H_t as indicated by equation (3).

The coefficient of expansion is usually available with reference to 0°C or 32°F, but no significant error is ordinarily introduced by using this value if t_o differs from 0°C. If warranted, the proper value of s can be computed.

Both the cubical and linear thermal expansions of most manometer liquids and scales are hyperbolic in character and therefore in general cannot be accurately represented by the single terms s and m used in equation (4). For the small temperature ranges over which manometers are generally used, the errors introduced are not usually significant. Consideration of this point is essential in very precise measurements.

Exceptions to the above are mercury, for which m requires no modification over the temperature range of interest, and water, for which m varies with temperature considerably and significantly for most measurements at all temperatures ordinarily of interest. Therefore, for water, equation (4) does not apply, and corrections must be applied in two parts, first for the temperature error for the scale { $=s(t-t_s)$} and then for the error for the liquid by a multiplier obtained from Table 12.

If t_o be substituted in equation (4) for the temperature t_s at which the scale is calibrated true and the resulting error be incorporated into the scale correction, considerable simplification in constructing tables is obtained. The error thus introduced is usually not significant. On this basis, equation (4) becomes

$$C = \frac{s(t-t_o) - m(t-t_o)}{1 + m(t-t_o)} H_t = C_o H_t \qquad (5)$$

For cistern manometers where the level of the liquid in the cistern shifts with change in the pressure while the scale remains fixed, equations (4) or (5) do not apply. Usually the temperature correction can be put in the form

$$C_1 = (H_t + h) C_o \qquad (6)$$

where C_1 is the temperature correction, C_o is defined by equation (5), and h is an addition to the indicated column height H_t which in general must be determined by calibration tests at various temperatures of a manometer of any given design.

3.4 Gravity Errors. The effect of variation of gravity from the standard value on manometer indications is as follows:

$$P = \frac{g}{g_s} H_o \qquad (7)$$

$$\text{or } P = H_o + H_o \frac{(g - g_s)}{g_s} = H_o + C \qquad (8)$$

where P is the height of the liquid column subjected to standard gravity. This is the pressure if, as is common practice, no further corrections are applied.
H_o is the indicated height of the liquid column at the standard temperature
C is the correction to be applied to H_o
g is the ambient value of gravity

g_s is the standard value of gravity, 980.665 cm/sec^2

The ambient value of gravity at any location can be obtained as a function of latitude from the Smithsonian Meteorological (or Physical) Tables and more accurate values for many locations from the U. S. Coast & Geodetic Survey, (Washington, D.C.).

In some cases the value of gravity must be obtained from the accepted relation for gravity as a function of latitude. This relation holds only for sea level. To obtain the value of gravity at a station h feet above sea level:

$$g = g_o - 0.000094h \qquad (9)$$

where g is the value of gravity at the station, g_o is the value of gravity at sea level, both in cm/sec^2, and h is the altitude in feet. Equation (9) holds only for free air, but is sufficiently accurate for moderate elevations of terrain above sea level.

3.5 Capillary errors. If a liquid wets the walls of the manometer tube or cistern, the center of the liquid column is elevated above the level which would obtain if the surface were infinite in extent. Conversely if the liquid does not wet the surface, of which mercury is a conspicuous example, the column level is depressed. The amount of the depression tends to vary with the direction of the change in pressure and greatly with local differences in the condition of the surface in contact with the liquid.

Correction for the capillary effect, if made at all, is normally made only for the depression of the mercury in the tube. Part of the table given by Gould and Vickers in the Journal Scientific Instruments 29, 85, 1952, is reproduced, based on a surface tension of mercury of 450 dynes per centimeter.

Depression of mercury column in mm

Bore of tube, mm	Height of meniscus in mm				
	0.6	0.8	1.0	1.5	2.0
6	0.73	0.94	1.12	1.43	--
8	0.37	0.48	0.58	0.78	0.89
10	0.20	0.26	0.32	0.44	0.52
12	0.12	0.15	0.19	0.26	0.31
15	0.05	0.07	0.09	0.12	0.15
20	0.015	0.02	0.024	0.034	0.042

To reduce the variable effects of surface tension, certain practices may be recommended, assuming that the scale correction includes the capillary effect.

a) In the design of the manometer, large bore tubes greatly reduce the change in capillary depression (or elevation) with meniscus height. For mercury manometers the minimum bore should be about 10 mm (0.4 in.); there is little overall advantage in bores exceeding 15 to 20 mm (0.6 to 0.8 in.). The above recommended minimum and maximum bores apply equally well to water manometers and probably also to those with other liquids. Equal size of bore is obviously indicated for U-tube manometers.

b) Cistern manometers should also have the recommended tube bores. The capillary effect in the cistern is minimized by making the area of the cistern large. In mercury manometers of this type especially, it is necessary to tap or vibrate the cistern vigorously in order to reduce scatter in the readings at a constant pressure. It also helps to vibrate the tube, but not to the same degree.

c) The gradual accumulation of corrosion products and dirt at mercury surfaces changes the capillary correction. This change is larger in its effect on the reading the smaller the bore of the tube or of the cistern. Corrosion seems easier to prevent with other liquids.

d) After a pressure change, drainage of liquids which wet the surface of tubes is a source of error, particularly in manometers in which the measured pressure depends upon the indication of one surface level only, as in the case of most cistern manometers. In effect a time lag in reading occurs while drainage takes place. The effect reduces with increase in the bore of the manometer tubes.

e) The addition of a few drops of a wetting agent, such as Aerosol OT100, or Dreen, to the water helps greatly in obtaining a symmetrical meniscus in water manometers. This decreases the difficulty in making readings and also eliminates in large measure the effect of films of foreign material on the glass.

3.6 Compressibility effects. The absolute pressure acting on a liquid compresses it and thereby changes its density. It is of importance for manometers only in the cases where the difference between two high pressures is measured.

The compressibility coefficient C, or change in volume per-unit pressure, is defined as follows:

$$C = \frac{1}{V_o}\frac{dV}{dP} \qquad (10)$$

where V_o is the volume at pressure P or more practically is the volume at the lowest pressure

dV/dP is the rate of change of volume with pressure normally negative since the volume usually decreases with the application of pressure

A few values of the coefficient are given in the table for water, mercury, and ethyl alcohol. The pressures are absolute values. The values for water were obtained from "Properties of Ordinary Water Substance" by E. N. Dorsey; those on mercury from the "Smithsonian Physical Tables;" and those on ethyl alcohol from the "Handbook of Chemistry and Physics."

Compressibility of liquids

Liquid	Temp. deg C	*Coefficient	Pressure range, atmospheres
Water	10	48.0	1-25
	20	47.2	1-25
	10	49.2	25-50
	20	47.6	25-50
	10	46.0	100-200
	20	44.2	100-200
	50	42.8	100-200
	20	37.4	500-100
	20	32.6	1000-1500
	20	29.2	1500-2000
	20	25.9	2000-2500
	20	23.6	2500-3000
Mercury	20	3.95	300
	22	3.97	500
	22	3.91	1000
Ethyl Alcohol	20	112	1-50
	28	86	150-200
	28	81	150-400

Petroleum oils with a specific gravity 60/60°F between 0.80 and 0.90 have a compressibility coefficient of approximately 70 x 10^{-6} at 20°C (68°F) for a gage pressure change from 0 to 50 atmospheres. Reference: R. S. Jessup, BS Jnl. of Research, Vol. 5, 1930, p 985; RP244. Most organic liquids have compressibilities of the same order as that of oil.

As a consequence of compressibility it requires 4 x 10^{-6} more pressure to obtain a change in indication of one mm of mercury at an absolute pressure of 760 mm than it does at one mm of mercury. This difference is 12 times as great for water and 38 times as great for ethyl alcohol. Thus the unit of pressure defined in terms of a liquid column is also a function of pressure, but the effect in manometers as ordinarily used to measure low gage pressures is less than 0.001 percent.

3.7 Effect of Absorbed Gases. Air absorbed in water decreases the density, contrary to what might be expected. At 100°C the decrease of water density presumably fully saturated with air is 1.6, and at 20°C, 0.4 parts per million. The weight of absorbed air is 27 at 10°C and 22 parts per million at 20°C. The effect is quite variable and requires consideration for each gas in contact with a particular liquid.

The "Handbook of Chemistry and Physics" and the "International Critical Tables" contain data on the solubility of many gases in a number of liquids. These references, however, contain relatively little information on the effect of solubility on the density of those liquids that are used in manometers.

Mercury is an exception in that small amounts of gases go into solution. No data were found, but no sensible outgassing is evident when mercury is subject to a sudden decrease in pressure, as is the case with most other manometric liquids.

Since there is considerable time lag in both outgassing and in the dissolving of gases in liquids, considerable uncertainty usually exists as to the precise amount of gas in solution. For this reason, densities used in computing pressures should be for gas-free liquids if available, and when necessary, corrections made for the change in density due to the gas in solution. The correction is rarely made except in precise work or under unusual conditions of measurement

4 Basis, description and use of tables

4.1 Table 1. Abbreviations. Abbreviations used are those proposed by the American Standards Association (Z10.1-1941).

4.2 Table 2. Fundamental constants and common factors. As indicated in the table the values are largely taken from "Units of Weight and Measure," NBS M233, although the number of digits in the values is far in excess of that needed in manometry. The conversion factors are primarily from metric to English units and vice versa.

4.3

4.4 Tables 3, 4, and 5. No comment is required.

4.5

4.6 Table 6. Density of mercury. The values of the density of mercury given here are based on the mean value of the thermal coefficient of volume expansion. Accurate (not mean) values of the coefficient of cubical thermal expansion of mercury are given by Beattie, Blaisdell, Kaye, Gerry and Johnson, Proc. Am. Acad. Arts and Sciences, 74, 370, 1941. The two values of the density do not differ more than one part in 100000. At 0°C, the density is generally considered accurate to one part in 100,000 for virgin natural mercury. There is no great difficulty in purifying mercury to the degree necessary to realize the densities given; even minute impurities of the base metals make the mercury unusable in a manometer.

The density at 0°C is the standard used at present in defining pressure in terms of the height of a mercury column.

4.7 Table 7. Density of water. The values given here differ slightly from those given by various experimenters. The data for temperatures above 40°C (104°F) are less reliable than those for lower temperatures, which is indicated by dropping one digit from the values. As pointed out under "Discussion of Standards and Errors of Manometers," the density is affected somewhat by the content of absorbed air. Also, the dissolved salts will affect the density, which effect is avoided by the use of distilled water.

The unit height of a water column at either 15°C, 60°F, or 68°F is used in various fields of engineering to define a pressure. The ISA has adopted as a recommended practice 68°F (20°C) as the definition.

4.8 Tables 8A and 8B. Gravity corrections at sea level at various latitudes or at various values of gravity. In Table 8A are given the gravity corrections at sea level for a column of any liquid in any unit of height, mm, cm, in., or ft, against latitude. The values of gravity corresponding to latitude are from the formulas and tables given in the Smithsonian Meteorological Tables, 1958 edition.

Table 8B presents the gravity corrections, again for any liquid or in any unit of height, against evenly divided values of gravity. This table is convenient to use if the value of gravity for the station is known. It is preferable to base corrections on the actual value of gravity of the station, if available. The U. S. Coast and Geodetic Survey, (Washington, D. C.) has determined and can furnish values of gravity for hundreds of locations in the United States.

When Table 8A is used, an additional correction is required for the elevation of the station above sea level. The altitude correction to be applied to the value of gravity, which is strictly speaking only for free air and applies only approximately to large elevations found in mountainous areas, is as follows:

$$\text{Correction (cm/sec}^2\text{)} = -94 \times 10^{-6}h$$

where h is the elevation in feet of the manometer above sea level.

As an example of the use of the tables, assume a liquid column height of 72 inches (after application of scale correction, before or after application of the temperature correction) at latitude 38 degrees and elevation above sea level of 150 feet.

From Table 8A the value of gravity at sea level at 38 degrees latitude is 979.997 cm/sec^2.

The altitude correction is $-94 \times 150 \times 10^{-6}$ or –0.014.

The value of gravity is 979.983 cm/sec^2.

By interpolation in Table 8B, the gravity correction is –0.048 in.

The column height corrected for gravity is 72 –0.048 or 71.952 inches.

Neglecting the altitude correction and using Table 8A to obtain the correction, there is obtained 0.049 inch. Correcting gravity for the altitude effect introduces negligible error in this case.

4.9 Table 9. Conversion factors for various pressure units. This table was computed based largely on the data given in Tables 2, 6, and 7. The number of digits of the factors is greater than required for most manometer use. The factors were used insofar as applicable in preparing the other tables.

The factors apply only to manometer readings after all corrections have been made to obtain the pressures in the units stated.

4.10 Table 10. Properties of manometer liquids. This table is not complete, either in the properties of the liquids listed or in the best liquids which might be used for a particular application. Members of the ISA who have additional data are urged to furnish it so that this table can be perfected.

Water is probably the most widely used manometric liquid, being not only low in cost, readily available, and stable in nature, but also having a low factor of thermal expansion. Its major disadvantages are its limited range of utility—usually from 0.05 to 2.0 psi, and only 40°F to 100°F — and its corrosive effect on ferrous metals. One of the most desirable methods of increasing its visibility in glass tubing is by the addition of a few drops of fluorescein solution; coloring by inks or dyes is not satisfactory.

Mercury is the second most widely used manometric liquid, being quite stable and reasonably available, immiscible with other liquids, and having a low thermal expansion and low vapor

pressure. It can be used over a wide range of temperature conditions—from –35°F to over 250°F, and normally in the pressure range from 0.2 psi to 20-30 psi. Many metals, such as copper, tin, silver, and zinc are soluble in mercury, so that instrument parts in contact with it should be glass, carbon steel, stainless steel or good grade iron.

The major use of kerosine as a manometric liquid is a substitute for water in locations of low temperatures; for many years steel mills and coke oven plants have used "mm of oil" as a manometric unit on exposed mains. Normal practice specifies the use of 40-41 degrees API kerosine, having a specific gravity of 0.8200-0.8204 at 60°F. It has some advantages over water in that it can be used at low temperatures, will not become discolored by rusting of iron fittings with which it is in contact, and provides slightly more accurate measurements because of its lower density. Its use provides a fire hazard, and it cannot be used at temperatures above 75-85°F because of vapor phase and meniscus effects.

Ellison gage oil is a special petroleum fraction, similar to kerosine, having a specific gravity of 0.830-0.834 designed for use in inclined gages measuring low differentials in pressure.

Alcohol, and mixtures of alcohol and ethylene glycol, are quite frequently used as substitutes for water in locations in which temperatures below 35°F are encountered. Ethyl alcohol, having a specific gravity of only 0.794, may provide a slightly more sensitive measurement of pressures, but has the drawbacks of being inconstant in density due to absorption of water vapor, becoming discolored by rusting, promoting a fire hazard, and being undesirable above 90-100°F. A mixture of 36 percent by volume of ethyl alcohol, and 64 percent of ethylene glycol (or Prestone) has a specific gravity at 60°F comparable to that of water, and is therefore frequently used in water manometers for below freezing temperatures. However, both alcohol and glycol have relatively large thermal expansion coefficients which, if not taken into account when these substances are used at low temperatures, may lead to serious calibration errors.

Glycerine finds some use as a manometric liquid at temperatures above those at which water or kerosine may be used from 100°F to 250°F. At ordinary temperatures it is relatively viscous and slow draining; deliquescence alters its density.

Both dibromobenzene and dibromoethane have densities approximately twice as great as that of water, and they are therefore used to obtain more accurate measurements within the range 10 to 150 in H_2O than can be obtained by use of mercury. Both have the serious drawback of being hydrolyzed by water and becoming slightly acidic; they should be used only in glass tubes or instruments with special brass chambers and fittings.

Acetylene tetrabromide, or tetrabromoethane, is another high density liquid which is used for measuring pressures greater than those that can be conveniently reached by use of water columns, i.e., equivalents of 5 to 250 in H_2O or 0.2 to 10.0 psi. In spite of a greater degree of bromination, tetrabromoethane appears to be somewhat more stable and less reactive than dibromoethane, but not sufficiently so to permit use in contact with appreciable concentrations of water vapor, nor in instruments that are not provided with special brass chambers or fittings.

Butyl phthalate has low vapor pressure and forms a satisfactory meniscus. It has a relatively low freezing point. It absorbs air readily to a degree which may be troublesome, but no quantitative data were found.

Liquid mixtures such as alcohol-water, alcohol-glycol, and liquids which absorb water readily, such as glycol, alcohol, and glycerin do not hold their initial densities in a manometer open to the air and therefore must be used with caution.

Many organic liquids, such as the petroleum derivatives, Halowax oil and others, have densities which vary from lot to lot. The petroleum derivatives are mixtures, while the organic liquids in the technical grades contain impurities to a degree sufficient to affect the density. The densities given are therefore approximate and should be determined for each lot if pressures are to be

measured accurately. Comparison of manometers containing liquids of unknown density against a water column is a convenient method of determining their density.

4.11 Table 11. Expansion coefficients of scale materials. The length of the scale is determined from the coefficients of linear expansion of scale materials by the relation

$L = L_o(1+at)$ for t in deg C

$L = L_o\{1+b(t-32)\}$ for t in deg F

where L is the length at temperature t, L_o is the length at 0°C or 32°F, and a and b are the expansion coefficients per C and per F respectively.

The above relation is not exact, but the error is tolerable for the small temperature ranges ordinarily experienced by manometers. In fact, if the scale length is known at some other temperature than 0°C, the above relations can be written without serious loss in accuracy as follows:

$L = L_1\{1+a(t-t_1)\}$ for t in deg C

$L = L_1\{1+b(t-t_1)\}$ for t in deg F

where L_1 is the length measured at t_1 and the other terms are defined as above.

It is obvious for precise measurements, that the variations in the coefficients for a given material are such that the coefficient of expansion of the scale material must be measured. Knowledge of the composition of the scale material, and of the degree of cold work for metals, may often serve to pick up a reasonably accurate value from the literature on the subject.

4.12 Table 12. Conversion factors for water columns at various temperatures. For a number of temperatures of the water column, the equivalent psi is given for one inch of water, and the equivalent height of a mercury column at 32°F and of water columns at 60°F, 68°F (20°C), and 77°F (25°C) are given for unit height of a water column in any unit as cm, in., etc. The table must be entered in all cases with the true height, that is, the indicated height must be corrected for scale errors and for the effect of temperature on the scale, and any other errors, if significant.

If psi corresponding to one cm of water are desired, multiply the given values in psi by 0.3937.

As an example, find the equivalent psi, in. of mercury and in. of water at 68°F of 35 in. of water at 75°F. Entering the table at 75°F there is obtained

35 x 0.036031 = 1.261 psi

35 x 0.073359 = 2.568 in. of mercury at 0°C

35 x 0.9991 = 34.97 in. of water at 68°F

4.13 Tables 13 and 14. Temperature corrections for water manometers with brass scales to obtain reading at 68°F (20°C) and at 60°F. These tables were constructed from the following relation:

$$\text{Correction} = \left[\frac{D - D_o}{D_o} + s(t - t_o)\right]h$$

where D is density of water at temperature t; D_o the density at the reference temperature t_o which is 68°F in Table 13 and 60°F in Table 14; s is the linear coefficient of expansion of brass; and h is the indicated height of the water column at temperature t after correction for scale error. The temperatures are in degrees Fahrenheit.

This form of the equation has to be used rather than equation (4) of the section on "Temperature Errors," because the coefficient of expansion of water varies too much with temperature to be assumed constant.

Table 11 shows that the coefficient s varies for brass. The value was taken as 10.2×10^{-6} per degree F following the usual practice in barometry. A deviation in s of 10 percent from the value chosen will on the average affect the corrections in the order of 1 percent. The density of water was obtained from Table 7.

Either table may be entered with the height of the column in inches or mm, or any other unit, to obtain the temperature correction in the same unit. Also, it has been assumed that the scales are graduated to indicate correctly at 68°F in Table 13, and 60°F in Table 14. The tables can be used nevertheless if the effect of deviations from this assumption can be lumped in with the scale error.

As an example, assume a manometer with a brass scale to read 720 mm at a manometer temperature of 82°F, to obtain the height of the water column at 68°F. Assume the scale correction to be –1 mm when calibrated at 68°F. Applying this correction gives a reading of 719 mm. Enter Table 13 successively with 700, 100 and 900 mm, and interpolate between 80 and 85°F. The temperature correction is then, properly locating the decimal point, 1.24 + 0.02 + 0.02 or –1.28 mm, and the reading corrected for temperature is 717.7 mm.

4.14 Tables 15A and 15B. Equivalents in psi of water columns at various temperatures in inches and in feet and inches. These tables were constructed from the conversion factors given in Table 9. The tables are entered with the true height of the water column at the designated temperature, that is, entered with manometer readings corrected for all errors.

As an example of the use of Table 15B, 8 ft 11½ in. of water at 95°F = 3.447 + 0.395 + 0.018 = 3.860 psi.

4.15 Table 16. Conversion factors for mercury columns at various temperatures. The table presents the equivalent of one inch of mercury in psi at the designated temperature, and the factor for converting the height of a mercury column at the designated temperature to the height of a mercury column at 32°F (0°C) and to the height of a water column at any one of the three temperatures, 60, 68, or 77°F. The conversion factor can be used to convert the mercury column in any unit of height to obtain the height in the same unit of the desired liquid column. The table should be entered with the true height of the mercury column at the designated temperature.

The computations are based on the data given in Tables 6, 7, and 9.

As an example, convert 25.00 mm of mercury at 85°F to psi, to a mercury column at 32°F, and to a water column at 68°F.

(a) 25 x 0.48854 = 12.21 psi

(b) 25 x 0.9947 = 24.87 mm of mercury at 32°F

(c) 25 x 13.547 = 338.7 mm of water at 68°F

To obtain psi for 1 mm of mercury, multiply the psi factor given in the table by 0.03937.

4.16 Tables 17 and 18. Temperature corrections for mercury manometers and barometers with brass scales to obtain readings at 0°C (32°F). The two tables are alike except that one is for deg C and the other is for deg F. The indicated column heights given in the tables were selected for convenience: if temperatures are measured in deg C, the manometer is more likely to be graduated in millimeters; in deg F, in inches. However, either table may be entered with the liquid height either in millimeters or inches, or any other unit, to obtain the temperature correction in the same unit.

The corrections were computed from equation (4) of the section on "Temperature Errors."

$$\text{Correction} = \frac{s(t - t_o) - m(t - t_o)}{1 + m(t - t_o)} H_t$$

where H_t = reading of the manometer at temperature t corrected for scale error.

t = temperature of the manometer in deg C for Table 17, in deg F for Table 18.

t_o = 0°C for Table 17, 32°F for Table 18.

m = coefficient of expansion of mercury, 0.0001818 per deg C for Table 17, 0.0001010 for Table 18.

s = linear coefficient of expansion for the brass scale, 0.0000184 for deg C for Table 17, 0.0000102 per deg F for Table 18.

It is obvious that the correction is linear with the reading and very nearly so with temperature, sufficiently for the purposes of interpolation in the tables.

Brass scales will not necessarily have the value given above for the coefficient of expansion, which is that commonly used in barometry. A deviation of as much as 10 percent from the value used will introduce an error of about 1 percent in the correction.

It will be noted that the brass scale has been assumed accurate at 32°F or 0°C. Such is not generally the case, but the corrections will still apply with high accuracy if the error due to this assumption is merged with the scale error. This procedure is facilitated by the common practice of calibrating a manometer against a "standard" manometer.

Table 17 for deg C is identical with the barometer temperature correction table for deg C in the Smithsonian Meteorological Tables (SMT). Table 18 for deg F differs from that in the SMT in that the brass scale is assumed calibrated correctly at 62°F (t_o in the term $s(t–t_o)$ in the equation above equals 62°F) in SMT, instead of 32°F as here assumed. Since neither temperature is in correspondence with normal practice, it seems more practical and convenient to use 32°F.

The corrections apply only to manometers and barometers in which the scale is read at both liquid levels, or the zero of the scale and the lower liquid level are brought to coincidence. In instruments of the design, including the cistern type, where the scale is calibrated to take care of the rise or fall of one of the liquid surfaces, the corrections given in the tables do not apply. The effect on the reading of the expansion of the mercury in the cistern, or below the lowest surface of the mercury, is not covered by the equation given above. However, the corrections can be used for cistern type instruments if the reading with which the table is entered be increased roughly by

the height of the mercury in the cistern at zero differential pressure. The exact amount of this increase must be determined by tests at two temperatures.

As an example, assume that a U-tube manometer with a brass scale at 75°F reads 22.21 inches of mercury after correction for scale error. From Table 18 the correction is 0.078 + 0.42 x 0.019 or 0.086 inch. The corrected reading is 22.21 – 0.09 or 22.12 inches of mercury.

4.17 Table 19. Equivalents in psi of mercury columns in inches of mercury at various temperatures. This table was computed from the data given in Tables 6 and 9. The heights of the mercury column are in true inches of mercury at the temperature designated, and should be in terms of the height under the condition of standard gravity.

4.18 Tables 20A and 20B. Equivalents of mercury columns at various temperatures to water columns at 20°C (68°F) and at 60°F. These tables are computed from the data given in Tables 6 and 7. They can be entered with true inches of mercury at the designated temperature, either before or after correcting the height for gravity error. If the mercury height is uncorrected for gravity error, the equivalent water column will be also.

4.19 Table 21. Density of kerosine and equivalent pressures in psi of kerosine columns at various temperatures. This table is for kerosine of specific gravity 0.8200 at 60/60 (41.06 API degrees Baume). The densities at various temperatures are based on the specific gravity data given in the National Standard Petroleum Tables, National Bureau of Standards Circular 410, 1936.

In practice, it is necessary to select the kerosine to have a specific gravity of 0.8200 at 60/60 in order for the table to apply. Evaporation of any components of the kerosine will affect the density, but data on this possibility are not available.

Where the height, one inch or 100 mm, is specified, the heights are in true inches at the temperature designated, corrected for gravity error for which Tables 8A and 8B are applicable.

As an example, a kerosine column of 52.08 true mm at 75°F equals

(a) 52.08 x 0.00157 = 0.06026 psi

(b) 52.08 x 0.8134 = 42.36 g/ sq cm

4.20 Table 22. Equivalents in psi of columns of kerosine in inches at various temperatures. The definition of the kerosine and basic data for the table are as indicated in Table 21.

The heights of the kerosine column are in true inches at the temperature designated, corrected for gravity error, for which Tables 8A and 8B are applicable.

As an example, a kerosine column of 45.28 inches at 75°F, with all corrections applied, equals

1.176 + 0.147 + 0.006 + 0.002 = 1.331 psi

4.21 Table 23. Equivalents in inches of water at 60°F of kerosine columns in mm at various temperatures. This table is for kerosine of the same density as for Tables 21 and 22. The table was computed with the aid of Table 3 of NBS Circular 410, National Standard Petroleum Tables.

The table must be entered with heights in true mm and inches. Conversion may be made before or after applying correction for gravity, as convenient.

As an example, 115 mm of kerosine at 75°F equals 3.205 + 0.320 + 0.161 or 3.686 inches of water at 60°F.

4.22 Table 24. Equivalents in inches of water at 60°F of gage oil columns at various temperatures. This oil is a kerosine known commercially as "Ellison Gage Oil." The data given are based on a coefficient of volume expansion of the oil about 4 percent less than for an oil of the same specific gravity 60/60 given in NBS Handbook C410. The spread in the densities with temperature is therefore about 4 percent greater in the table.

The table serves equally well to convert oil columns in any unit of height to water columns in the same unit of height, as mm of oil to mm of water.

The table must be entered only with true inches or other units of height at the designated temperature. Gravity corrections can be applied before or after conversion.

As an example, 18.72 inches (or mm) of oil at 75°F equals 8.282 + 6.625 + 0.584 + 0.017 or 15.51 inches (or mm) of water at 60°F.

4.23 Table 25. Equivalents in inches of water at 60°F of alcohol columns at various temperatures. This table is for 100 percent ethyl alcohol which, unfortunately, is not easily obtained or maintained in manometers. For 95 percent alcohol by weight, the remainder water, the density increases about 2 percent and correspondingly increases the equivalent column, height in inches of water.

The table can be used equally well to convert alcohol columns in any unit of height to water columns in the same unit of height, as mm of alcohol to mm of water.

The table applies only to true inches or other units of height at the designated temperatures.

As an example, 20.52 inches (or mm) of alcohol at 75°F equals 15.74 + 0.39 + 0.02 or 16.15 inches (or mm) of water.

4.24 Table 26. Equivalents in inches of water at 60°F of alcohol-glycol columns at various temperatures. This mixture is so chosen that the specific gravity is the same as that of water at 60°F, but as indicated in the table differs significantly from the specific gravity of water at other temperatures. It is useful when the manometer temperature is below 32°F. At these temperatures, the use of carbitol or butyl phthalate, or perhaps alcohol alone, may be preferable. See Table 10.

The application of the table to other units of height and the restriction to true heights are as stated under Table 25.

As an example, 29.22 inches (or mm) of alcohol-glycol at 75°F equals 19.87 + 8.94 + 0.20 + 0.02 or 29.03 inches (or mm) of water at 60°F.

4.25 Table 27. Equivalents in inches of water at 60°F of dibromobenzene columns at various temperatures. The Handbook of Physics and Chemistry gives the specific gravity of o-dibromobenzene as $1.9557\ \frac{20.5}{4}$ which equals $1.9576\ \frac{69}{60}$. It has the serious drawback of being hydrolyzed by water and becoming slightly acidic. It should be used only in glass tubes or instruments with brass chambers and fittings.

The application of the table to other units of height and the restriction to true heights are as stated under Table 25.

As an example, 29.22 inches (or mm) of dibromobenzene at 75°F equals 39.06 + 17.58 + 0.39 + 0.04 or 57.07 inches (or mm) of water.

4.26 Table 28. Equivalents in psi of dibromobenzene columns at various temperatures. The height of the column should be entered with true inches at the designated temperature with corrections applied for all errors.

As an example, 29.22 inches of dibromobenzene at 75°F equals 1.410 + 0.635 + 0.014 + 0.001 or 2.060 psi.

4.27 Table 29. Equivalents in inches of water at 60°F of dibromoethane (also known as ethylidene bromide) columns at various temperatures. The Handbook of Chemistry and Physics gives $2.089\ \frac{20.5}{4}$ equals $2.09\ \frac{69}{60}$ for the specific gravity and 108-110°C (226-230°F) for the boiling point. In Table 29 the specific gravity is $2.045\ \frac{70}{60}$ which is 2.2 percent less than the above value. The lower value apparently applies to the technical grade of the liquid.

Dibromoethane like dibromobenzene is hydrolyzed by water and becomes slightly acidic. The same restrictions apply as to the use of glass tubes, or brass, in manometers.

The application of the table to other units of height and the restriction to true heights are as stated under Table 25.

As an example, 29.22 inches (or mm) of dibromoethane at 75°F equals 40.79 + 18.36 + 0.41 + 0.04 or 59.60 inches (or mm) of water at 60°F.

4.28 Table 30. Equivalents in psi of dibromoethane columns at various temperatures. The table should be entered with true inches at the designated temperature with corrections applied for all errors.

As an example, 29.22 inches of dibromoethane at 75°F equals 1.472 + 0.663 + 0.015 + 0.002 or 2.152 psi.

4.29 Table 31. Equivalents in inches of water at 60°F of columns of acetylene tetrabromide at various temperatures. The Handbook of Chemistry and Physics gives the specific gravity of 1, 1, 2, 2-tetrabromoethane (or acetylene tetrabromide) as $2.9368\ \frac{20}{4}$ equivalent to $2.9667\ \frac{68}{60}$. In Table 31 it is $2.9614\ \frac{68}{60}$ which is 0.17 percent lower than for the presumably pure chemical.

The application of the table to other units of height and the restriction to true heights are stated under Table 25.

As an example, 29.22 inches (or mm) of acetylene tetrabromide at 75°F equals 59.04 + 26.57 + 0.59 + 0.06 or 86.26 inches (or mm) of water at 60°F.

4.30 Table 32. Equivalents in psi of acetylene tetrabromide at various temperatures. The table should be entered with true inches at the designated temperature with corrections applied for all errors.

In spite of a greater degree of bromination, tetrabromoethane appears to be somewhat more stable and less reactive than dibromoethane, but not sufficiently so to permit use in contact with appreciable concentrations of water vapor, nor in instruments that are not provided with special brass chambers or fittings.

As an example 29.22 inches of acetylene tetrabromide at 75°F equals 2.131 + 0.959 + 0.021 + 0.002 or 3.113 psi.

Table 1 — Abbreviations

Term	Abbreviations
absolute	abs
atmosphere	atm
boiling point	bp
centimeter	cm
cubic	cu
cubic centimeter	cu cm or cm^3
cubic foot	cu ft
cubic inch	cu in.
cubic meter	cu m or m^3
foot	ft
freezing point	fp
gram	g
grams per cubic centimeter	g/cu cm or g/cm^3
grams per square centimeter	g/sq cm or g/cm^2
inch	in.
inches of mercury	in. Hg
inches of water	in. H_2O
kilogram	kg
kilograms per square meter	kg/sq m or kg/m^2
melting point	mp
millibars	mb
micron (0.001 mm)	μ or mu
milliliter	ml
millimeter	mm
millimeters of mercury	mm Hg
millimeters of water	mm H_2O
ounce	oz
ounce avoirdupois	oz avdp
ounces per square inch	oz/sq in. or oz/in^2
pound	lb
pounds per cubic inch	lb/cu in.
pounds per cubic foot	lb/cu ft
pounds per square foot	psf
pounds per square inch	psi
pounds per square inch gage	psig
pounds per square inch absolute	psia
specific gravity	sp gr
square centimeter	sq cm or cm^2
square foot	sq ft
square inch	sq in.
square meter	sq m or m^2
square millimeter	sq mm or mm^2
temperature	temp

Table 2 — Fundamental constants and conversion factors

Largely from “Units of Weight and Measure”

National Bureau of Standards Misc. Publ. No. M233

Fundamental constants are underlined

1 cm = 0.3937 inches	<u>1 inch = 2.54 cm</u>
1 meter = 39.37 inches	
1 meter = 3.280840 feet	1 foot = 30.48 cm
1 sq cm = 0.1550003 sq inch	1 sq inch = 6.4516 sq inch
1 sq meter = 10.76391 cu feet	1 sq foot = 929.0304 sq cm
1 cu cm = 0.06102374 cu inch	1 cu inch - 16.387064 cu cm
1 cu meter = 35.31467 cu feet	1 cu foot = 0.028316847 cu meter
1 kilogram = 2.204623 pounds	<u>1 pound = 453.59237 grams</u>
1 gram = 0.03527397 ounce	1 ounce = 28.349523 grams
<u>1 liter = 1000.028 cu cm</u>	
1 liter = 61.02545 cu inches	
1 cu cm = 0.9999720 liter	1 cu inch = 0.01638661 liter
1 gram/cu cm = 62.4280 lb/cu foot	1 lb/cu foot = 0.0160185 gram/cu cm
1 gram/cu cm = 0.0361273 lb/cu inch	1 lb/cu inch = 27.6799 gram/cu cm
1 gram/ml = 0.9999730 gram/cu cm	1 gram/cu cm = 1.000028 grams/ml

Standard acceleration of gravity = 980.665 cm/sec^2 = 32.1740 ft sec^2

(International value in physics and engineering)

Table 3 — Decimal equivalents of fractions of one inch

1-64	0.015625	17-64	0.265625	33-64	0.515625	49-64	0.765625
1-32	0.031250	9-32	0.281250	17-32	0.531250	25-32	0.781250
3-64	0.046875	19-64	0.296875	35-64	0.546875	51-64	0.796875
1-16	0.062500	5-16	0.312500	9-16	0.562500	13-16	0.812500
5-64	0.078125	21-64	0.328125	37-64	0.578125	53-64	0.828125
3-32	0.093750	11-32	0.343750	19-32	0.593750	27-32	0.843750
7-64	0.109375	23-64	0.359375	39-64	0.609375	55-64	0.859375
1-8	0.125000	3-8	0.375000	5-8	0.625000	7-8	0.875000
9-64	0.140625	25-64	0.390625	41-64	0.640625	57-64	0.890625
5-32	0.156250	13-32	0.406250	21-32	0.656250	29-32	0.906250
11-64	0.171875	27-64	0.421875	43-64	0.671875	59-64	0.921875
3-16	0.187500	7-16	0.437500	11-16	0.687500	15-16	0.937500
13-64	0.203125	29-64	0.453125	45-64	0.703125	61-64	0.953125
7-32	0.218750	15-32	0.468750	23-32	0.718750	31-32	0.968750
15-64	0.234375	31-64	0.484375	47-64	0.734375	63-64	0.984375
1-4	0.250000	1-2	0.500000	3-4	0.750000	-	-

Table 4 — Millimeter equivalents of inches

Millimeters

Inches	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	0.00	2.54	5.08	7.62	10.16	12.70	15.24	17.78	20.32	22.86
1	25.40	27.94	30.48	33.02	35.56	38.10	40.64	43.18	45.72	48.26
2	50.80	53.34	55.88	58.42	60.96	63.50	66.04	68.58	71.12	73.66
3	76.20	78.74	81.28	83.82	86.36	88.90	91.44	93.98	96.52	99.06
4	101.60	104.14	106.68	109.22	111.76	114.30	116.84	119.35	121.92	124.46
5	127.00	129.54	132.08	134.62	137.16	139.70	142.24	144.78	147.32	149.86
6	152.40	154.94	157.48	160.02	162.56	165.10	167.64	170.18	172.72	175.26
7	177.80	180.34	182.88	185.42	187.96	190.50	193.04	195.58	198.12	200.66
8	203.20	205.74	208.28	210.22	213.36	215.90	218.44	220.98	223.52	226.06
9	228.60	231.14	233.68	236.22	238.76	241.30	243.84	246.38	248.92	251.46
10	254.00	256.54	259.08	261.32	264.16	266.70	269.24	271.78	274.32	276.86

Table 5 — Inch equivalents of millimeters

Inches

mm	0	1	2	3	4	5	6	7	8	9
0	0.0000	0.0394	0.0787	0.1181	0.1575	0.1969	0.2362	0.2756	0.3150	0.3543
10	0.3937	0.4331	0.4724	0.5118	0.5512	0.5906	0.6299	0.6693	0.7087	0.7480
20	0.7874	0.8268	0.8661	0.9055	0.9449	0.9842	1.0236	1.0630	1.0124	1.1417
30	1.1811	1.2205	1.2598	1.2992	1.3386	1.3780	1.4173	1.4567	1.4961	1.5354
40	1.5748	1.6124	1.6535	1.6929	1.7323	1.7717	1.8110	1.8504	1.8898	1.9291
50	1.9685	2.0079	2.0472	2.0866	2.1260	2.1654	2.2047	2.2441	2.2835	2.3228
60	2.3622	2.4016	2.4409	2.4803	2.5197	2.5590	2.5984	2.6378	2.6772	2.7165
70	2.7559	2.7953	2.8346	2.8740	2.9134	2.9528	2.9921	3.0315	3.0709	3.1102
80	3.1496	3.1890	3.2283	3.2677	3.3071	3.3464	3.3858	3.4252	3.4646	3.5039
90	3.5433	3.5827	3.6220	3.6614	3.7008	3.7402	3.7795	3.8189	3.8583	3.8976
100	3.9370	3.9764	4.0157	4.0551	4.0945	4.1338	4.1732	4.2126	4.2520	4.2913

Table 6 — Density of mercury

At 0°C (32°F) =13.5951 grams per cu cm
= 0.491157 lb weight per cu in.
= 848.719 lb weight per cu ft

At other temperatures the density can be from the following:

V $= V_0 (1 + 0.0001818\ t)$ where t is in deg C (1)
$= V [1 + 0.0001010 (t–32)]$ where t is in deg F (2)
D = 1/V (3)

where V = specific volume at temperature t
V_0 = specific volume at 0°C or 32°F in the same unit as V
D = the mass per unit volume

Density of mercury from Smithsonian Physical Tables. These values agree with those computed from formulas (1) and (3) above.

.

Temperature deg C	Temperature deg F	Density g per cu cm
–20	–4	13.6446
–10	14	13.6198
0	32	13.5951
5	41	13.5827
10	50	13.5704
15	59	13.5581
20	68	13.5458
25	77	13.5336
30	86	13.5214
35	95	13.5091
40	104	13.4970
45	113	13.4847
50	122	13.4725
60	140	13.4482
70	158	13.4240
80	176	13.3998
90	194	13.3775
100	212	13.3515

Temperature deg F	Density lb per cu in.	Density g per cu cm
0	0.49275	13.6391
10	0.49225	13.6253
20	0.49175	13.6116
32	0.491157	13.5951
40	0.49076	13.5841
50	0.49026	13.5704
60	0.48977	13.5568
70	0.48928	13.5431
80	0.48879	13.5295
90	0.48830	13.5159
100	0.48780	13.5023
110	0.48732	13.4888
120	0.48683	13.4753
130	0.48634	13.4617
140	0.48585	13.4482
150	0.48536	13.4347
160	0.48488	13.4213
170	0.48439	13.4079
180	0.48391	13.3944
190	0.48342	13.3809
200	2.48293	13.3675

Table 7 — Density of water

Distilled and free from air

From NBS Jnl. of Research, v. 18, Feb. 1937, RP 971 and from Table 93, volume on "Water-Substance" by N. E. Dorsey, 1940

Temperature deg C	Density	
	g per cu cm	lb per cu in.
0	0.999841	0.0361218
3.98	0.999973	0.0361265
5	0.999965	0.0361262
10	0.999701	0.0361167
15	0.999102	0.0360951
20	0.998207	0.0360627
25	0.997048	0.0360209
30	0.995651	0.0359704
35	0.994037	0.0359121
40	0.992221	0.0358465
45	0.99021	0.035774
50	0.98804	0.035695
60	0.98324	0.035522

Temperature deg F	Density	
	lb per cu in.	g per cu cm
35	0.0361232	0.999882
40	0.0361265	0.999971
45	0.0361236	0.999892
50	0.0361167	0.999701
55	0.0361060	0.999406
60	0.0360919	0.999015
65	0.0360746	0.998536
68	0.0360627	0.998207
70	0.0360542	0.997971
75	0.0360309	0.997327
80	0.0360050	0.996608
85	0.0359764	0.995819
90	0.0359454	0.994960
95	0.0359121	0.994037
100	0.0358764	0.993051
105	0.0358387	0.992006
110	0.035799	0.99090
115	0.035757	0.98974
120	0.035713	0.98854
130	0.035622	0.98600
140	0.035522	0.98324
150	0.035414	0.98025
200	0.034792	0.96304

Table 8A — Gravity corrections at sea level at various latitudes for manometers filled with any liquid

Latitude	Gravity	Height of liquid column in any unit				
degrees	cm/sec^2	20	40	60	80	100
0	978.036	–0.054	–0.107	–0.161	–0.214	–0.268
10	978.191	–0.050	–0.101	–0.151	–0.201	–0.252
20	978.638	–0.041	–0.083	–0.124	–0.165	–0.207
25	978.955	–0.035	–0.070	–0.104	–0.139	–0.174
30	979.324	–0.027	–0.055	–0.082	–0.110	–0.137
35	979.731	–0.019	–0.038	–0.057	–0.076	–0.095
40	980.167	–0.010	–0.020	–0.030	–0.040	–0.051
45	980.616	–0.001	–0.002	–0.003	–0.004	–0.005
–	980.665	0	0	0	0	0
50	981.065	+0.008	+0.017	+0.025	+0.033	+0.041
55	981.500	+0.017	+0.034	+0.052	+0.069	+0.086
60	981.911	+0.025	+0.051	+0.076	+0.102	+0.127
65	982.281	+0.033	+0.066	+0.099	+0.132	+0.166
70	982.601	+0.040	+0.079	+0.119	+0.158	+0.197
80	983.051	+0.049	+0.097	+0.146	+0.195	+0.243
90	983.208	+0.052	+0.104	+0.156	+0.207	+0.259

Table 8B— Gravity corrections for manometers filled with any liquid

Gravity	Height of liquid column in any unit				
cm/sec^2	20	40	60	80	100
978.0	–0.054	–0.109	–0.162	–0.217	–0.272
978.5	–0.044	–0.088	–0.132	–0.177	–0.221
979.0	–0.034	–0.068	–0.102	–0.136	–0.170
979.5	–0.024	–0.048	–0.071	–0.095	–0.119
980.0	–0.014	–0.027	–0.041	–0.054	–0.068
980.5	–0.003	–0.007	–0.010	–0.013	–0.017
980.665	0	0	0	0	0
981.0	+0.007	+0.014	+0.021	+0.027	+0.034
981.5	+0.017	+0.034	+0.051	+0.068	+0.085
982.0	+0.027	+0.054	+0.082	+0.109	+0.136
982.5	+0.037	+0.075	+0.112	+0.150	+0.187
983.0	+0.048	+0.095	+0.143	+0.191	+0.238
983.5	+0.058	+0.116	+0.174	+0.231	+0.289

Table 9 — Conversion factors for various pressure units

Equivalent value in various units

Pressure unit value	mm mercury 0C	inches mercury 0C	millibars	pounds per sq. in.	pounds per sq. ft.	ounces per sq in.	grams per sq cm	cm water 60°F	in water 60°F	cm water 20°C	in water 20°C	cm water 25°C	in water 25°C	atmosphere
mm mercury	1	0.03937	1.3332	0.019337	2.7845	0.30939	1.3595	1.3609	0.53577	1.3619	0.53620	1.3635	0.53682	1.31579×10^{-3}
in. mercury	25.400	1	33.864	0.49115	70.726	7.8585	34.531	34.566	13.609	34.593	13.619	34.634	13.635	0.0334210
millibars	0.75006	0.029530	1	0.014504	2.0885	0.23206	1.0197	1.0207	0.40186	1.0215	0.40218	1.0227	0.40265	9.86923×10^{-4}
lb per sq in.	51.715	2.0360	68.948	1	144	16	70.307	70.376	27.707	70.433	27.730	70.515	27.762	0.0680460
lb per sq ft.	0.35913	0.014139	0.47880	0.0069444	1	0.11111	0.48824	0.48872	0.19241	0.48912	0.19257	0.48969	0.19279	4.72540×10^{-4}
oz per sq in.	3.2322	0.12725	4.3092	0.0625	9	1	4.3942	4.3985	1.7317	4.4021	1.7331	4.4072	1.7351	4.25286×10^{-3}
grams per sq cm	0.73556	0.028959	0.98067	0.014223	2.0482	0.22757	1	1.0010	0.39409	1.0018	0.39441	1.0030	0.39487	9.67842×10^{-4}
cm water 60°F	0.73483	0.028930	0.97970	0.014209	2.0461	0.22735	0.99901	1	0.3937	1.0008	0.39402	1.0020	0.39448	9.66887×10^{-4}
in. water 60°F	1.8665	0.073483	2.4884	0.036092	5.1972	0.57747	2.5375	2.5400	1	2.5421	1.0008	2.5450	1.0020	2.45589×10^{-3}
cm water 20°C	0.73424	0.028907	0.97891	0.014198	2.0444	0.22717	0.99821	0.99919	0.39338	1	0.3937	1.0012	0.39416	9.66105×10^{-4}
in. water 20°C	1.8650	0.073424	2.4864	0.036063	5.1930	0.57700	2.5354	2.5380	0.99919	2.5400	1	2.5430	1.0012	2.45392×10^{-3}
cm water 25°C	0.73339	0.028873	0.97777	0.014181	2.0421	0.22690	0.99705	0.99803	0.39292	0.99884	0.39324	1	0.3937	9.64984×10^{-4}
in. water 25°C	1.8628	0.03339	2.4835	0.036021	5.1870	0.57633	2.5325	2.5350	0.99803	2.5371	0.99884	2.5400	1	2.45106×10^{-3}
atmosphere	760	29.9213	1013.250	14.69595	2116.22	235.136	1033.227	1034.25	407.184	1035.08	407.511	1036.29	407.987	1

1 millibar = 1000 dynes per sq cm

1 kg per sq meter = 0.1 gram per sq cm

1 kg per sq cm = 1000 grams per sq cm

1 gram per sq meter = 0.0001 gram per sq cm

Table 10 — Properties of manometric liquids

Liquid	Specific gravity 20/20	Action with water vapor	Vapor pressure at 68° F	*Coefficient of thermal expansion* per deg F x 10^6	per deg C x 10^6	Range deg F	Melting Point deg F	Boiling Point deg F	Flash Point deg F
			mmHg						
1. Ethyl Alcohol, C_2H_6O	0.7939	absorbs	43.9	600	1080	50-86	–179	173	55
2. Kerosine, 41 API at 60° F	0.8200 60/60	negligible	-	480	864	30-100	–20	300+	120
3. Ellison Gage Oil	0.8340 60/60	negligible	-	466	839	30-100	-	300+	140
4. Benzene (Benzol), C_6H_6	0.8794	negligible	74.7	687	1237	68	42	176	12
5. Butyl Cellosolve $C_6H_{14}O_2$ (Ethylene Glycol Monobutyl Ether)	0.9019	absorbs	0.85	-	-	-	–100	340	165
6. Water	1.000	-	17.5	115	207	68	32	212	non-inflam.
7. Alcohol Glycol	1.000	absorbs	-	427	769	30-100	–60	173	70
8. Carbitol, $C_6H_{14}O_3$ (Diethylene Glycol Monoethyl Ether)	1.024-30	absorbs	-	-	-	-	–76	202	210
9. n-Butyl Phthalate, $C_{16}H_{22}O_4$	1.0477	negligible	10^{-4}	433	780	-	–31	644	340
10. Ethylene Glycol (Glycol), $C_2H_6O_2$	1.1155 20/4	absorbs slowly	0.09	354	638	68	+0.8	387	241
11. Halowax Oil	1.19-1.25	-	0.3-50° C	367	660	-	–24- –42		203
12. Glycerine (Glycerol), $C_3H_8O_3$	1.260 20/4	absorbs	low	281	505	68	64	554	320
13. o-Dibromobenzene, $C_6H_4Br_2$	1.956 20/4	negligible	-	432	778	30-100	35.2	430	150+
14. 1, l-Dibromoethane, $C_2H_4Br_2$	2.089 20/4	negligible	34.7	532	958	30-100	40	230	75+
15. Acetylene tetrabromide (Tetra bromoethane), $C_2H_2Br_4$	2.964 20/4	absorbs slightly	-	370	660	-	–4	-	non-inflam.
16. Mercury	13.570	negligible	0.0012	101	181.8	-20 to 250	–38	679	non-inflam.

Table 11 — Expansion coefficients of scale materials

Material	Temperature range deg C	Coefficient of linear expansion		Observer or source
		Per degree C x 10^{-6}	Per degree F x 10^{-6}	
Slate	20 to 100	6.3 to 8.8	3.5 to 4.9	Griffiths
	0 to 100	9.4	5.2	Watertown Arsenal
	Ordinary temp.	10.4	5.8	Adie
Porcelain	20 to 200	1.6 to 19.6	0.9 to 10.9	Souder and Hidnert
Wood				
Along Grain	a	1. to 11.	0.6 to 6.	Various observers
Across Grain	a	32. to 73.	18. to 41.	Various observers
Glass	0 to 300	0.8 to 12.8	0.4 to 7.1	Corning Glass Works
Quartz, fused	20 to 60	0.40	0.22	Souder and Hidnert
Iron	25 to 100	12.0	6.7	Souder and Hidnert
Wrought Iron	25 to 100	12.1	6.7	Circular NBS C447
Cast Iron	20 to 100	8.7 to 11.1	4.8 to 6.2	Circular NBS C447
Steel (carbon)	20 to 100	9.4 to 12.5	5.2 to 6.9	Metals Handbook (1939)
Stainless Steel				
12 Cr	20 to 100	10.0	5.6	Hidnert
18 Cr, 9 Ni	20 to 60	16.1	8.9	Hidnert
Brass	20 to 100	16.9 to 19.4	9.4 to 10.8	Hidnert
Bronze	20 to 100	16.8 to 19.1	9.3 to 10.6	NBS Research Paper RP 1518
Bakelite	20 to 60	21. to 33.	12. to 18.	Souder and Hidnert
Aluminum	0 to 60	23.2	12.9	Hidnert
Hard Rubber b	c	50. to 84.	28. to 47.	Proc. Rubber Technology Conference, London, England (1938)

a. Various temperature ranges between 2 and 100° C

b. Includes terms "ebonite" and "vulcanite"

c. Various temperature ranges between 0 and 100° C

Table 12 — Conversion factors for water columns at various temperatures

Observed Temperature of Water		*Equiv. Psi of 1 in. of water*	*Factor for Converting Water Column Height at Various Temperatures to:*			
			Mercury Column	Water Column		
deg F	deg C		at 32° F	at 60° F	at 68° F	at 77° F
32	0.00	0.036122	0.073544	1.0008	1.0016	1.0028
35	1.67	0.036123	0.073547	1.0009	1.0017	1.0028
39.2	3.98	0.036126	0.073554	1.0010	1.0018	1.0029
45	7.22	0.036124	0.073548	1.0009	1.0017	1.0028
50	10.00	0.036117	0.073534	1.0007	1.0015	1.0027
55	12.78	0.036106	0.073512	10004	1.0012	1.0024
60	15.56	0.036092	0.073483	1.0000	1.0008	1.0020
65	18.33	0.036075	0.073448	0.9995	1.0003	1.0015
68	20.00	0.036063	0.073424	0.9992	1.0000	1.0012
70	21.11	0.036054	0.073407	0.9990	0.9998	1.0009
75	23.89	0.036031	0.073359	0.9983	0.9991	1.0003
77	25.00	0.036021	0.073339	0.9980	0.9988	1.0000
80	26.67	0.036005	0.073306	0.9976	0.9984	0.9996
85	29.44	0.035976	0.073248	0.9968	0.9976	0.9988
90	32.22	0.035945	0.073185	0.9959	0.9967	0.9979
95	35.00	0.035912	0.073117	0.9950	0.9958	0.9970
100	37.78	0.035876	0.073045	0.9940	0.9948	0.9960
110	43.33	0.035799	0.072887	0.9919	0.9927	0.9938
120	48.89	0.035713	0.072713	0.9895	0.9903	0.9915
130	54.44	0.035622	0.072526	0.9870	0.9878	0.9989
140	60.00	0.035522	0.072323	0.9842	0.9850	0.9862
150	65.56	0.035414	0.072103	0.9812	0.9820	0.9832
200	93.33	0.034792	0.070837	0.9640	0.9648	0.9659

Table 13 — Temperature corrections for water manometers with brass scales to obtain reading at 68°F

Plus corrections are to be added to, minus corrections to be subtracted from reading.

Temperature		Enter with indicated column height (mm or inches) and its temperature.																		
deg F	deg C	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
32	0.00	+0.13	+0.19	+0.25	+0.32	+0.38	+0.44	+0.51	+0.57	+0.63	+0.70	+0.76	+0.82	+0.89	+0.95	+1.02	+1.08	+1.14	+1.21	+1.27
35	1.67	0.13	0.20	0.27	0.34	0.40	0.47	0.54	0.60	0.67	0.74	0.80	0.87	0.94	1.01	1.07	1.14	1.21	1.27	1.34
40	4.44	0.15	0.22	0.30	0.37	0.44	0.52	0.59	0.67	0.74	0.81	0.89	0.96	1.04	1.11	1.18	1.26	1.33	1.41	1.48
45	7.22	0.15	0.22	0.29	0.36	0.44	0.51	0.58	0.65	0.73	0.80	0.87	0.94	1.02	1.09	1.16	1.24	1.31	1.38	1.46
50	10.00	0.13	0.20	0.26	0.33	0.39	0.46	0.53	0.59	0.66	0.72	0.79	0.85	0.92	0.98	1.05	1.12	1.18	1.25	1.32
55	12.78	0.11	0.16	0.21	0.27	0.32	0.37	0.43	0.48	0.53	0.59	0.64	0.69	0.75	0.80	0.85	0.91	0.96	1.01	1.07
60	15.56	0.07	0.11	0.15	0.18	0.22	0.25	0.29	0.33	0.36	0.40	0.44	0.47	0.51	0.55	0.58	0.62	0.65	0.69	0.73
65	18.33	+0.03	+0.04	+0.06	+0.07	+0.09	+0.10	+0.12	+0.13	+0.15	+0.16	+0.18	+0.19	+0.21	+0.22	+0.24	+0.25	+0.27	+0.28	+0.30
68	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	21.11	–0.02	–0.03	–0.04	–0.05	–0.06	–0.08	–0.09	–0.10	–0.11	–0.12	–0.13	–0.14	–0.15	–0.16	–0.17	–0.18	–0.19	–0.21	-0.22
75	23.89	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.41	0.45	0.49	0.53	0.57	0.61	0.65	0.69	0.73	0.77	0.81
77	25.00	0.11	0.16	0.21	0.27	0.32	0.37	0.43	0.48	0.53	0.59	0.64	0.69	0.75	0.80	0.85	0.91	0.96	1.02	1.07
80	26.67	0.15	0.22	0.30	0.37	0.44	0.52	0.59	0.67	0.74	0.81	0.89	0.96	1.04	1.11	1.18	1.26	1.33	1.41	1.48
85	29.44	0.22	0.33	0.44	0.55	0.67	0.78	0.89	1.00	1.11	1.22	1.33	1.44	1.55	1.66	1.78	1.89	2.00	2.11	2.22
90	32.22	0.30	0.45	0.61	0.76	0.91	1.06	1.21	1.36	1.51	1.67	1.82	1.97	2.12	2.27	2.42	2.57	2.73	2.88	3.03
95	35.00	0.39	0.59	0.78	0.98	1.17	1.37	1.56	1.76	1.95	2.15	2.34	2.54	2.73	2.93	3.12	3.32	3.51	3.71	3.90
100	37.78	0.48	0.73	0.97	1.21	1.45	1.69	1.94	2.18	2.42	2.66	2.90	3.15	3.39	3.63	3.87	4.11	4.36	4.60	4.84
105	40.56	0.58	0.88	1.17	1.46	1.75	2.04	2.33	2.63	2.92	3.21	3.50	3.79	4.08	4.38	4.67	4.96	5.25	5.54	5.83
110	43.33	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.14	4.48	4.82	5.17	5.51	5.86	6.20	6.55	6.89
115	46.11	0.80	1.20	1.60	2.00	2.40	2.80	3.20	3.60	4.00	4.40	4.80	5.20	5.60	6.00	6.40	6.80	7.20	7.60	8.00
120	48.89	–0.92	–1.37	–1.83	–2.29	–2.75	–3.20	–3.66	–4.12	–4.58	–5.03	–5.49	–5.95	–6.41	–6.87	–7.32	–7.78	–8.24	–8.70	–9.15

Table 14 — Temperature corrections for water manometers with brass scales to obtain reading at 60°F

Plus corrections are to be added to, minus corrections to be subtracted from reading.

Temperature		Enter with indicated column height (mm or inches) and its temperature.																		
deg F	deg C	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
32	0.00	+0.06	+0.08	+0.11	+0.14	+0.17	+0.19	+0.22	+0.25	+0.28	+0.30	+0.33	+0.36	+0.39	+0.41	+0.44	+0.47	+0.50	+0.52	+0.54
35	1.67	0.06	0.09	0.12	0.15	0.18	0.21	0.25	0.28	0.31	0.34	0.37	0.40	0.43	0.46	0.49	0.52	0.55	0.58	0.61
40	4.44	0.08	0.11	0.15	0.19	0.23	0.26	0.30	0.34	0.38	0.41	0.45	0.49	0.53	0.56	0.60	0.64	0.68	0.72	0.75
45	7.22	0.07	0.11	0.14	0.18	0.22	0.25	0.29	0.33	0.36	0.40	0.43	0.47	0.51	0.54	0.58	0.62	0.65	0.69	0.72
50	10.00	0.06	0.09	0.12	0.15	0.18	0.20	0.23	0.26	0.29	0.32	0.35	0.38	0.41	0.44	0.47	0.50	0.53	0.56	0.58
55	12.78	+0.03	+0.05	+0.07	+0.08	+0.10	+0.12	+0.14	+0.15	+0.17	+0.19	+0.20	+0.22	+0.24	+0.26	+0.27	+0.29	+0.31	+0.32	+0.34
60	15.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	18.33	–0.04	–0.06	–0.09	–0.11	–0.13	–0.15	–0.17	–0.19	–0.21	–0.24	–0.26	–0.28	–0.30	–0.32	–0.34	–0.36	–0.39	–0.41	–0.43
68	20.00	0.07	0.11	0.15	0.18	0.22	0.25	0.29	0.33	0.36	0.40	0.44	0.47	0.51	0.55	0.58	0.62	0.65	0.69	0.73
70	21.11	0.09	0.14	0.19	0.24	0.28	0.33	0.38	0.42	0.47	0.52	0.57	0.61	0.66	0.71	0.75	0.80	0.85	0.90	0.94
75	23.89	0.15	0.23	0.31	0.38	0.46	0.54	0.61	0.69	0.77	0.85	0.92	1.00	1.08	1.15	1.23	1.31	1.38	1.46	1.54
77	25.00	0.18	0.27	0.36	0.45	0.54	0.63	0.72	0.81	0.90	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.62	1.71	1.80
80	26.67	0.22	0.33	0.44	0.55	0.66	0.77	0.88	0.99	1.10	1.21	1.32	1.43	1.54	1.65	1.76	1.87	1.98	2.09	2.21
85	29.44	0.29	0.44	0.59	0.74	0.88	1.03	1.18	1.32	1.47	1.62	1.77	1.91	2.06	2.21	2.36	2.50	2.65	2.80	2.94
90	32.22	0.38	0.56	0.75	0.94	1.13	1.31	1.50	1.69	1.88	2.06	2.25	2.44	2.63	2.81	3.00	3.19	3.38	3.57	3.75
95	35.00	0.46	0.69	0.93	1.16	1.39	1.62	1.85	2.08	2.31	2.54	2.78	3.01	3.24	3.47	3.70	3.93	4.16	4.39	4.63
100	37.78	0.56	0.83	1.11	1.39	1.67	1.95	2.22	2.50	2.78	3.06	3.34	3.62	3.89	4.17	4.45	4.73	5.01	5.28	5.56
105	40.56	0.66	0.98	1.31	1.64	1.97	2.29	2.62	2.95	3.28	3.61	3.93	4.26	4.59	4.92	5.25	5.57	5.90	6.23	6.56
110	43.33	0.76	1.14	1.52	1.90	2.28	2.66	3.05	3.43	3.81	4.19	4.57	4.95	5.33	5.71	6.09	6.47	6.85	7.23	7.61
115	46.11	0.87	1.31	1.74	2.18	2.62	3.05	3.49	3.93	4.36	4.80	5.23	5.67	6.11	6.54	6.98	7.41	7.85	8.29	8.72
120	48.89	–0.99	–1.48	–1.97	–2.47	–2.96	–3.46	–3.95	–4.44	–4.94	–5.43	–5.92	–6.42	–6.91	–7.40	–7.90	–8.39	–8.89	–9.38	–9.87

Table 15A — Equivalents in psi, of water columns in inches at various temperatures

Temperature of water in deg F

Inches Water	40	50	60	68	70	80	90	100	150	200
	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi
0.1	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0036	0.0035	0.0035
0.2	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0071	0.0070
0.3	0.0108	0.0108	0.0108	0.0108	0.0108	0.0108	0.0108	0.0108	0.0106	0.0104
0.4	0.0145	0.0144	0.0144	0.0144	0.0144	0.0144	0.0144	0.0144	0.0142	0.0139
0.5	0.0181	0.0181	0.0180	0.0180	0.0180	0.0180	0.0180	0.0179	0.0177	0.0174
0.6	0.0217	0.0217	0.0217	0.0216	0.0216	0.0216	0.0216	0.0215	0.0213	0.0209
0.7	0.0253	0.0253	0.0253	0.0252	0.0252	0.0252	0.0252	0.0251	0.0248	0.0244
0.8	0.0289	0.0289	0.0289	0.0288	0.0288	0.0288	0.0288	0.0287	0.0283	0.0278
0.9	0.0325	0.0325	0.0325	0.0325	0.0324	0.0324	0.0323	0.0323	0.0319	0.0313
1.0	0.0361	0.0361	0.0361	0.0361	0.0361	0.0360	0.0359	0.0359	0.0354	0.0348
2.	0.0723	0.0722	0.0722	0.0721	0.0721	0.0720	0.0719	0.0718	0.0708	0.0696
3.	0.1084	0.1084	0.1083	0.1082	0.1082	0.1080	0.1078	0.1076	0.1062	0.1044
4.	0.1445	0.1445	0.1444	0.1443	0.1442	0.1440	0.1438	0.1435	0.1417	0.1392
5.	0.1806	0.1806	0.1805	0.1803	0.1803	0.1800	0.1797	0.1794	0.1771	0.1740
6.	0.2168	0.2167	0.2166	0.2164	0.2163	0.2160	0.2157	0.2153	0.2125	0.2088
7.	0.2529	0.2528	0.2526	0.2524	0.2524	0.2520	0.2516	0.2511	0.2479	0.2435
8.	0.2890	0.2889	0.2887	0.2885	0.2884	0.2880	0.2876	0.2870	0.2833	0.2783
9.	0.3251	0.3251	0.3248	0.3246	0.3245	0.3240	0.3235	0.3229	0.3187	0.3131
10.	0.3613	0.3612	0.3609	0.3606	0.3605	0.3600	0.3595	0.3588	0.3541	0.3479
20.	0.7225	0.7223	0.7218	0.7213	0.7211	0.7201	0.7189	0.7175	0.7083	0.6958
30.	1.0838	1.0835	1.0828	1.0819	1.0816	1.0802	1.0784	1.0763	1.0624	1.0438
40	1.4451	1.4447	1.4437	1.4425	1.4422	1.4402	1.4378	1.4351	1.4166	1.3917
50.	1.8063	1.8058	1.8046	1.8031	1.8027	1.8002	1.7973	1.7938	1.7707	1.7396
60.	2.1676	2.1670	2.1655	2.1638	2.1632	2.1603	2.1567	2.1526	2.1248	2.0875
70.	2.5289	2.5282	2.5264	2.5244	2.5238	2.5204	2.5162	2.5113	2.4790	2.4354
80.	2.8901	2.8893	2.8874	2.8850	2.8843	2.8804	2.8756	2.8701	2.8331	2.7834
90.	3.2514	3.2505	3.2483	3.2456	3.2449	3.2404	3.2351	3.2289	3.1873	3.1313
100.	3.6126	3.6117	3.6092	3.6063	3.6054	3.6005	3.5945	3.5876	3.5414	3.4792

Table 15B — Equivalents in psi, of water columns in feet and inches at various temperatures

Temperature of water columns in deg F

Water Column		40	50	60	68	70	80	90	100	150	200
Feet	In.	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi
	1/8	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0045	0.0044	0.0043
	1/4	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090	0.0089	0.0087
	3/8	0.0135	0.0135	0.0135	0.0135	0.0135	0.0135	0.0135	0.0135	0.0133	0.0130
	1/2	0.0181	0.0181	0.0180	0.0180	0.0180	0.0180	0.1880	0.0179	0.0177	0.0174
	5/8	0.0226	0.0226	0.0226	0.0225	0.0225	0.0225	0.0225	0.0224	0.0221	0.0217
	3/4	0.0271	0.0271	0.0271	0.0270	0.0270	0.0270	0.0270	0.0269	0.0266	0.0261
	7/8	0.0316	0.0316	0.0316	0.0316	0.0315	0.0315	0.0315	0.0314	0.0310	0.0304
	1	0.0361	0.0361	0.0361	0.0361	0.0361	0.0360	0.0359	0.0359	0.0354	0.0348
	2	0.0722	0.0722	0.0722	0.0721	0.0721	0.0720	0.0719	0.0718	0.0708	0.0696
	3	0.1084	0.1084	0.1083	0.1082	0.1082	0.1080	0.1078	0.1076	0.1062	0.1044
	4	0.1445	0.1445	0.1444	0.1443	0.1442	0.1440	0.1438	0.1435	0.1417	0.1392
	5	0.1806	0.1806	0.1805	0.1803	0.1803	0.1800	0.1797	0.1794	0.1771	0.1740
	6	0.2168	0.2167	0.2166	0.2164	0.2163	0.2160	0.2157	0.2153	0.2125	0.2088
	7	0.2529	0.2528	0.2526	0.2524	0.2524	0.2520	0.2516	0.2511	0.2479	0.2435
	8	0.2890	0.2889	0.2887	0.2885	0.2884	0.2880	0.2876	0.2870	0.2833	0.2783
	9	0.3251	0.3251	0.3248	0.3246	0.3245	0.3240	0.3235	0.3229	0.3187	0.3131
	10	0.3613	0.3612	0.3609	0.3606	0.3605	0.3600	0.3595	0.3588	0.3541	0.3479
	11	0.3974	0.3973	0.3970	0.3967	0.3966	0.3961	0.3954	0.3946	0.3896	0.3827
	12	0.4335	0.4334	0.4331	0.4328	0.4326	0.4321	0.4313	0.4305	0.4250	0.4175
1		0.4335	0.4334	0.4331	0.4328	0.4326	0.4321	0.4313	0.4305	0.4250	0.4175
2		0.8670	0.8668	0.8662	0.8655	0.8653	0.8641	0.8627	0.8610	0.8499	0.8350
3		1.3005	1.3002	1.2993	1.2983	1.2979	1.2962	1.2940	1.2915	1.2749	1.2525
4		1.7340	1.7336	1.7324	1.7310	1.7306	1.7882	1.7254	1.7220	1.6999	1.6700
5		2.1676	2.1670	2.1655	2.1638	2.1632	2.1603	2.1567	2.1526	2.1248	2.0875
6		2.6011	2.6004	2.5968	2.5965	2.5959	2.5924	2.5880	2.5831	2.5498	2.5050
7		3.0346	3.0338	3.0317	3.0293	3.0285	3.0244	3.0194	3.0136	2.9748	2.9225
8		3.4681	3.4672	3.4648	3.4620	3.4612	3.4565	3.4507	3.4441	3.3997	3.3400
9		3.9016	3.9006	3.8979	3.8948	3.8938	3.8885	3.8821	3.8746	3.8248	3.7575
10		4.3351	4.3340	4.3310	4.3276	4.3265	4.3206	4.3134	4.3051	4.2497	4.1750
11		4.7686	4.7674	4.7641	4.7603	4.7591	4.7527	4.7447	4.7356	4.6746	4.5925
12		5.2021	5.2008	5.1972	5.1931	5.1918	5.1847	5.1761	5.1661	5.0996	5.0100

Table 16 — Conversion factors for mercury columns at various temperatures

Mercury temperature			Factor for converting mercury column height of various temperatures to:			
deg F	deg C	Equiv. psi of 1 in. Hg	Mercury column at 32° F	Water column at 60° F	Water column 68° F	Water column 77° F
0	–17.78	0.49275	1.0032	13.652	13.663	13.680
10	–12.22	0.49225	1.0022	13.638	13.649	13.665
20	–6.67	0.49175	1.0012	13.625	13.636	13.652
30	–1.11	0.49126	1.0002	13.611	13.622	13.638
32	0.00	1.49116	1.0000	13.609	13.620	13.635
35	1.67	0.49101	0.9997	13.604	13.615	13.631
40	4.44	0.49076	0.9992	13.598	13.609	13.624
45	7.22	0.49051	0.9987	13.591	13.602	13.618
50	10.00	0.49026	0.9982	13.584	13.595	13.611
55	12.78	0.40002	0.9977	13.577	13.588	13.604
60	15.56	0.48977	0.9972	13.570	13.581	13.597
65	18.33	0.48952	0.9967	13.564	13.575	13.590
68	20.00	0.48938	0.9964	13.560	13.570	13.586
70	21.11	0.48928	0.9962	13.557	13.568	13.584
75	23.89	0.48904	0.9957	13.550	13.561	13.577
77	25.00	0.48894	0.9955	13.547	13.558	13.574
80	26.67	0.48879	0.9952	13.543	13.554	13.570
85	29.44	0.48854	0.9947	13.536	13.547	13.563
90	32.22	0.48830	0.9942	13.530	13.541	13.556
95	35.00	0.48805	0.9937	13.523	13.534	13.549
100	37.78	0.48780	0.9932	13.516	13.527	13.543
110	43.33	0.48732	0.9922	13.502	13.513	13.529
120	48.89	0.48683	0.9912	13.489	13.500	13.515
130	54.44	0.48634	0.9902	13.475	13.486	13.502
140	60.00	0.48585	0.9892	13.462	13.472	13.488
150	65.56	0.48536	0.9882	13.448	13.459	13.475
160	71.11	0.48488	0.9872	13.434	13.445	13.461
170	76.67	0.48439	0.9862	13.421	13.432	13.447
180	82.22	0.48391	0.9852	13.407	13.418	13.434
190	87.78	0.48342	0.9842	13.393	13.404	13.420
200	93.33	0.48293	0.9832	13.380	13.391	13.406

Table 17 — Temperature corrections for mercury manometers and barometers with brass scales to obtain reading at 0°C

All corrections are to be subtracted

Enter with indicated column height (mm, in., of mb) and its temperature

Temperature deg C	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.08	0.12	0.16	0.20	0.24	0.29	0.33	0.37	0.41	0.45	0.49	0.53	0.57	0.61	0.65	0.69	0.73	0.78	0.82	0.86	0.90	0.94	0.98
10	0.16	0.24	0.33	0.41	0.49	0.57	0.65	0.73	0.82	0.90	0.98	1.06	1.14	1.22	1.30	1.39	1.47	1.55	1.63	1.71	1.79	1.88	1.96
11	0.18	0.27	0.36	0.45	0.54	0.63	0.72	0.81	0.90	0.99	1.08	1.17	1.26	1.35	1.44	1.52	1.61	1.70	1.79	1.88	1.97	2.06	2.15
12	0.20	0.29	0.39	0.49	0.59	0.68	0.78	0.88	0.98	1.08	1.17	1.27	1.37	1.47	1.57	1.66	1.76	1.86	1.96	2.05	2.15	2.25	2.35
13	0.21	0.32	0.42	0.53	0.64	0.74	0.85	0.95	1.06	1.17	1.27	1.38	1.48	1.59	1.70	1.80	1.91	2.01	2.12	2.23	2.33	2.44	2.54
14	0.23	0.34	0.46	0.57	0.68	0.80	0.91	1.03	1.14	1.25	1.37	1.48	1.60	1.71	1.83	1.94	2.05	2.17	2.28	2.40	2.51	2.62	2.74
15	0.24	0.37	0.49	0.61	0.73	0.86	0.98	1.10	1.22	1.34	1.47	1.59	1.71	1.83	1.96	2.08	2.20	2.32	2.44	2.57	2.69	2.81	2.93
16	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.17	1.30	1.43	1.56	1.69	1.82	1.96	2.09	2.22	2.35	2.48	2.61	2.74	2.87	3.00	3.13
17	0.28	0.42	0.55	0.69	0.83	0.97	1.11	1.25	1.38	1.52	1.66	1.80	1.94	2.08	2.22	2.35	2.49	2.63	2.77	2.91	3.05	3.18	3.32
18	0.29	0.44	0.59	0.73	0.88	1.03	1.17	1.32	1.47	1.61	1.78	1.91	2.05	2.20	2.35	2.49	2.64	2.79	2.93	3.08	3.22	3.37	3.52
19	0.31	0.46	0.62	0.77	0.93	1.08	1.24	1.39	1.55	1.70	1.86	2.01	2.17	2.32	2.48	2.63	2.78	2.94	3.09	3.25	3.40	3.56	3.71
20	0.33	0.49	0.65	0.81	0.98	1.14	1.30	1.47	1.63	1.79	1.95	2.12	2.28	2.44	2.60	2.77	2.93	3.09	3.26	3.42	3.58	3.74	3.91
21	0.34	0.51	0.68	0.85	1.03	1.20	1.37	1.54	1.71	1.88	2.05	2.22	2.39	2.56	2.73	2.91	3.08	3.25	3.42	3.59	3.76	3.93	4.10
22	0.36	0.54	0.72	0.90	1.07	1.25	1.43	1.61	1.79	1.97	2.15	2.33	2.51	2.69	2.86	3.04	3.22	3.40	3.58	3.76	3.94	4.12	4.30
23	0.37	0.56	0.75	0.94	1.12	1.31	1.50	1.68	1.87	2.06	2.25	2.43	2.62	2.81	2.99	3.18	3.37	3.56	3.74	3.93	4.12	4.30	4.49
24	0.39	0.59	0.78	0.98	1.17	1.37	1.56	1.76	1.95	2.15	2.34	2.54	2.73	2.93	3.12	3.32	3.51	3.71	3.90	4.10	4.30	4.49	4.69
25	0.41	0.61	0.81	1.02	1.22	1.42	1.63	1.83	2.03	2.24	2.44	2.64	2.85	3.05	3.25	3.46	3.66	3.86	4.07	4.27	4.47	4.68	4.88
26	0.42	0.63	0.85	1.06	1.27	1.48	1.69	1.90	2.11	2.33	2.54	2.75	2.96	3.17	3.38	3.59	3.81	4.02	4.23	4.44	4.65	4.86	5.07
27	0.44	0.66	0.88	1.10	1.32	1.54	1.76	1.98	2.20	2.41	2.63	2.85	3.07	3.29	3.51	3.73	3.95	4.17	4.39	4.61	4.83	5.05	5.27
28	0.46	0.68	0.91	1.14	1.37	1.59	1.82	2.05	2.28	2.50	2.73	2.96	3.19	3.41	3.64	3.87	4.10	4.32	4.55	4.78	5.01	5.23	5.46
29	0.47	0.71	0.94	1.18	1.41	1.65	1.89	2.12	2.36	2.59	2.83	3.06	3.30	3.54	3.77	4.01	4.24	4.48	4.71	4.95	5.19	5.42	5.66
30	0.49	0.73	0.98	1.22	1.46	1.71	1.95	2.19	2.44	2.68	2.93	3.17	3.41	3.66	3.90	4.14	4.39	4.63	4.88	5.12	5.36	5.61	5.85
31	0.50	0.76	1.01	1.26	1.51	1.76	2.01	2.27	2.52	2.77	3.02	3.27	3.53	3.78	4.03	4.28	4.53	4.79	5.04	5.29	5.54	5.79	6.04
32	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	2.86	3.12	3.38	3.64	3.90	4.16	4.42	4.68	4.94	5.20	5.46	5.72	5.98	6.24
33	0.54	0.80	1.07	1.34	1.61	1.88	2.14	2.41	2.68	2.95	3.22	3.48	3.75	4.02	4.29	4.56	4.82	5.09	5.36	5.63	5.90	6.16	6.43
34	0.55	0.83	1.10	1.38	1.66	1.93	2.21	2.48	2.76	3.04	3.31	3.59	3.87	4.14	4.42	4.69	4.97	5.25	5.52	5.80	6.07	6.35	6.63
35	0.57	0.85	1.14	1.42	1.70	1.99	2.27	2.56	2.84	3.13	3.41	3.69	3.98	4.26	4.55	4.83	5.11	5.40	5.68	5.97	6.25	6.54	6.82
36	0.58	0.88	1.17	1.46	1.75	2.05	2.34	2.63	2.92	3.21	3.51	3.80	4.09	4.38	4.68	4.97	5.26	5.55	5.84	6.14	6.43	6.72	7.01
37	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.30	3.60	3.90	4.20	4.50	4.80	5.10	5.40	5.71	6.01	6.31	6.61	6.91	7.21
38	0.62	0.92	1.23	1.54	1.85	2.16	2.47	2.77	3.08	3.39	3.70	4.01	4.32	4.62	4.93	5.24	5.55	5.86	6.17	6.47	6.78	7.09	7.40
39	0.63	0.95	1.27	1.58	1.90	2.21	2.53	2.85	3.16	3.48	3.80	4.11	4.43	4.75	5.06	5.38	5.69	6.01	6.33	6.64	6.96	7.28	7.59
40	0.65	0.97	1.30	1.62	1.95	2.27	2.60	2.92	3.24	3.57	3.89	4.22	4.54	4.87	5.19	5.52	5.84	6.16	6.49	6.81	7.14	7.46	7.79
45	0.73	1.09	1.46	1.82	2.19	2.55	2.92	3.28	3.65	4.01	4.38	4.74	5.11	5.47	5.83	6.20	6.56	6.93	7.29	7.66	8.02	8.39	8.75
50	0.81	1.21	1.62	2.02	2.43	2.83	3.24	3.64	4.05	4.45	4.86	5.26	5.67	6.07	6.48	6.88	7.29	7.69	8.10	8.50	8.91	9.31	9.73

Table 18 — Temperature corrections for mercury manometers and barometers with brass scales to obtain readings at 32°F

All corrections are to be subtracted

Enter with indicated column height (mm, in., or mb) and its temperature:

Temperature deg F	10	15	20	25	30	35	40	45	50	55	60	70	80	90	100
32	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
35	0.003	0.004	0.005	0.007	0.008	0.009	0.011	0.012	0.014	0.015	0.016	0.019	0.022	0.024	0.027
40	0.007	0.011	0.014	0.018	0.022	0.025	0.029	0.033	0.036	0.040	0.044	0.051	0.058	0.065	0.072
45	0.012	0.018	0.024	0.029	0.035	0.041	0.047	0.053	0.059	0.065	0.071	0.082	0.094	0.106	0.118
50	0.016	0.024	0.033	0.041	0.049	0.057	0.065	0.073	0.081	0.090	0.098	0.114	0.130	0.147	0.163
51	0.017	0.026	0.034	0.043	0.052	0.060	0.069	0.077	0.086	0.095	0.103	0.120	0.138	0.155	0.172
52	0.018	0.027	0.036	0.045	0.054	0.063	0.072	0.081	0.090	0.100	0.109	0.127	0.145	0.163	0.181
53	0.019	0.028	0.038	0.048	0.057	0.066	0.076	0.086	0.095	0.104	0.114	0.133	0.152	0.171	0.190
54	0.020	0.030	0.040	0.050	0.060	0.070	0.080	0.090	0.099	0.109	0.119	0.139	0.159	0.179	0.199
55	0.021	0.031	0.042	0.052	0.062	0.073	0.083	0.094	0.104	0.114	0.125	0.146	0.166	0.187	0.208
56	0.022	0.033	0.043	0.054	0.065	0.076	0.087	0.098	0.108	0.119	0.130	0.152	0.174	0.196	0.217
57	0.023	0.034	0.045	0.056	0.068	0.079	0.090	0.102	0.113	0.124	0.136	0.158	0.181	0.204	0.226
58	0.024	0.035	0.047	0.059	0.070	0.082	0.094	0.106	0.117	0.129	0.141	0.164	0.188	0.212	0.235
59	0.024	0.037	0.049	0.061	0.073	0.086	0.098	0.110	0.122	0.134	0.147	0.171	0.196	0.220	0.244
60	0.025	0.038	0.051	0.064	0.076	0.089	0.102	0.114	0.127	0.139	0.152	0.178	0.203	0.228	0.254
61	0.026	0.039	0.053	0.066	0.079	0.092	0.105	0.118	0.131	0.144	0.158	0.184	0.210	0.236	0.263
62	0.027	0.041	0.054	0.068	0.082	0.095	0.109	0.122	0.135	0.149	0.163	0.190	0.218	0.244	0.272
63	0.028	0.042	0.056	0.070	0.084	0.098	0.112	0.126	0.140	0.154	0.169	0.197	0.225	0.252	0.281
64	0.029	0.044	0.058	0.072	0.087	0.102	0.116	0.130	0.145	0.159	0.174	0.203	0.232	0.260	0.290
65	0.030	0.045	0.060	0.075	0.090	0.105	0.120	0.134	0.149	0.164	0.179	0.209	0.239	0.268	0.299
66	0.031	0.046	0.062	0.077	0.092	0.108	0.123	0.139	0.154	0.169	0.185	0.216	0.246	0.277	0.308
67	0.032	0.048	0.063	0.079	0.095	0.111	0.127	0.143	0.158	0.174	0.190	0.222	0.253	0.285	0.317
68	0.033	0.049	0.065	0.081	0.098	0.114	0.130	0.147	0.163	0.179	0.195	0.228	0.260	0.293	0.326
69	0.034	0.050	0.067	0.084	0.100	0.117	0.134	0.151	0.167	0.184	0.201	0.234	0.268	0.301	0.335
70	0.034	0.052	0.069	0.086	0.103	0.120	0.138	0.155	0.172	0.189	0.206	0.241	0.275	0.310	0.344
71	0.035	0.053	0.071	0.088	0.106	0.124	0.141	0.159	0.176	0.194	0.212	0.247	0.282	0.318	0.353
72	0.036	0.054	0.072	0.090	0.109	0.127	0.145	0.163	0.181	0.199	0.217	0.253	0.290	0.326	0.362
73	0.037	0.056	0.074	0.093	0.111	0.130	0.148	0.167	0.185	0.204	0.223	0.260	0.297	0.334	0.371
74	0.038	0.057	0.076	0.095	0.114	0.133	0.152	0.171	0.190	0.209	0.228	0.266	0.304	0.341	0.380
75	0.039	0.059	0.078	0.097	0.117	0.136	0.156	0.175	0.194	0.214	0.233	0.272	0.311	0.349	0.389
76	0.040	0.060	0.080	0.100	0.119	0.139	0.159	0.179	0.199	0.219	0.239	0.279	0.318	0.358	0.398
77	0.041	0.061	0.081	0.102	0.122	0.142	0.163	0.183	0.203	0.224	0.244	0.285	0.325	0.366	0.407
78	0.042	0.062	0.083	0.104	0.125	0.146	0.166	0.187	0.208	0.229	0.250	0.291	0.333	0.374	0.416
79	0.042	0.064	0.085	0.106	0.128	0.149	0.170	0.191	0.212	0.234	0.255	0.298	0.340	0.383	0.425
80	0.043	0.065	0.087	0.108	0.130	0.152	0.174	0.195	0.217	0.239	0.260	0.304	0.347	0.391	0.434
81	0.044	0.066	0.089	0.111	0.133	0.155	0.177	0.199	0.221	0.244	0.266	0.310	0.354	0.399	0.443
82	0.045	0.068	0.090	0.113	0.136	0.158	0.181	0.203	0.226	0.249	0.271	0.316	0.362	0.407	0.452
83	0.046	0.069	0.092	0.115	0.138	0.161	0.184	0.207	0.230	0.254	0.277	0.323	0.369	0.415	0.461

Table 18 (continued from previous page)

Temperature deg F	10	15	20	25	30	35	40	45	50	55	60	70	80	90	100
84	0.047	0.070	0.094	0.118	0.141	0.164	0.188	0.211	0.235	0.258	0.282	0.329	0.376	0.423	0.470
85	0.048	0.072	0.096	0.120	0.144	0.168	0.192	0.215	0.239	0.263	0.287	0.335	0.383	0.431	0.479
86	0.049	0.073	0.098	0.122	0.146	0.171	0.195	0.219	0.244	0.268	0.293	0.341	0.390	0.439	0.488
87	0.050	0.075	0.099	0.124	0.149	0.174	0.199	0.224	0.248	0.273	0.298	0.348	0.397	0.447	0.497
88	0.050	0.076	0.101	0.126	0.152	0.177	0.202	0.227	0.252	0.278	0.303	0.354	0.404	0.455	0.505
89	0.051	0.077	0.103	0.128	0.154	0.180	0.206	0.231	0.257	0.283	0.308	0.360	0.411	0.463	0.514
90	0.052	0.078	0.105	0.131	0.157	0.183	0.209	0.235	0.261	0.288	0.314	0.366	0.418	0.471	0.523
91	0.053	0.080	0.106	0.133	0.160	0.186	0.213	0.239	0.266	0.293	0.319	0.372	0.426	0.479	0.532
92	0.054	0.081	0.108	0.135	0.162	0.189	0.216	0.243	0.270	0.298	0.324	0.379	0.433	0.487	0.541
93	0.055	0.082	0.110	0.138	0.165	0.192	0.220	0.248	0.275	0.302	0.330	0.385	0.440	0.495	0.550
94	0.056	0.084	0.112	0.140	0.168	0.196	0.224	0.252	0.279	0.307	0.335	0.391	0.447	0.503	0.559
95	0.057	0.085	0.114	0.142	0.170	0.199	0.227	0.256	0.284	0.312	0.341	0.398	0.455	0.511	0.568
96	0.058	0.087	0.115	0.144	0.173	0.202	0.231	0.260	0.288	0.317	0.346	0.404	0.462	0.519	0.577
97	0.059	0.088	0.117	0.146	0.176	0.205	0.234	0.264	0.293	0.322	0.352	0.410	0.469	0.527	0.586
98	0.060	0.089	0.119	0.149	0.178	0.208	0.233	0.268	0.297	0.327	0.357	0.416	0.476	0.535	0.595
99	0.060	0.091	0.121	0.151	0.181	0.211	0.242	0.272	0.302	0.332	0.362	0.423	0.483	0.544	0.604
100	0.061	0.092	0.123	0.153	0.184	0.215	0.245	0.276	0.306	0.337	0.368	0.429	0.490	0.552	0.613
101	0.062	0.093	0.124	0.156	0.187	0.218	0.249	0.280	0.311	0.342	0.373	0.435	0.497	0.560	0.622
102	0.063	0.095	0.126	0.158	0.189	0.221	0.252	0.284	0.315	0.347	0.379	0.442	0.505	0.568	0.631
103	0.064	0.096	0.128	0.160	0.192	0.224	0.256	0.288	0.320	0.352	0.384	0.448	0.512	0.576	0.640
104	0.065	0.097	0.130	0.162	0.195	0.227	0.260	0.292	0.324	0.357	0.389	0.454	0.519	0.584	0.649
105	0.066	0.099	0.132	0.164	0.197	0.230	0.263	0.296	0.329	0.362	0.395	0.461	0.526	0.592	0.658
106	0.067	0.100	0.133	0.167	0.200	0.233	0.266	0.300	0.333	0.366	0.400	0.466	0.533	0.599	0.666
107	0.068	0.101	0.135	0.169	0.203	0.236	0.270	0.304	0.338	0.371	0.405	0.472	0.540	0.607	0.675
108	0.068	0.103	0.137	0.171	0.205	0.239	0.274	0.308	0.342	0.376	0.410	0.479	0.547	0.616	0.684
109	0.069	0.104	0.139	0.173	0.208	0.243	0.277	0.312	0.347	0.381	0.416	0.485	0.554	0.624	0.693
110	0.070	0.105	0.140	0.176	0.211	0.246	0.281	0.316	0.351	0.386	0.421	0.491	0.562	0.632	0.702
111	0.071	0.107	0.142	0.178	0.213	0.249	0.284	0.320	0.356	0.391	0.427	0.498	0.569	0.640	0.711
112	0.072	0.108	0.144	0.180	0.216	0.252	0.288	0.324	0.360	0.396	0.432	0.504	0.576	0.648	0.720
113	0.073	0.109	0.146	0.182	0.219	0.255	0.292	0.328	0.365	0.401	0.438	0.511	0.583	0.656	0.729
114	0.074	0.111	0.148	0.184	0.221	0.258	0.295	0.332	0.369	0.406	0.443	0.517	0.590	0.664	0.738
115	0.075	0.112	0.149	0.187	0.224	0.261	0.299	0.336	0.374	0.411	0.448	0.523	0.598	0.672	0.747
116	0.076	0.113	0.151	0.189	0.227	0.265	0.302	0.340	0.378	0.416	0.454	0.529	0.605	0.680	0.756
117	0.076	0.115	0.153	0.191	0.230	0.268	0.306	0.344	0.383	0.421	0.459	0.536	0.612	0.689	0.765
118	0.077	0.116	0.155	0.194	0.232	0.271	0.310	0.348	0.387	0.426	0.464	0.542	0.619	0.697	0.774
119	0.078	0.117	0.157	0.196	0.235	0.274	0.313	0.352	0.392	0.431	0.470	0.548	0.626	0.705	0.783
120	0.079	0.119	0.158	0.198	0.238	0.277	0.317	0.356	0.396	0.436	0.475	0.554	0.634	0.713	0.792

Table 19 — Equivalents in psi of mercury columns in inches of mercury at various temperatures

Mercury inches	Mercury temperature of water in deg F									
	20	30	32	40	50	60	70	80	90	100
	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi
0.1	0.0492	0.0491	0.0491	0.0491	0.0490	0.0490	0.0489	0.0489	0.0488	0.0488
0.2	0.0984	0.0983	0.0982	0.0982	0.0981	0.0980	0.0979	0.0978	0.0977	0.0976
0.3	0.1475	0.1474	0.1474	0.1472	0.1471	0.1469	0.1468	0.1468	0.1465	0.1463
0.4	0.1967	0.1965	0.1965	0.1963	0.1961	0.1959	0.1957	0.1955	0.1953	0.1951
0.5	0.2459	0.2456	0.2456	0.2454	0.2451	0.2449	0.2446	0.2444	0.2442	0.2439
0.6	0.2951	0.2948	0.2947	0.2945	0.2942	0.2939	0.2936	0.2933	0.2930	0.2927
0.7	0.3442	0.3439	0.3438	0.3435	0.3432	0.3428	0.3425	0.3422	0.3418	0.3415
0.8	0.3934	0.3930	0.3929	0.3926	0.3922	0.3918	0.3914	0.3910	0.3906	0.3902
0.9	0.4426	0.4421	0.4420	0.4417	0.4412	0.4408	0.4404	0.4399	0.4395	0.4390
1.0	0.4918	0.4913	0.4912	0.4908	0.4903	0.4898	0.4893	0.4888	0.4883	0.4878
2	0.9835	0.9825	0.9823	0.9815	0.9805	0.9795	0.9786	0.9776	0.9766	0.9756
3	1.4753	1.4738	1.4735	1.4723	1.4708	1.4693	1.4678	1.4664	1.4649	1.4634
4	1.9670	1.9650	1.9646	1.9630	1.9611	1.9591	1.9571	1.9551	1.9532	1.9512
5	2.4588	2.4563	2.4558	2.4538	2.4513	2.4489	2.4464	2.4439	2.4415	2.4390
6	2.9505	2.9475	2.9469	2.9446	2.9416	2.9386	2.9357	2.9327	2.9298	2.9268
7	3.4423	3.4388	3.4381	3.4353	3.4319	3.4284	3.4249	3.4215	3.4181	3.4146
8	3.9340	3.9300	3.9293	3.9261	3.9221	9.9182	3.9142	3.9103	3.9064	3.9024
9	4.4258	4.4213	4.4204	4.4168	4.4124	4.4080	4.4035	4.3991	4.3947	4.3902
10	4.9175	4.9126	4.9116	4.9076	4.9026	4.8977	4.8928	4.8879	4.8830	4.8780
20	9.8351	9.8251	9.8231	9.8152	9.8053	9.7955	9.7856	9.7757	9.7659	9.7561
30	14.753	14.738	14.735	14.723	14.708	14.693	14.678	14.664	14.649	14.634
40	19.670	19.650	19.646	19.630	19.611	19.591	19.571	19.551	19.532	19.512
50	24.588	24.563	24.558	24.538	24.513	24.489	24.464	24.439	24.415	24.390
60	29.505	29.475	29.469	29.446	29.416	29.386	29.357	29.327	29.298	29.268
70	34.423	34.388	34.381	34.353	34.319	34.284	34.249	34.215	34.181	34.146
80	39.340	39.300	39.293	39.261	39.221	39.182	39.142	39.103	39.064	39.024
90	44.258	44.213	44.204	44.168	44.124	44.080	44.035	43.991	43.947	43.902
100	49.175	49.126	49.116	49.076	49.026	48.997	48.928	48.879	48.830	48.780

Example: 48.36 in. of mercury at 85° F = (19.542 + 3.908 + 0.146 + 0.029) = 23.625 psi.

Table 20A — Equivalents of mercury columns at various temperatures to water columns at 20°C (68°F) height of water column

Mercury Height	Temperature of mercury column deg F							
	32	40	50	60	70	80	90	100
0.1	1.362	1.361	1.359	1.358	1.357	1.355	1.354	1.353
0.2	2.724	2.722	2.719	2.716	2.713	2.711	2.708	2.705
0.3	4.086	4.083	7.078	4.074	4.070	4.066	4.062	4.058
0.4	5.448	5.443	5.438	5.432	5.427	5.422	5.416	5.411
0.5	6.810	6.804	6.797	6.791	6.784	6.777	6.770	6.763
0.6	8.172	8.165	8.157	8.149	8.140	8.132	8.124	8.116
0.7	9.534	9.526	9.516	9.507	9.497	9.488	9.478	9.469
0.8	10.896	10.887	10.876	10.865	10.854	10.843	10.832	10.821
0.9	12.258	12.248	12.235	12.223	12.211	12.198	12.186	12.174
1	13.620	13.608	13.595	13.581	13.567	13.554	13.540	13.527
2	27.239	27.217	27.190	27.162	27.135	27.108	27.080	27.053
3	40.859	40.826	40.784	40.743	40.702	40.661	40.621	40.580
4	54.478	54.434	54.379	54.325	54.270	54.215	54.161	54.106
5	68.098	68.042	68.974	67.906	67.837	67.769	67.701	67.633
6	81.717	81.651	81.569	81.487	81.405	81.323	81.241	81.159
7	95.337	95.260	95.163	95.068	94.972	94.877	94.781	94.686
8	108.956	108.868	108.758	108.649	108.539	108.430	108.321	108.212
9	122.576	122.476	122.353	122.230	122.107	121.984	121.862	121.739
10	136.195	136.085	135.948	135.812	135.674	135.538	135.402	135.266
20	272.390	272.170	271.896	271.623	271.349	271.076	270.804	270.531
30	408.586	408.255	407.843	407.434	407.023	406.614	406.205	405.797
40	544.781	544.340	543.791	543.246	542.697	542.152	541.607	541.062
50	680.976	680.425	679.739	679.058	678.372	677.690	677.009	676.328
60	817.171	816.510	815.687	814.869	814.046	813.228	812.411	811.593
70	953.366	952.595	951.635	950.680	949.720	948.766	947.813	946.859
80	1089.56	1088.68	1087.58	1086.49	1085.39	1084.30	1083.21	1082.12
90	1225.76	1224.76	1223.53	1222.30	1221.07	1219.84	1218.62	1217.39
100	1361.95	1360.85	1359.48	1358.12	1356.74	1355.38	1354.02	1352.66

The table can be used for any consistent unit of column height.

Example: 150 in. or mm of mercury at 70° F = 1356.74 + 678.37 = 2035.11 in. or mm of water at 68° F.

Table 20B — Equivalents of mercury columns at various temperatures to water columns at 60°F height of water column

Mercury Height	Temperature of mercury column deg F							
	32	40	50	60	70	80	90	100
0.1	1.361	1.360	1.358	1.357	1.356	1.354	1.353	1.352
0.2	2.722	2.719	2.717	2.714	2.711	2.709	2.706	2.703
0.3	4.083	4.079	4.075	4.071	4.067	4.063	4.059	4.055
0.4	5.443	5.439	5.434	5.428	5.423	5.417	5.412	5.406
0.5	6.804	6.799	6.792	6.785	6.778	6.771	6.765	6.758
0.6	8.165	8.158	8.150	8.142	8.134	8.126	8.118	8.109
0.7	9.526	9.518	9.509	9.499	9.490	9.480	9.470	9.461
0.8	10.887	10.878	10.867	10.856	10.845	10.834	10.823	10.812
0.9	12.248	12.238	12.225	12.213	12.201	12.189	12.176	12.164
1	13.609	13.597	13.584	13.570	13.556	13.543	13.529	13.516
2	27.217	27.195	27.168	27.140	27.113	27.086	27.058	27.031
3	40.826	40.792	40.751	40.711	40.669	40.629	40.558	40.547
4	54.434	54.390	54.335	54.281	54.226	54.171	54.117	54.062
5	68.043	67.987	67.919	67.851	67.782	67.714	67.646	67.578
6	81.651	81.585	81.503	81.421	81.339	81.257	81.175	81.094
7	95.260	95.182	95.086	94.991	94.895	94.800	94.705	94.609
8	108.868	108.780	108.670	108.561	108.452	108.343	108.234	108.125
9	122.477	122.377	122.254	122.132	122.008	122.886	121.763	121.640
10	136.085	135.975	135.838	135.702	135.565	135.428	135.292	135.156
20	272.170	271.950	271.676	271.403	271.129	270.857	270.585	270.312
30	408.255	407.925	407.513	407.105	406.694	406.285	405.877	405.468
40	544.340	543.900	543.351	542.807	542.258	541.714	541.169	540.624
50	680.425	679.874	679.189	678.508	677.823	677.142	676.461	675.781
60	816.510	815.849	815.027	814.210	813.387	812.570	811.754	810.937
70	952.595	951.824	950.865	949.912	948.952	947.999	947.046	946.093
80	1088.68	1087.80	1086.70	1085.61	1084.52	1083.43	1082.34	1081.25
90	1224.77	1223.77	1222.54	1221.32	1220.08	1218.86	1217.63	1216.40
100	1360.85	1359.75	1358.38	1357.02	1355.65	1354.28	1352.92	1351.56

The table can be used for any consistent unit of column height.

Example: 150 in. or mm of mercury at 70° F = 1355.65 + 677.82 = 2033.47 in. or mm of water at 60° F.

Table 21 — Density of kerosine and equivalent pressures in psi of kerosine columns at various temperatures*

Kerosine temp. deg F	Density lb per cu ft	Density ** g per cm^3	Specific gravity***	Equiv. psi of one inch	Equiv. psi of 100 mm
-20	53.10	0.8505	0.8513	0.03073	0.1210
-15	52.98	0.8486	0.8494	0.03066	0.1207
-10	52.85	0.8466	0.8474	0.03058	0.1204
-5	52.73	0.8447	0.8455	0.03052	0.1201
0	52.61	0.8427	0.8435	0.03044	0.1199
5	52.49	0.8408	0.8416	0.03038	0.1196
10	52.37	0.8389	0.8397	0.03031	0.1193
15	52.25	0.8369	0.8377	0.03023	0.1190
20	52.12	0.8348	0.8356	0.03016	0.1187
25	52.00	0.8330	0.8338	0.03009	0.1185
30	51.88	0.8310	0.8318	0.03002	0.1182
35	51.75	0.8290	0.8298	0.02995	0.1179
40	51.63	0.8271	0.8279	0.02988	0.1176
45	51.51	0.8251	0.8259	0.02981	0.1174
50	51.38	0.8231	0.8239	0.02974	0.1171
55	51.27	0.8212	0.8220	0.02967	0.1168
60	51.14	0.8192	0.8200	0.02960	0.1165
65	51.02	0.8172	0.8180	0.02952	0.1162
70	50.90	0.8153	0.8161	0.02945	0.1160
75	50.78	0.8134	0.8142	0.02939	0.1157
80	50.65	0.8113	0.8121	0.02931	0.1154
85	50.53	0.8094	0.8102	0.02924	0.1151
90	50.40	0.8074	0.8082	0.02917	0.1148
95	50.28	0.8054	0.8062	0.02910	0.1146
100	50.17	0.8036	0.8044	0.02903	0.1143

* Kerosine specific gravity 0.820 at 60/60; or 41.06° API.

** Pressure equivalent in g sq cm of 1 cm column of kerosine.

*** Specific gravity referred to water at 60° F.

Table 22 — Equivalents in psi of columns of kerosine in inches at various temperatures

	Temperature of kerosine column in deg F										
Inches Kerosine	0	10	20	30	40	50	60	70	80	90	100
	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi	psi
0.1	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
0.2	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
0.3	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
0.4	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
0.5	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
0.6	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.017
0.7	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.020	0.020
0.8	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.023	0.023
0.9	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.027	0.026	0.026	0.026
1	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.029	0.029	0.029	0.029
2	0.061	0.061	0.060	0.060	0.060	0.060	0.059	0.059	0.059	0.058	0.058
3	0.091	0.091	0.090	0.090	0.090	0.089	0.089	0.088	0.088	0.088	0.087
4	0.122	0.121	0.121	0.120	0.120	0.119	0.118	0.118	0.117	0.117	0.116
5	0.152	0.152	0.151	0.150	0.149	0.149	0.148	0.147	0.147	0.146	0.145
6	0.183	0.182	0.181	0.180	0.179	0.178	0.178	0.177	0.176	0.175	0.174
7	0.213	0.212	0.211	0.210	0.209	0.208	0.207	0.206	0.205	0.204	0.203
8	0.244	0.242	0.241	0.240	0.239	0.238	0.237	0.236	0.235	0.233	0.232
9	0.274	0.273	0.271	0.270	0.269	0.268	0.266	0.265	0.264	0.263	0.261
10	0.304	0.303	0.302	0.300	0.299	0.297	0.296	0.295	0.293	0.292	0.290
20	0.609	0.606	0.603	0.600	0.598	0.595	0.592	0.589	0.586	0.584	0.581
30	0.913	0.909	0.905	0.901	0.896	0.892	0.888	0.884	0.879	0.875	0.871
40	1.218	1.212	1.206	1.201	1.195	1.190	1.184	1.178	1.173	1.167	1.161
50	1.522	1.516	1.508	1.501	1.494	1.487	1.480	1.473	1.466	1.459	1.452
60	1.826	1.819	1.810	1.801	1.793	1.784	1.776	1.767	1.759	1.750	1.742
70	2.131	2.122	2.111	2.101	2.092	2.082	2.072	2.062	2.052	2.042	2.032
80	2.435	2.425	2.413	2.402	2.391	2.379	2.368	2.356	2.345	2.334	2.322
90	2.740	2.728	2.714	2.702	2.689	2.676	2.664	2.651	2.638	2.626	2.613
100	3.044	3.031	3.016	3.002	2.988	2.974	2.960	2.945	2.931	2.917	2.903

Table 23 — Equivalents in inches of water at 60°F of kerosine columns in mm at various temperatures

mm Kerosene	Temperature of kerosine column in deg F										
	0	10	20	30	40	50	60	70	80	90	100
	Inches of water										
1	0.033	0.033	0.033	0.033	0.033	0.032	0.032	0.032	0.032	0.032	0.032
2	0.066	0.066	0.066	0.065	0.065	0.065	0.065	0.064	0.064	0.064	0.063
3	0.100	0.099	0.099	0.098	0.098	0.097	0.097	0.096	0.096	0.095	0.095
4	0.133	0.132	0.132	0.131	0.130	0.130	0.129	0.129	0.128	0.127	0.127
5	0.166	0.165	0.164	0.164	0.163	0.162	0.161	0.161	0.160	0.159	0.158
6	0.199	0.198	0.197	0.196	0.196	0.195	0.194	0.193	0.192	0.191	0.190
7	0.232	0.231	0.230	0.229	0.228	0.227	0.226	0.225	0.224	0.223	0.222
8	0.266	0.264	0.263	0.262	0.261	0.259	0.258	0.257	0.256	0.255	0.253
9	0.299	0.298	0.296	0.295	0.293	0.292	0.291	0.289	0.288	0.286	0.285
10	0.332	0.331	0.329	0.327	0.326	0.324	0.323	0.321	0.320	0.318	0.317
20	0.664	0.661	0.658	0.655	0.652	0.649	0.646	0.643	0.639	0.636	0.633
30	0.996	0.992	0.987	0.982	0.978	0.973	0.968	0.964	0.959	0.955	0.950
40	1.328	1.322	1.316	1.310	1.304	1.297	1.291	1.285	1.279	1.273	1.267
50	1.660	1.653	1.645	1.637	1.630	1.622	1.614	1.606	1.599	1.591	1.583
60	1.993	1.984	1.974	1.965	1.956	1.946	1.937	1.928	1.918	1.909	1.900
70	2.325	2.314	2.303	2.292	2.282	2.271	2.260	2.249	2.238	2.227	2.217
80	2.657	2.645	2.632	2.620	2.608	2.595	2.583	2.570	2.558	2.546	2.534
90	2.989	2.975	2.961	2.947	2.933	2.919	2.905	2.892	2.877	2.864	2.850
100	3.321	3.306	3.290	3.275	3.259	3.244	3.228	3.213	3.197	3.182	3.167
200	6.642	6.612	6.580	6.550	6.519	6.487	6.457	6.426	6.394	6.364	6.334
300	9.963	9.918	9.869	9.824	9.778	9.731	9.685	9.639	9.592	9.546	9.507
400	13.284	13.224	13.159	13.099	13.038	12.975	12.913	12.852	12.789	12.728	12.668
500	16.604	16.530	16.449	16.374	16.297	16.218	16.142	16.065	15.986	15.910	15.834
600	19.925	19.835	19.739	19.649	19.556	19.462	19.370	19.278	19.183	19.091	19.001
700	23.246	23.141	23.029	22.924	22.816	22.706	22.598	22.491	22.380	22.273	22.168
800	26.567	26.447	26.318	26.198	26.075	25.950	25.826	25.704	25.578	25.455	25.335
900	29.888	29.753	29.608	29.473	29.335	29.193	29.055	28.917	28.775	28.637	28.502
000	33.209	33.059	32.898	32.748	32.594	32.437	32.283	32.130	31.972	31.819	31.669

Table 24 — Equivalents in inches of water at 60°F, of gage oil* columns at various temperatures

	Temperature of gage oil column in deg F												
Inches Oil	–20	–10	0	10	20	30	40	50	60	70	80	90	100
	Inches of water												
0.01	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.008	0.008	0.008	0.008	0.008	0.008
0.02	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.016
0.03	0.026	0.026	0.026	0.026	0.026	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
0.04	0.035	0.035	0.034	0.034	0.034	0.034	0.034	0.034	0.033	0.033	0.033	0.033	0.033
0.05	0.043	0.043	0.043	0.043	0.043	0.042	0.042	0.042	0.042	0.042	0.041	0.041	0.041
0.06	0.052	0.052	0.051	0.051	0.051	0.051	0.051	0.050	0.050	0.050	0.050	0.049	0.049
0.07	0.061	0.060	0.060	0.060	0.060	0.059	0.059	0.059	0.058	0.058	0.058	0.058	0.057
0.08	0.069	0.069	0.069	0.068	0.068	0.068	0.067	0.067	0.067	0.066	0.066	0.066	0.066
0.09	0.078	0.078	0.077	0.077	0.077	0.076	0.076	0.075	0.075	0.075	0.074	0.074	0.074
0.1	0.087	0.086	0.086	0.085	0.085	0.085	0.084	0.084	0.083	0.083	0.083	0.082	0.082
0.2	0.173	0.172	0.172	0.171	0.170	0.169	0.168	0.168	0.167	0.166	0.165	0.165	0.164
0.3	0.260	0.258	0.257	0.256	0.255	0.254	0.253	0.251	0.250	0.249	0.248	0.247	0.246
0.4	0.346	0.345	0.343	0.341	0.340	0.338	0.337	0.335	0.334	0.332	0.331	0.329	0.327
0.5	0.433	0.431	0.429	0.427	0.425	0.423	0.421	0.419	0.417	0.415	0.413	0.411	0.409
0.6	0.519	0.517	0.514	0.512	0.510	0.507	0.505	0.503	0.500	0.498	0.496	0.493	0.491
0.7	0.606	0.603	0.600	0.597	0.595	0.592	0.589	0.587	0.584	0.581	0.578	0.576	0.573
0.8	0.692	0.689	0.686	0.683	0.680	0.677	0.673	0.670	0.667	0.664	0.661	0.659	0.655
0.9	0.779	0.775	0.772	0.768	0.765	0.761	0.758	0.754	0.751	0.747	0.744	0.740	0.737
1.	0.865	0.861	0.857	0.853	0.850	0.846	0.842	0.839	0.834	0.830	0.826	0.822	0.818
2.	1.730	1.722	1.715	1.707	1.699	1.691	1.684	1.676	1.668	1.660	1.653	1.645	1.637
3.	2.595	2.584	2.572	2.560	2.549	2.537	2.525	2.514	2.502	2.490	2.479	2.467	2.455
4.	3.460	3.445	3.429	3.414	3.398	3.383	3.367	3.352	3.336	3.320	3.305	3.289	3.274
5.	4.325	4.306	4.287	4.267	4.248	4.228	4.209	4.190	4.170	4.151	4.131	4.112	4.092
6.	5.191	5.167	5.144	5.121	5.097	5.074	5.051	5.027	5.004	4.981	4.957	4.934	4.911
7.	6.056	6.028	6.001	5.974	5.947	5.920	5.892	5.865	5.838	5.811	5.784	5.756	5.729
8.	6.921	6.890	6.859	6.827	6.796	6.765	6.734	6.703	6.672	6.641	6.610	6.579	6.548
9.	7.786	7.751	7.716	7.681	7.646	7.611	7.576	7.541	7.506	7.471	7.436	7.401	7.366
10.	8.651	8.612	8.573	8.534	8.495	8.457	8.418	8.379	8.340	8.301	8.262	8.223	8.185

*Specifically, "Ellison Gage Oil" for inclined gages: spec. grav. 60/60 =0.834

Table 25 — Equivalents in inches of water at 60°F, of alcohol columns at various temperatures (100% ethyl alcohol)

	Temperature of alcohol-glycol column in deg F												
Inches Alcohol	–30	–20	–10	0	10	20	30	40	50	60	70	80	90
	Inches of water												
0.01	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
0.02	0.017	0.017	0.017	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
0.03	0.025	0.025	0.025	0.025	0.025	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.023
0.04	0.034	0.033	0.033	0.033	0.033	0.033	0.032	0.032	0.032	0.032	0.032	0.031	0.031
0.05	0.042	0.042	0.041	0.041	0.041	0.041	0.040	0.040	0.040	0.040	0.040	0.039	0.039
0.06	0.050	0.050	0.050	0.049	0.049	0.049	0.049	0.048	0.048	0.048	0.047	0.047	0.047
0.07	0.059	0.058	0.058	0.058	0.057	0.057	0.057	0.056	0.056	0.056	0.055	0.055	0.055
0.08	0.067	0.067	0.066	0.066	0.065	0.065	0.065	0.064	0.064	0.064	0.063	0.063	0.062
0.09	0.075	0.075	0.074	0.074	0.074	0.073	0.073	0.072	0.072	0.072	0.071	0.071	0.070
0.1	0.084	0.083	0.083	0.082	0.082	0.081	0.081	0.080	0.080	0.079	0.079	0.079	0.078
0.2	0.167	0.166	0.165	0.164	0.164	0.163	0.162	0.161	0.160	0.159	0.159	0.157	0.156
0.3	0.251	0.250	0.248	0.247	0.245	0.244	0.242	0.241	0.240	0.238	0.237	0.235	0.234
0.4	0.335	0.333	0.331	0.329	0.327	0.325	0.323	0.321	0.319	0.318	0.316	0.314	0.312
0.5	0.418	0.416	0.414	0.411	0.409	0.406	0.404	0.402	0.399	0.397	0.395	0.392	0.390
0.6	0.502	0.499	0.496	0.493	0.491	0.488	0.485	0.482	0.479	0.476	0.474	0.471	0.468
0.7	0.585	0.582	0.579	0.576	0.572	0.569	0.566	0.562	0.559	0.556	0.552	0.549	0.546
0.8	0.669	0.665	0.662	0.658	0.654	0.650	0.646	0.643	0.639	0.635	0.631	0.628	0.624
0.9	0.753	0.749	0.744	0.740	0.736	0.732	0.727	0.723	0.719	0.715	0.710	0.706	0.702
1.	0.836	0.832	0.827	0.822	0.818	0.813	0.808	0.803	0.799	0.794	0.789	0.785	0.780
2.	1.673	1.663	1.654	1.644	1.635	1.626	1.616	1.607	1.597	1.588	1.578	1.569	1.560
3.	2.509	2.495	2.481	2.467	2.452	2.438	2.424	2.410	2.396	2.382	2.368	2.353	2.339
4.	3.345	3.327	3.308	3.289	3.270	3.251	3.232	3.213	3.194	3.176	3.157	3.138	3.119
5.	4.182	4.158	4.135	4.111	4.087	4.064	4.040	4.017	3.993	3.970	3.946	3.922	3.899
6.	5.018	4.990	4.961	4.933	4.905	4.877	4.848	4.820	4.792	4.763	4.735	4.707	4.679
7.	5.854	5.821	5.788	5.755	5.722	5.689	5.656	5.623	5.590	5.557	5.524	5.491	5.458
8.	6.691	6.653	6.615	6.578	6.540	6.502	6.464	6.427	6.389	6.351	6.313	6.276	6.238
9.	7.527	7.485	7.442	7.400	7.357	7.315	7.272	7.230	7.188	7.145	7.103	7.060	7.018
10.	8.363	8.316	8.269	8.222	8.175	8.128	8.081	8.033	7.986	7.939	7.892	7.945	7.798

Table 26 — Equivalents in inches of water at 60°F, of alcohol-glycol columns at various temperatures

Inches Alcohol-Glycol	Temperature of alcohol-glycol column in deg F													
	–40	–30	–20	-10	0	10	20	30	40	50	60	70	80	100
0.1	0.104	0.104	0.103	0.103	0.103	0.102	0.102	0.101	0.101	0.100	0.100	0.100	0.099	0.098
0.2	0.209	0.208	0.207	0.206	0.205	0.204	0.203	0.203	0.202	0.201	0.200	0.199	0.198	0.197
0.3	0.313	0.312	0.310	0.309	0.308	0.306	0.305	0.304	0.303	0.301	0.300	0.299	0.297	0.295
0.4	0.417	0.415	0.414	0.412	0.410	0.409	0.407	0.405	0.403	0.402	0.400	0.398	0.397	0.393
0.5	0.521	0.519	0.517	0.515	0.513	0.511	0.509	0.506	0.504	0.502	0.500	0.498	0.496	0.492
0.6	0.626	0.623	0.621	0.618	0.615	0.613	0.610	0.608	0.605	0.603	0.600	0.597	0.595	0.590
0.7	0.730	0.727	0.724	0.721	0.718	0.715	0.712	0.709	0.706	0.703	0.700	0.697	0.694	0.688
0.8	0.834	0.831	0.827	0.824	0.821	0.817	0.814	0.810	0.807	0.803	0.800	0.797	0.793	0.786
0.9	0.938	0.935	0.931	0.927	0.923	0.919	0.916	0.912	0.908	0.904	0.900	0.896	0.892	0.885
1.0	1.043	1.038	1.034	1.030	1.026	1.021	1.017	1.013	1.009	1.004	1.000	0.996	0.992	0.983
2	2.085	2.077	2.068	2.060	2.052	2.043	2.034	2.026	2.017	2.009	2.000	1.992	1.983	1.966
3	3.128	3.115	3.103	3.090	3.077	3.064	3.051	3.038	3.026	3.013	3.000	2.987	2.974	2.949
4	4.171	4.154	4.137	4.120	4.103	4.085	4.068	4.051	4.034	4.017	4.000	3.983	3.966	3.932
5	5.214	5.192	5.171	5.150	5.128	5.107	5.085	5.064	5.043	5.021	5.000	4.979	4.957	4.915
6	6.256	6.231	6.205	6.179	6.154	6.128	6.103	6.077	6.051	6.026	6.000	5.974	5.949	5.898
7	7.299	7.269	7.239	7.209	7.179	7.150	7.120	7.090	7.060	7.030	7.000	6.970	6.940	6.880
8	8.342	8.307	8.273	8.239	8.205	8.171	8.137	8.103	8.068	8.034	8.000	7.966	7.932	7.863
9	9.384	9.346	9.307	9.269	9.231	9.192	9.154	9.115	9.077	9.038	9.000	8.962	8.923	8.846
10	10.427	10.384	10.342	10.299	10.256	10.214	10.171	10.128	10.085	10.043	10.000	9.957	9.915	9.829
20	20.854	20.769	20.683	20.598	20.512	20.427	20.342	20.256	20.171	20.085	20.000	19.915	19.829	19.658
30	31.281	31.153	31.025	30.897	30.769	30.641	30.512	30.384	30.256	30.128	30.000	29.872	29.744	29.488
40	41.708	41.537	41.366	41.196	41.025	40.854	40.683	40.512	40.342	40.171	40.000	39.830	39.658	39.317
50	52.135	51.922	51.708	51.495	51.281	51.068	50.854	50.641	50.427	50.214	50.000	49.787	49.573	49.146
60	62.562	62.306	62.050	61.793	61.537	61.281	61.025	60.769	60.512	60.256	60.000	59.744	59.488	58.975
70	72.989	72.690	72.391	72.092	71.793	71.495	71.196	70.897	70.598	70.299	70.000	69.701	69.402	68.804
80	83.416	83.074	82.733	82.391	82.050	81.708	81.366	81.025	80.683	80.342	80.000	79.658	79.317	78.633
90	93.843	93.456	93.074	92.690	92.306	91.922	91.537	91.153	90.769	90.384	90.000	89.616	89.231	88.463
100	104.27	103.84	103.42	102.99	102.56	102.14	101.71	101.28	100.85	100.43	100.00	99.573	99.146	98.292

* 36% by volume ethyl alcohol; 64% ethylene glycol; specific gravity at 60°F = 1.000

Table 27 — Equivalents in inches of water at 60°F, of dibromobenzene* columns at various temperatures

Inches Dibromobenzene	Temperature of dibromobenzene columns in deg F								
	30	40	50	60	70	80	90	100	110
	Inches of water								
0.01	0.020	0.020	0.020	0.020	0.020	0.019	0.019	0.019	0.019
0.02	0.040	0.040	0.039	0.039	0.039	0.039	0.039	0.039	0.038
0.03	0.060	0.059	0.059	0.059	0.059	0.058	0.058	0.058	0.058
0.04	0.080	0.079	0.079	0.079	0.078	0.078	0.078	0.077	0.077
0.05	0.100	0.099	0.099	0.098	0.098	0.097	0.097	0.097	0.096
0.06	0.120	0.119	0.118	0.118	0.117	0.117	0.116	0.116	0.115
0.07	0.139	0.139	0.138	0.138	0.137	0.136	0.136	0.135	0.135
0.08	0.159	0.159	0.158	0.157	0.157	0.156	0.155	0.155	0.154
0.09	0.179	0.178	0.178	0.177	0.176	0.175	0.175	0.174	0.173
0.1	0.199	0.198	0.197	0.197	0.196	0.195	0.194	0.193	0.192
0.2	0.398	0.397	0.395	0.393	0.392	0.390	0.388	0.386	0.385
0.3	0.597	0.595	0.592	0.590	0.587	0.585	0.582	0.580	0.577
0.4	0.797	0.793	0.790	0.786	0.783	0.780	0.776	0.773	0.769
0.5	0.996	0.992	0.987	0.983	0.979	0.975	0.970	0.966	0.962
0.6	1.195	1.190	1.185	1.180	1.175	1.169	1.164	1.159	1.154
0.7	1.394	1.388	1.382	1.376	1.370	1.364	1.358	1.352	1.347
0.8	1.593	1.586	1.580	1.573	1.566	1.559	1.552	1.546	1.539
0.9	1.792	1.785	1.777	1.769	1.762	1.754	1.747	1.739	1.731
1.0	1.992	1.983	1.974	1.966	1.958	1.949	1.941	1.932	1.924
2	3.983	3.966	3.949	3.932	3.915	3.898	3.881	3.864	3.847
3	5.974	5.949	5.923	5.898	5.873	5.847	5.822	5.796	5.771
4	7.965	7.932	7.898	7.864	7.830	7.796	7.762	7.728	7.694
5	9.957	9.915	9.872	9.830	9.788	9.745	9.703	9.660	9.618
6	11.949	11.898	11.847	11.796	11.745	11.694	11.643	11.592	11.541
7	13.940	13.881	13.821	13.762	13.703	13.643	13.584	13.524	13.465
8	15.932	15.864	15.796	15.728	15.660	15.592	15.524	15.456	15.388
9	17.923	17.847	17.770	17.694	17.618	17.541	17.465	17.388	17.312
10	19.915	19.830	19.745	19.660	19.575	19.490	19.405	19.320	19.235

* ortho-dibromobenzene: spec. gravity at 60/60 = 1.9660; m.p. = 30° F.

Table 28 — Equivalents in psi, of dibromobenzene columns at various temperatures

Inches Dibromobenzene	Temperature of dibromobenzene column in deg F								
	30	40	50	60	70	80	90	100	110
	psi								
0.1	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007
0.2	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
0.3	0.022	0.022	0.021	0.021	0.021	0.021	0.021	0.021	0.021
0.4	0.029	0.029	0.029	0.028	0.028	0.028	0.028	0.028	0.028
0.5	0.036	0.036	0.036	0.036	0.035	0.035	0.035	0.035	0.035
0.6	0.043	0.043	0.043	0.043	0.042	0.042	0.042	0.042	0.042
0.7	0.050	0.050	0.050	0.050	0.050	0.049	0.049	0.049	0.049
0.8	0.058	0.057	0.057	0.057	0.057	0.056	0.056	0.056	0.056
0.9	0.065	0.064	0.064	0.064	0.064	0.063	0.063	0.063	0.063
1.0	0.072	0.072	0.071	0.071	0.071	0.070	0.070	0.070	0.069
2	0.144	0.143	0.143	0.142	0.141	0.141	0.140	0.140	0.139
3	0.216	0.215	0.214	0.213	0.212	0.211	0.210	0.209	0.208
4	0.288	0.286	0.285	0.284	0.283	0.281	0.280	0.279	0.278
5	0.359	0.358	0.356	0.355	0.353	0.352	0.350	0.349	0.347
6	0.431	0.429	0.428	0.426	0.424	0.422	0.420	0.419	0.417
7	0.503	0.501	0.499	0.497	0.495	0.492	0.490	0.488	0.486
8	0.575	0.573	0.570	0.568	0.565	0.563	0.560	0.558	0.555
9	0.647	0.644	0.641	0.639	0.636	0.633	0.630	0.628	0.625
10	0.719	0.716	0.713	0.710	0.706	0.703	0.700	0.697	0.694
20	1.437	1.431	1.425	1.419	1.413	1.407	1.400	1.395	1.388
30	2.156	2.147	2.138	2.129	2.119	2.110	2.101	2.092	2.083
40	2.875	2.863	2.850	2.838	2.826	2.814	2.801	2.789	2.777
50	3.594	3.578	3.563	3.548	3.532	3.517	3.502	3.486	3.471
60	4.312	4.294	4.276	4.257	4.239	4.220	4.202	4.184	4.165
70	5.031	5.010	4.988	4.967	4.945	4.924	4.902	4.881	4.859
80	5.750	5.725	5.701	5.676	5.652	5.627	5.603	5.578	5.554
90	6.469	6.441	6.413	6.386	6.358	6.331	6.303	6.275	6.248
100	7.187	7.157	7.126	7.095	7.065	7.034	7.003	6.972	6.942

Table 29 — Equivalents in inches of water at 60°F, of dibromoethane* columns at various temperatures

Inches Dibromoethane	Temperature of dibromoethane column in deg F									
	10	20	30	40	50	60	70	80	90	100
	Inches of Water									
0.01	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.020	0.020	0.020
0.02	0.042	0.042	0.042	0.042	0.041	0.041	0.041	0.041	0.041	0.041
0.03	0.063	0.063	0.063	0.062	0.062	0.062	0.061	0.061	0.061	0.060
0.04	0.084	0.084	0.084	0.083	0.083	0.082	0.082	0.081	0.081	0.081
0.05	0.105	0.105	0.104	0.104	0.103	0.103	0.102	0.102	0.101	0.101
0.06	0.127	0.126	0.126	0.125	0.124	0.123	0.123	0.122	0.121	0.121
0.07	0.148	0.147	0.146	0.146	0.145	0.144	0.143	0.142	0.142	0.141
0.08	0.169	0.168	0.167	0.166	0.165	0.165	0.164	0.163	0.162	0.161
0.09	0.190	0.189	0.188	0.187	0.186	0.185	0.184	0.183	0.182	0.181
0.1	0.211	0.210	0.209	0.208	0.207	0.206	0.205	0.203	0.202	0.201
0.2	0.422	0.420	0.418	0.416	0.413	0.411	0.409	0.407	0.405	0.403
0.3	0.633	0.630	0.627	0.623	0.620	0.617	0.614	0.610	0.607	0.604
0.4	0.844	0.840	0.836	0.831	0.827	0.822	0.818	0.814	0.809	0.805
0.5	1.055	1.050	1.044	1.039	1.034	1.028	1.023	1.017	1.012	1.006
0.6	1.266	1.260	1.253	1.247	1.240	1.234	1.227	1.221	1.214	1.207
0.7	1.478	1.470	1.462	1.455	1.447	1.439	1.436	1.424	1.416	1.409
0.8	1.689	1.680	1.671	1.662	1.654	1.645	1.636	1.627	1.619	1.610
0.9	1.900	1.890	1.880	1.870	1.860	1.850	1.841	1.831	1.821	1.811
1.0	2.111	2.100	2.088	2.078	2.067	2.056	2.045	2.034	2.023	2.012
2	4.221	4.200	4.178	4.156	4.134	4.112	4.090	4.068	4.046	4.025
3	6.332	6.299	6.266	6.234	6.201	6.168	6.135	6.102	6.070	6.037
4	8.443	8.399	8.355	8.312	8.268	8.224	8.180	8.136	8.093	8.049
5	10.553	10.499	10.444	10.389	10.335	10.280	10.225	10.171	10.116	10.061
6	12.664	12.599	12.533	12.467	12.402	12.336	12.270	12.205	12.139	12.074
7	14.775	14.698	14.622	14.545	14.469	14.392	14.315	14.239	14.162	14.086
8	16.886	16.798	16.710	16.623	16.536	16.448	16.360	16.273	16.186	16.098
9	18.996	18.898	18.799	18.701	18.602	18.504	18.406	18.307	18.209	18.110
10	21.107	20.998	20.888	20.779	20.669	20.560	20.451	20.341	20.232	20.123

*1,1 – Dibromoethane: spec gravity, 2.056 at 60/60.

Table 30 — Equivalents in psi, of dibromoethane columns at various temperatures

Inches Dibromoethane	Temperature of dibromoethane column in deg F									
	10	20	30	40	50	60	70	80	90	100
					psi					
0.1	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007
0.2	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
0.3	0.023	0.023	0.023	0.023	0.022	0.022	0.022	0.022	0.022	0.022
0.4	0.031	0.030	0.030	0.030	0.030	0.030	0.030	0.029	0.029	0.029
0.5	0.038	0.038	0.038	0.038	0.037	0.037	0.037	0.037	0.037	0.036
0.6	0.046	0.046	0.045	0.045	0.045	0.045	0.044	0.044	0.044	0.044
0.7	0.053	0.053	0.053	0.053	0.052	0.052	0.052	0.051	0.051	0.051
0.8	0.061	0.061	0.060	0.060	0.060	0.059	0.059	0.059	0.058	0.058
0.9	0.069	0.068	0.068	0.068	0.067	0.067	0.066	0.066	0.066	0.065
1.0	0.076	0.076	0.075	0.075	0.075	0.074	0.074	0.073	0.073	0.073
2	0.152	0.152	0.151	0.150	0.149	0.148	0.148	0.147	0.146	0.145
3	0.229	0.227	0.226	0.225	0.224	0.223	0.221	0.220	0.219	0.218
4	0.305	0.303	0.302	0.300	0.298	0.297	0.295	0.294	0.292	0.291
5	0.381	0.379	0.377	0.375	0.373	0.371	0.369	0.367	0.365	0.363
6	0.457	0.455	0.452	0.450	0.448	0.445	0.443	0.441	0.438	0.436
7	0.533	0.531	0.528	0.525	0.522	0.519	0.517	0.514	0.511	0.508
8	0.609	0.606	0.603	0.600	0.597	0.594	0.591	0.587	0.584	0.581
9	0.686	0.682	0.679	0.675	0.671	0.668	0.664	0.661	0.657	0.654
10	0.762	0.758	0.754	0.750	0.746	0.742	0.738	0.734	0.730	0.726
20	1.524	1.516	1.508	1.500	1.492	1.484	1.476	1.468	1.460	1.452
30	2.285	2.273	2.262	2.250	2.238	2.226	2.214	2.202	2.191	2.179
40	3.047	3.031	3.015	3.000	2.984	2.968	2.952	2.936	2.921	2.905
50	3.809	3.789	3.769	3.750	3.730	3.710	3.690	3.671	3.651	3.631
60	4.571	4.547	4.523	4.499	4.476	4.452	4.428	4.405	4.381	4.357
70	5.332	5.305	5.277	5.249	5.222	5.194	5.166	5.139	5.111	5.084
80	6.094	6.062	6.031	5.999	5.968	5.936	5.905	5.873	5.841	5.810
90	6.856	6.820	6.785	6.749	6.714	6.678	6.643	6.607	6.572	6.536
100	7.618	7.578	7.539	7.499	7.460	7.420	7.381	7.341	7.302	7.262

Table 31 — Equivalents in inches of water at 60°F, of columns of acetylene tetrabromide* at various temperatures

Inches acetylene tetrabromide	Temperature of acetylene tetrabromide column in deg F										
	0	10	20	30	40	50	60	70	80	90	100
	Inches of Water										
0.01	0.031	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.029	0.029
0.02	0.061	0.061	0.061	0.060	0.060	0.060	0.059	0.059	0.059	0.059	0.058
0.03	0.091	0.091	0.091	0.090	0.090	0.090	0.089	0.089	0.088	0.088	0.088
0.04	0.122	0.121	0.121	0.121	0.120	0.119	0.119	0.118	0.118	0.117	0.117
0.05	0.152	0.152	0.151	0.151	0.150	0.149	0.149	0.148	0.147	0.147	0.146
0.06	0.183	0.182	0.182	0.181	0.180	0.179	0.178	0.178	0.177	0.176	0.175
0.07	0.213	0.212	0.212	0.211	0.210	0.209	0.208	0.207	0.206	0.205	0.204
0.08	0.244	0.243	0.242	0.241	0.240	0.239	0.238	0.237	0.236	0.235	0.234
0.09	0.274	0.273	0.272	0.271	0.270	0.269	0.268	0.266	0.265	0.264	0.263
0.1	0.305	0.304	0.303	0.301	0.300	0.299	0.297	0.296	0.295	0.293	0.292
0.2	0.610	0.607	0.605	0.602	0.600	0.597	0.594	0.592	0.589	0.587	0.584
0.3	0.914	0.911	0.907	0.904	0.900	0.896	0.892	0.888	0.884	0.880	0.876
0.4	1.221	1.216	1.210	1.205	1.200	1.194	1.189	1.184	1.178	1.173	1.168
0.5	1.526	1.519	1.512	1.506	1.500	1.493	1.486	1.479	1.473	1.466	1.460
0.6	1.830	1.822	1.815	1.807	1.799	1.791	1.783	1.775	1.767	1.760	1.752
0.7	2.136	2.126	2.117	2.108	2.099	2.090	2.080	2.071	2.062	2.053	2.044
0.8	2.441	2.431	2.420	2.409	2.399	2.388	2.378	2.367	2.357	2.346	2.335
0.9	2.746	2.734	2.722	2.710	2.699	2.687	2.675	2.663	2.651	2.639	2.527
1.0	3.051	3.038	3.025	3.012	2.998	2.985	2.972	2.959	2.946	2.932	2.919
2	6.102	6.076	6.049	6.023	5.997	5.970	5.994	5.918	5.891	5.865	5.839
3	9.153	9.114	9.074	9.035	8.995	8.956	8.916	8.876	8.837	8.797	8.758
4	12.204	12.151	12.099	12.046	11.993	11.941	11.888	11.835	11.783	11.730	11.677
5	15.255	15.189	15.123	15.058	14.992	14.926	14.860	14.794	14.728	14.662	14.597
6	18.306	18.227	18.148	18.069	17.990	17.911	17.832	17.753	17.674	17.595	17.516
7	21.357	21.265	21.173	21.081	20.988	20.896	20.804	20.712	20.619	20.527	20.435
8	24.408	24.303	24.197	24.092	23.987	23.881	23.776	23.670	23.565	23.460	23.354
9	27.459	27.341	27.222	27.104	26.985	26.867	26.748	26.629	26.511	26.392	26.274
10	30.510	30.379	30.247	30.115	29.983	29.852	29.720	29.588	29.456	29.325	29.193

*1,1,2,2–Tetrabromoethane: spec.grav.2.972 at 60/60.

Table 32 — Equivalents in psi of acetylene tetrabromide at various temperatures

Inches acetylene tetrabromide	Temperature of acetylene tetrabromide column in deg F										
	0	10	20	30	40	50	60	70	80	90	100
						psi					
0.1	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
0.2	0.022	0.022	0.022	0.022	0.022	0.022	0.021	0.021	0.021	0.021	0.021
0.3	0.033	0.033	0.033	0.033	0.032	0.032	0.032	0.032	0.032	0.032	0.032
0.4	0.044	0.044	0.044	0.043	0.043	0.043	0.043	0.043	0.043	0.042	0.042
0.5	0.055	0.055	0.055	0.054	0.054	0.054	0.054	0.053	0.053	0.053	0.053
0.6	0.066	0.066	0.066	0.065	0.065	0.065	0.064	0.064	0.064	0.064	0.063
0.7	0.077	0.077	0.076	0.076	0.076	0.075	0.075	0.075	0.074	0.074	0.074
0.8	0.088	0.088	0.087	0.087	0.087	0.086	0.086	0.085	0.085	0.085	0.084
0.9	0.099	0.099	0.098	0.098	0.097	0.097	0.097	0.096	0.096	0.095	0.095
1.0	0.110	0.110	0.109	0.109	0.108	0.108	0.107	0.107	0.106	0.106	0.105
2.	0.220	0.219	0.218	0.217	0.216	0.215	0.215	0.214	0.213	0.212	0.211
3.	0.330	0.329	0.327	0.326	0.325	0.323	0.322	0.320	0.319	0.318	0.316
4.	0.440	0.438	0.437	0.435	0.433	0.431	0.429	0.427	0.425	0.423	0.421
5.	0.550	0.548	0.546	0.543	0.541	0.539	0.536	0.534	0.532	0.529	0.527
6.	0.660	0.657	0.655	0.652	0.649	0.646	0.644	0.641	0.638	0.635	0.632
7.	0.770	0.767	0.764	0.761	0.757	0.754	0.751	0.747	0.744	0.741	0.738
8.	0.880	0.876	0.873	0.869	0.866	0.862	0.858	0.854	0.850	0.847	0.843
9.	0.990	0.986	0.982	0.978	0.974	0.970	0.965	0.961	0.957	0.953	0.948
10	1.101	1.096	1.092	1.087	1.082	1.077	1.073	1.068	1.063	1.058	1.054
20	2.202	2.193	2.183	2.174	2.164	2.155	2.145	2.136	2.126	2.117	2.107
30	3.303	3.289	3.275	3.261	3.246	3.232	3.218	3.204	3.189	3.175	3.161
40	4.404	4.385	4.366	4.347	4.328	4.309	4.290	4.271	4.252	4.233	4.214
50	5.506	5.482	5.458	5.434	5.411	5.387	5.363	5.339	5.315	5.292	5.268
60	6.607	6.578	6.550	6.521	6.493	6.464	6.436	6.407	6.379	6.350	6.322
70	7.708	7.675	7.641	7.608	7.575	7.542	7.508	7.475	7.442	7.408	7.375
80	8.809	8.771	8.733	8.695	8.657	8.619	8.581	8.543	8.505	8.467	8.429
90	9.910	9.867	9.824	9.782	9.739	9.696	9.653	9.611	9.568	9.525	9.482
100	11.011	10.964	10.916	10.869	10.821	10.774	10.726	10.678	10.631	10.583	10.536

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