Pressure

1 lb per square inch	=	144 lb per square foot 2.0416 in. mercury at 64 F 2.309 ft water at 62 F 27.71 in. water at 62 F
1 oz per square inch	=	0.1276 in. mercury at 62 F 1.732 in. water at 62 F
1 atmosphere	=	14.7 lb per square inch 2116.3 lb per square foot 33.974 ft water at 62 F 30 in. mercury at 62 F 29.921 in. mercury at 32 F
1 in. water at 62 F	=	0.03609 lb per square inch 0.5774 oz per square inch 5.196 lb per square foot
1 ft water at 62 F	=	0.433 lb per square inch 62.355 lb per square foot
1 in. mercury at 62 F	=	0.491 lb per square inch 7.86 oz per square inch 1.131 ft water at 62 F 13.57 in. water at 62 F

Metric Units

1 cm	=	0.3937 in.
1 in.	=	2.54 cm
1 m	=	3.281 ft
1 ft	=	0.3048 m
1 sq cm	=	0.155 sq in.
1 sq in.	=	6.45 sq cm
1 sq m	=	10.765 sq ft
1 sq ft	=	0.0929 sq m
1 cu cm	=	0.061 cu in.
1 cu in.	=	16.39 cu cm
1 cu m	=	35.32 cu ft
1 cu ft	=	0.0283 cu m
1 liter	=	1000 cu cm = 0.264 gal
1 kg	=	2.2046 lb
1 lb	=	0.4536 kg
1 metric ton	=	2205 lb (avdp)
1 gram	=	980.59 dynes = 0.002205 lb
1 kilometer per hour	=	0.6214 mph
1 gram per square centimeter	=	0.2896 in. mercury, at 0 deg C 0.394 in. water, at 15 C
1 kg per square centimeter (metric atmosphere)	=	14.22 lb per square inch
1 gram per cubic centimeter	=	0.03614 lb per cubic inch 62.43 lb per cubic foot
1 dyne	=	0.00007233 poundals
1 joule	=	10,000,000 ergs 0.73767 ft-lb
1 metric horsepower (force de cheval)	=	75 kg-m per second 0.986 hp (U. S.)
1 kilogram-calorie (large calorie)	=	1000 gram-calories (small calorie) 3.97 Btu
1 kilogram-calorie per kilogram	=	1.8 Btu per pound

1 gram-calorie per square centimeter	=	3.687 Btu per square foot
1 gram-calorie per square centimeter per centimeter	=	1.451 Btu per square foot per inch
1 gram-calorie per second per square centimeter for a temperature graduation of 1 deg C per centimeter	=	2903 Btu per hour per square foot for a temperature graduation of 1 deg F per inch of thickness.

INSTRUMENTS FOR AND METHODS OF MEASUREMENT

Pressure

The pressure of the atmosphere is usually measured by a *mecurial barometer* which, in its simplest form, consists of a glass tube about three feet long, closed at the upper end, filled with mercury and inverted in a shallow bath of mercury. The atmosphere, pressing on the exposed top of the mercury in the cistern, supports a column of mercury in the tube to a height of about 30 in. Readings are taken of the height of the column between the levels of mercury in the tube and in the cistern. The pressure of the atmosphere is the same as the pressure exerted by this supported column of mercury, and in pounds per square inch, is equal to its height times 0.491 which is the weight in pounds of one cubic inch of mercury. At latitude 45 deg and sea level, and at a temperature of 32 F, the atmosphere will support a column of mercury 29.921 in. in height. This pressure of 14.7 lb per square inch, derived by multiplying 29.921 by 0.491, is called *standard* or *normal barometric pressure.*

Pressure is usually measured by means of gages which indicate the difference between the pressure being measured and the pressure of the atmosphere at the same time and place. A gage which indicates higher pressures than that exerted by the atmosphere is known as a *pressure gage*, and a gage which indicates pressures lower than atmospheric pressure is known as a *vacuum gage.* The most common type of these gages contains a flexible hollow brass tube of oval cross section, known as a Bourdon tube. When subjected to pressure, this tube tends to straighten out, and the amount of pressure is measured by a pointer motivated by this straightening and reading against a suitably graduated scale.

A gage which indicates pressures slightly above or below that of the atmosphere is known as a *draft gage.* It is essentially a U-tube containing either water, kerosene, alcohol or mercury, with one leg exposed to the air and the other connected to the point where a pressure is to be determined. When the pressure being read is equal to that of the atmosphere, the level of the liquid in the legs will be the same, indicating a zero gage pressure. When a pressure is applied to a leg, one side will fall an amount and the other will rise an equal amount. The difference in height between the two liquid levels indicates the pressure expressed in inches of the liquid used in the gage.

Temperature

In engineering work, *mercurial thermometers* are largely employed to measure the intensity of heat. These depend on the uniform expansion of mercury to indicate changes in temperature. An amount of mercury held in a sealed tube with a bulb at one end, will rise to one definite level when immersed in melting ice, and to another definite level when immersed in boiling water. These two points are marked, and the space between them