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A NEW METHOD FOR THE ABSOLUTE MEASUREMENT OF HIGH PRESSURES

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AS part of a programme of work in the field of high-pressure physics, the National Physical Laboratory is now working on a project for the establishment of standards for the measurement of high pressures.

In practice, most measurements of high pressures intended to be of the greatest precision are made with pressure balances, or dead-weight gauges, of the familiar type in which fluid pressure acting on a piston of known area is balanced by a load applied by means of calibrated weights. The accuracy of such balances has hitherto been limited principally by the fact that at high pressures the piston and the cylinder in which it moves are distorted to an extent which is not easily measurable. As a result of this, the 'effective area' of the assembly is subject to an uncertainty which is likely to increase as the pressure is raised.

The usual method adopted in the past for the determination of the effective areas of piston–cylinder assemblies[1] has relied on the use of high-pressure mercury columns, but the results of these investigations have not so far given any clear or consistent indication of the changes in effective area under the influence of elevated pressures. A new standard mercury column of this type capable of operating up to about 2,500 atmospheres has recently been described by Bett, Hayes and Newitt[2], who discuss in detail a number of factors affecting the accuracy likely to be achieved. So far, however, no results of measurements with this instrument on actual balances have been published. While it is clear that a well-designed high-pressure mercury column is capable of the establishment of high pressures with considerable accuracy, it nevertheless seems likely to be a somewhat difficult instrument to use, mainly on account of the long and laborious series of pressure transfers which need to be made to reach the high-pressure range.