STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHODS OF TESTING RIGID CELLULAR PLASTICS

AS 2498.7
DETERMINATION OF VOLUME PERCENTAGE OF OPEN AND CLOSED CELLS*

1 SCOPE. This standard sets out a method for determining the volume percentage of open and closed cells of rigid cellular plastics, by measurement first of the geometrical volume and then of the impenetrable volume of test specimens. This method also permits taking into consideration (for cases a correction) the volume of cells opened during test specimen preparation by cutting. The results given by this method can be used for comparative purposes only.

2 DEFINITIONS. For the purposes of this standard, the following definitions apply:

2.1 Geometrical surface S—the total surface of the test specimen determined by measuring its geometrical dimensions.

2.2 Geometrical volume V_g—the volume of the test specimen determined by measuring its geometrical dimensions.

2.3 Geometrical surface to volume ratio r—the ratio S/V_g for the test specimen.

2.4 Impenetrable volume V_i—the volume of the test specimen in which air cannot penetrate and from which gas cannot escape, under the test conditions.

2.5 Apparent volume percentage of open cells ω_r—the following ratio:

$$\frac{V_g - V_i}{V_g} \times 100$$

It includes the cells opened during cutting of a test specimen having a geometrical surface S and a geometrical volume V_g, and depends on the nature of the cellular plastic under test and on the geometrical surface to volume ratio r of the test specimen.

2.6 Corrected volume percentage of open cells ω_o—the apparent volume percentage of open cells w_r corrected to take into account the cells opened during preparation of test specimens by cutting.

It is the limit of the apparent volume percentage ω_r as the geometrical surface to volume ratio r approaches zero.

2.7 Correct volume percentage of closed cells φ_o—

$$\varphi_o = 100 - \omega_o$$

This percentage takes account of the volume of the cell walls.

3 PRINCIPLE. The geometrical surface S and geometrical volume V_g of a number of test specimens, each having a different geometrical surface to volume ratio r, are determined.

The impenetrable volume V_i is determined by either of two methods, viz—

(a) P method—by pressure variation.

(b) V method—by volume variation.

The determination of the impenetrable volume V_i is based on the application of the Boyle-Mariotte law to a gas confined in an indeformable chamber, first in the absence and then in the presence of a test specimen.

Calculation of the apparent volume percentage of open cells ω_r of the test specimen, plotting of the curve $\omega_r = f(r)$ and the extrapolation to $r = 0$, followed by calculation of the corrected volume percentage of open cells ω_o and the corrected volume percentage of closed cells φ_o.

4 APPARATUS.

4.1 P Method.

4.1.1 The apparatus is an air pyknometer which permits reading of the difference between internal pressure and atmospheric pressure. A schematic diagram of the apparatus is shown in Fig. 1. It consists essentially of the following items:

*This method is derived from and is technically identical with ISO/DIS 4590.