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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHODS OF TESTING RIGID CELLULAR PLASTICS

AS 2498.3
DETERMINATION OF COMPRESSIVE STRESS*

1 SCOPE. This standard sets out a method for determining the compressive stress at 10 percent relative deformation of rigid cellular plastics.

2 PRINCIPLE. A compressive force is applied at constant speed, in an axial direction to the faces of a rectangular parallelepiped test specimen. The maximum stress supported by the test specimen is calculated.

If the value of the maximum stress corresponds to a relative deformation of less than 10 percent, it is noted as the 'compressive strength' (or 'critical compressive stress'). Otherwise, the stress corresponding to a relative deformation of 10 percent is calculated and its value noted as the 'compressive stress for a relative deformation of 10 percent.'

3 DEFINITIONS. For the purpose of this standard, the following definitions apply:

3.1 Relative deformation (ϵ)—quotient of the variation (in relation to its initial value) of the thickness of the test specimen by its initial thickness. It is expressed as a percentage.

3.2 Compressive strength (δ_M)—quotient of the maximum compressive force F_M, reached when the relative deformation ϵ is < 10 percent, by the initial surface area of the right cross-section of the test specimen. The relative deformation corresponding to δ_M is noted as ϵ_M.

3.3 Compressive stress at 10 percent relative deformation (σ_{10})—quotient of the compressive force F_{10} corresponding to a relative deformation $\epsilon_{10} = 10$ percent, by the initial surface area of the right cross-section of the test specimen.

4 APPARATUS.

4.1 Compression Testing Machine. Any compression testing machine suited to the range of force and displacement in question and having two square or circular plane parallel plates which are polished and cannot be deformed, and of which the length of one side (or the diameter) is at least 10 cm. One of the plates shall be fixed and the other movable; the latter shall be capable of moving at a constant rate of displacement in accordance with the conditions laid down in Clause 6. Compression testing machines complying with the requirements of Grade B machines of AS 2193 are suitable.

4.2 Measuring Devices.

4.2.1 *Measurement of displacement.* The compression testing machine shall be fitted with a system allowing continuous measurement of the displacement x of the movable plate with an accuracy of $\pm$ 5 percent or $\pm$ 0.1 mm if this latter value is a more precise measurement (see Note to Clause 4.2.2).

4.2.2 *Measurement of force.* A force sensor shall be fixed to one of the machine plates in order to measure the force F produced by the reaction of the test specimen upon the plates during the test. This sensor shall be such that its own deformation during the course of the measuring operation is negligible compared with that being measured, and in addition it shall allow the continuous measurement of the force at any point in time with an accuracy of $\pm$ 1 percent (see Note).

NOTE: A device for the simultaneous recording of the force F and the displacement x is recommended that allows, by obtaining a curve of $F = f(x)$, the graphical determination of the pair of values of F, x required in Clause 7 with the accuracy laid down in Clauses 4.2.1 and 4.2.2 and provides additional information on the behaviour of the product.

4.2.3 *Calibration.* The readings of force and displacement provided by the measuring devices of the compression testing machine (and possibly by its graphical recording device) shall be checked periodically using a series of standard masses (corresponding as the sensitivity used for the forces) and spacers of thicknesses, all of which are known to a greater degree of accuracy than that required in Clauses 4.2.1 and 4.2.2.

4.3 Measuring Instruments. Measuring instruments in accordance with AS 2498.2.

*This method is derived from ISO 844 and is equivalent with minor deviations.