

1
STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
METHODS OF TESTING PORTLAND AND BLENDED CEMENTS

AS 2350.7
HEAT OF HYDRATION OF PORTLAND CEMENT*

1 SCOPE. This standard sets out a method for the determination of the heat of hydration of portland cement.

2 PRINCIPLE. The heat of solution of the dry cement and the heat of solution of a separate portion of the cement that has been partially hydrated for 7 or 28 days are measured, the difference between these values being the heat of hydration for the respective period of hydrating.

3 APPARATUS.

3.1 General. The apparatus described in Clauses 3.2 and 3.3 shall be used.

3.2 Calorimetric Apparatus.

- (a) *Calorimeter.* The calorimeter (Fig. 1) shall consist of a 0.6 L wide-mouth vacuum jar, with cork stopper, held in a suitably insulated container (see item (b)) to keep the vacuum jar in position and to protect the jar from undue temperature fluctuations. The vacuum jar shall not cool more than 0.001°C per minute per degree of difference from room temperature when filled with warm water, stoppered, and allowed to stand unstirred for 30 min. The vacuum jar shall be coated on the interior with a material resistant to hydrofluoric acid, such as baked phenolic resin, a baked vinyl chloride acetate resin, or beeswax. The acid-resistant coating shall be intact and free of cracks at all times; it shall be examined frequently and renewed whenever necessary.
- (b) *Insulated container.* The container shall have an insulating layer of cotton or similar material, which shall be at least 25 mm in thickness and shall encase the sides and bottom of the vacuum jar, but shall be so arranged as to permit the easy removal of the jar.
- (c) *Differential thermometer.* The adjustable differential thermometer shall be of the Beckmann type or its equivalent, graduated at least to 0.01°C and shall have a range of approximately 6°C. The thermometer shall be so adjusted that the upper limit of the scale approximates room temperature. The portion of the thermometer that will rest inside the calorimeter shall be protected with a coating resistant to hydrofluoric acid (see item (a)). The thermometer shall be equipped with a suitable reading lens.
- (d) *Funnel.* The funnel through which the sample is introduced into the calorimeter shall be of glass or plastics material and shall have a stem approximately 75 mm long with an inside diameter of not less than 6 mm.
- (e) *Stirrer.* The stirrer shall be made of glass with a coating resistant to hydrofluoric acid, or of an inert plastics material, and shall extend as closely as possible to the bottom of the calorimeter. The motor shall be of the constant-speed type, at least 35 W and shall be equipped with a geared speed reducer so that a single speed, in the range of 350 r/min to 700 r/min, can be maintained constant.

NOTE: The function of the stirrer is twofold: to maintain uniform temperature throughout the liquid, and to supply sufficient agitation to keep the solid reactant in suspension in the acid mixture. In this calorimeter the latter function controls the design of the stirrer, which may be varied by the operator to give satisfactory performance. Since a stirrer capable of keeping the solid in suspension generates considerable heat in the calorimeter, it is important that the stirrer speed, and hence the rate of heat generation, be maintained constant. A synchronous motor and a geared speed reducer are therefore almost mandatory.

*Based on ASTM Method C186-68.