STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHODS OF TESTING FIBRE BUILDING BOARDS

AS 2457.6
DETERMINATION OF THERMAL CONDUCTIVITY

1 SCOPE. This standard sets out the method for determining the thermal conductivity of fibre building boards.

2 DEFINITIONS. The terms used in this standard shall be interpreted in accordance with AS 1057, AS 2456 and AS 2459.

3 PRINCIPLE. A test piece is placed between an electrically heated hotplate that is at a constant temperature and a liquid-cooled cold-plate that is also at a constant temperature. The whole apparatus is insulated to minimize heat loss and the effects of change in ambient temperature.

The electrical energy dissipated in the hotplate is measured. From this quantity together with the thickness of the test piece and the area of the heat-flow path the thermal conductivity is calculated.

4 CONDITIONING OF TEST SPECIMENS. All thermal conductivity determinations shall be made on test pieces cut from test specimens conditioned in accordance with AS 2457.1.

The size of the test specimen shall be sufficient to provide two test pieces each 300 ± 1 mm × 300 ± 1 mm and of equal thickness and not less than 25 mm thick.

5 APPARATUS. A guarded hotplate consisting essentially of—

(a) an electrically heated hotplate approximately 200 mm × 200 mm surrounded by a heated guard-plate with outside dimensions approximately 300 mm × 300 mm, with a central square hole 3 mm larger than the hotplate;

(b) two cold-plates, each 300 mm × 300 mm maintained at a constant temperature by liquid flow; and

(c) twelve thermocouples, each provided with independent electric windings; three thermocouples are fitted to each cold-plate, hotplate and guard-plate.

The whole apparatus is enclosed in thermal insulation to minimize heat loss and the effects of change in ambient temperature.

6 TEST PIECES. Test pieces shall be prepared as follows:

(a) Cut the test pieces TD1 and TD2 from the test specimen in accordance with Fig. 1 of AS 2457.1. Each test piece shall be 300 ± 1 mm × 300 ± 1 mm and of equal thickness.

(b) Where the thickness of the test specimen is less than 25 mm, prepare additional test pieces to make up a composite test piece not less than 25 mm nor more than 40 mm thick.

NOTE: Where the thermal conductivity tests are to be conducted on material of low thermal conductivity, it is not necessary to bond the layers of the test piece together.

(c) Mark each test piece to identify it with the test specimen from which it was cut.

7 PROCEDURE. The procedure shall be as follows:

(a) Place a test piece on each side of the hotplate and bring the cold-plates into contact with the outer sides of the test pieces.

(b) Measure the thickness of each test piece in the apparatus to ± 0.02 mm and record, i.e. the distance between the hotplate and the cold-plates.

(c) Set the apparatus so that the hotplate is at a temperature of 38 ± 2°C and the cold-plates are at a temperature of 10 ± 2°C.

(d) Adjust the electrical input so that the temperature of the guard-plate is equal to that of the hotplate under steady-state conditions.