

Australian/New Zealand Standard®

Plastics—Glass filament reinforced plastics (GRP)—Methods of test

Method 19: Method for the determination of the lap shear strength of laminate

1 SCOPE This Standard describes the test procedure to determine the lap shear strength of laminate.

2 PRINCIPLE Test specimens are cut to size and a further two parallel cuts (the full width of each test specimen) are made in opposite faces 12.5 mm apart.

The specimens are mounted in a tensile testing machine and a strain applied until rupture occurs in the form of a shear-type failure with some peeling at the interlaminar bond. The maximum load to cause rupture is noted and the lap shear strength calculated.

3 APPARATUS The following apparatus is required:

- (a) *Tensile testing machine* Capable of indicating the force applied to the test piece with an accuracy of $\pm 1\%$ of the indicated value.
- (b) *Measuring equipment* Capable of measuring the test piece dimensions to an accuracy of 0.1 mm.

4 PREPARATION OF TEST PIECES

4.1 Form of test specimen Test specimens shall be of the form and dimensions shown in Figure 1. They shall have a minimum thickness of 3 mm and their length may be varied to accommodate the requirements of the available testing equipment. The edges of the test piece shall be smooth but not round or bevelled. Two parallel cuts, one in each opposite face of the specimen and 12.5 mm apart, shall be sawn across the entire width of the test piece. They shall be as narrow as practicable and shall be parallel within 0.8 mm. This incision shall be half the laminate thickness.

4.2 Number of test pieces Five test pieces shall be tested when they consist of laminates made entirely from chopped strand mat (CSM) or by spraying. Whenever the laminate contains woven rovings (WR) or other directional reinforcement, 10 test pieces, five parallel with each principal axis of anisotropy, shall be tested.

Test pieces that fail prematurely or at an obvious flaw shall be discarded and retests shall be made.

5 PROCEDURE The procedure shall be as follows:

- (a) Condition the test pieces at $20 \pm 5^\circ\text{C}$ for a minimum of 3 h immediately prior to testing.
- (b) Insert the test piece in the grips of the tensile testing machine and apply stress until rupture occurs in the form of a shear-type failure with some peeling at the interlaminar bond.

- (c) Ensure that the speed of testing, i.e. the relative rate of motion of the grips or test fixtures during test, is within the range of 5.0 mm/min to 6.5 mm/min.

6 CALCULATION The lap shear strength of each test piece shall be calculated using the following equation:

$$S = \frac{W}{ab}$$

where

S = the lap shear strength of the specimen, in newtons per square millimetre

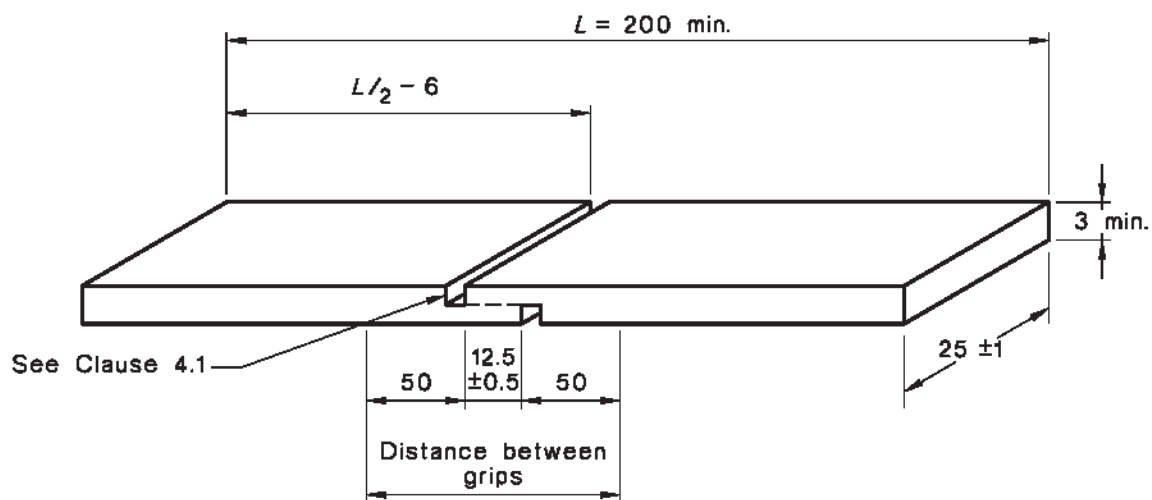
W = the maximum load, in newtons

a = the distance between sawcuts, in millimetres

b = the width of the specimen, in millimetres

7 REPORT The following information shall be reported:

- Full details of the laminate tested.
- The lap shear strength of the laminate.
- The individual test results.
- Reference to this test method, i.e. AS/NZS 3573.19.



DIMENSIONS IN MILLIMETRES

FIGURE 1 TEST SPECIMEN FOR THE DETERMINATION OF LAP SHEAR STRENGTH OF LAMINATE