

ASTM D5656 Lap Shear Strain

Calculating Shear Strain with Epsilon Model 4013 Lap Shear Extensometer

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Calculating Shear Strain

Lap shear extensometer model 4013 measures indicated axial deformation d_a , not shear strain γ . Shear strain is calculated under ASTM D5656 using the glue line thickness, which can vary – not pin spacing.



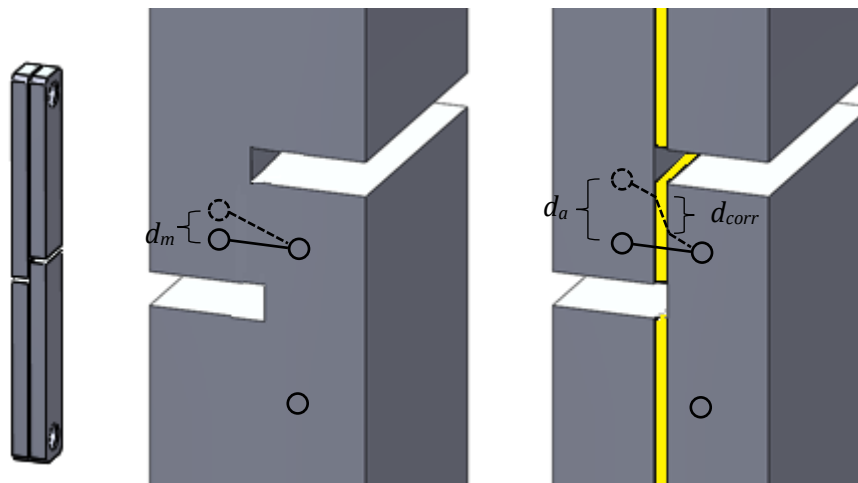
For this reason it is not possible to directly calibrate the extensometer output in units of shear strain.

Compensating for Adherend Deformation



The ASTM D5656 standard test is commonly used in applications with a glue line which is thin and/or relatively stiff. The deformation of the nominally rigid adherends may be non-trivial and should be accounted for. D5656 calls for explicit compensation for this adherend deformation d_m .

A solid bar specimen without adhesive bond is first loaded to a reference force to measure the deformation d_m of the adherends under load L . In subsequent testing of adhesives, this value is subtracted from the indicated displacement of the extensometer d_a to obtain the corrected axial displacement in the adhesive layer d_{corr} . This is used to calculate the shear strain in the glue line of thickness t .



$$\gamma = \frac{d_{corr}}{t} = \frac{d_a - d_m}{t}$$

In the calculation of d_m , adjustment for the thickness of the glue line is made as well, since there will be less adherend deformation between the pins with thicker bonds (*ASTM D5656 Section 11.5*). In typical applications, d_m is $\ll 0.010$ ".



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