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Standard Test Method for Shear Strength Properties of Metal Connector Plates[1]

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INTRODUCTION

The use of prepunched metal connector plates with or without integral projecting teeth as well as solid metal connector plates, usually fabricated from structural quality sheet coils, such as described in Specification A 653/A 653M, to fasten wood members together is a widely accepted practice. In many applications, these plates must resist shear forces, in one or two planes.

These plates must resist the force to be transferred from the wood member into the plate at the interface of the connection and wood members. The plate's resistance to a shear force in this plane is a measure of the ability of the teeth or nails to transmit forces from the wood member to the plate. This shear force is developed as the force per unit area of the plate, or force per tooth or nail. The method for arriving at the unit plate value is described in Test Methods D 1761.

These plates must resist shear forces through their cross sections in a plane perpendicular to the face of the plate. This resistance to shear is a measure of the ability of the connection to transmit forces within the connection. This test method is to be used for the determination of unit design values for pairs of plates (one pair on each side of the connection of the three-member specimen) subject to a shear force through their cross section.

During manufacture and subsequent loading of these plates, stress concentrations develop around the teeth and nail holes. Because of these stress concentrations and the difficulty of predicting the path of failure, design values for plates shall be based on tests rather than analytical methods. The shear resistance of the perforated plate is compared to the theoretical shear resistance of a solid metal-coupon control specimen to arrive at the effective shear resistance ratio of the perforated plate in the orientation tested.

If a given section taken through the length of a plate differs in a geometric character from a section taken in an alternative orientation, the effective shear resistance ratio of the plate, that is, the ratio of perforated-plate shear stress and matched solid-section shear stress, shall be a function of the alternative orientation. If this is the case, the test method presented here requires that the net section of the plate be evaluated at six different orientations.

If the net cross section of the plate is identical for all orientations, testing only along its length shall be necessary. The resulting effective shear resistance ratio of the plate is then applicable to all orientations of the plate.

If the effective shear resistance ratio is desired for any specific angle of plate orientation, it shall be evaluated by this test method.

If the plate is without prepunched (or predrilled) holes immediately prior to assembly of the wood members and teeth or nails are not to be located along the shear plane, tests on specimens, following the manufacturer's recommended minimum edge spacing, shall be used to determine the effective shear resistance ratio by this test method.

Since shear tests are difficult to perform on the solid metal-coupon control specimens, tension tests on these control specimens shall be substituted. Such tests shall be conducted in accordance with Test Methods E 8.

Tensile values are related to shear values by the Von Mises yield theory which indicates that the theoretical yielding in shear occurs at a stress equal to 0.577 of the yield stress in tension. For purposes of this test evaluation, the ultimate shear stress and ultimate tensile stress are in the same ratio.

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