

**INSULATION IMPACT ON SHEAR STRENGTH OF SCREW CONNECTIONS AND
SHEAR STRENGTH OF DIAPHRAGMS**

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(ABSTRACT)

Several thousand tests throughout the world have been conducted on the shear strength of screw connections in cold-formed steel, however, little to no research has been conducted on how various thicknesses of insulation placed between two sheets of steel, such as a steel panel and structural supporting member, affects a screw's shear strength. Elemental tests were conducted as part of this study at Virginia Tech where rolled fiberglass insulation was placed between two pieces of steel connected by self-drilling screws and tested to failure. The results were compared to the North American Specification for the Design of Cold-Formed Steel Structural Members to determine if the presence of insulation affected the shear and tensile strengths of screw connections involving insulation. A series of diaphragm tests were also performed to confirm the elemental tests.

While the presence of insulation between two steel sheets connected by screws reduces the shear strength of the connection, the current equations for predicting this strength in the North American Specification are adequate. When the data acquired from this study and the screw shear data obtained in past research were combined, it was clear that the data collected during this study fell within the scatter of the data used to develop Section E4.3 of the North American Specification neglecting the need for modification.