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Determination of Failure Modes of Screwed Connections in Cold-Formed Steel Structures

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Abstract : Steel, which is one of the base materials we prefer in the building construction, is the material with the highest ratio to weight of carrying capacity. Due to the carrying capacity, lighter and better quality steel in smaller sections and sizes has recently been used as a frame system in cold-formed steel structures. While light steel elements used as secondary frame elements during the past, they have nowadays started to be preferred as the main frame in low/middle story buildings and detached houses with advantages such as quick and easy installation, time-saving, and small amount of scrap. It is also economically ideal because the weight of structure is lighter than other steel profiles. Structural performances and failure modes of cold-formed structures are different from conventional ones due to their thin-walled structures. One of the most important elements of light steel structures to ensure stability is the connection. The screwed connections, which have self-drilling properties with special drilling tools, are widely used in the installation of cold-formed profiles. The length of the screw is selected according to the total thickness of the elements after the screw thickness is determined according to the elements of connections. The thickness of the material depends on the length of the drilling portion at the end of the screw. The shear tests of plates connected with self-drilling screws are carried out depending on the screw length, and their failure modes were evaluated in this study.

Keywords : cold-formed steel, screwed connection, connection, screw length
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