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Mechanism of Pull-out Performance of Lagscrewbolted Timber Joints I.

Effects of lead hole diameter, embedment depth, embedment direction and edge distance on pull-out performance

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Abstract: At present, moment-resisting connections for glulam constructions are widely constituted as drift-pin joints with insert-steel gusset plates, as well as bolted joints. These joints consume much steel and require complex design calculations. Therefore, Lagscrewbolts® were developed as a simple and economical timber connector. Lagscrewbolts have a lagscrew type thread on the outside surface and are threaded like a nut on the inside at one end of the shank.
In this study, a series of tests were conducted to clarify the effects of lead hole diameter, embedment depth, embedment direction and edge distance on the pull-out resistance of Lagscrewbolts. Lagscrewbolts having 30 mm top thread diameter and 25 mm root diameter were used. For timber members, Douglas-far glulam of E105-F300 grade were used.
The results obtained were as follows :
1) The optimum lead hole diameter was 27 mm.
2) Maximum pull-out load (P_{max}) vs. embedment depths, and slip modulus (K_s) vs. embedment depths showed positive correlations. These relationships were almost linear.
3) The maximum pull-out load (P_{max}) parallel to the grain was 0.75 times of that for perpendicular to the grain, and the pull-out slip modulus (K_s) parallel to the grain was 3 to 6 times of that for perpendicular to the grain.

4) The suitable edge-distance was thought to be more than 1.5*d* (*d* is the thread top diameter of the Lagscrewbolt).

Keywords: Lagscrewbolt, lead hole, embedment depth, embedment direction, edge distance

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