



<b>Revision Date</b>	05-29-2024
<b>Code/Section</b>	2018 IBC Section 2302.1; 2018 IRC Section R507; 2018 American Wood Council (AWC) National Design Specification for Wood Construction (NDS) Sections 12.1.4 and 12.2.1
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**Purpose and scope:**

To describe the plan review and inspection policy for the design of lag screws, also called lag bolts, for uses in structural applications.

This policy does not apply to proprietary screws that do not require pilot holes.

**Design and Installation Policy:**

Lag screws used in structural applications, shall conform to the following limitations:

1. The construction documents shall include the following installation information required by the 2018 AWC NDS Section 12.1.4:
  - The lead hole diameter for the threaded portion pilot hole, where pilot holes are required;
  - The clearance hole diameter and length for the shank pilot hole, where pilot holes are required;
  - The statement: "The threaded portion of the lag screw shall be inserted in its lead hole by turning with a wrench, not by driving with a hammer."
  
2. The structural calculations shall take into account the design criteria found in the 2018 AWC NDS Section 12.2.1 and all other building code requirements, but shall specifically include the following:
  - The withdrawal resistance shall be based on the length of the threaded portion penetrating the main member, excluding the tapered tip length;
  - The withdrawal resistance shall take into account fastener head pull-through in accordance with the 2018 AWC NDS Section 12.2.5;
  - The 2018 AWC NDS table 12J values shall be reduced for penetration less than 8D;
  - Combined lateral and withdrawal loading per the 2018 AWC NDS Section 12.4.1;
  - Local failures per the 2018 AWC NDS Section 11.1.2. Appendix E methods are acceptable. Less comprehensive methods are not acceptable.

**Rationale and Reference:**

Lag screws have been observed to cause failures by inducing splitting where incorrect installation procedures are used. It is very difficult to verify correct installation. Lag screws are typically used in connections where very little redundancy exists, and as such an individual fastener failure can readily lead to global failure. Many lag screws require two pilot holes to be installed in accordance with the building code, and this policy mandates that information be readily seen on the drawings.

The building code does not forbid the use of lag screws, but it does discourage their use in some situations. As such, designers should consider this before choosing to design critical connections with lag screws. Exterior locations in Phoenix are subject to large wood moisture losses due to Phoenix's low average ambient moisture which leads to wood shrinkage.

The 2018 AWC NDS commentary states that "Because of the greater possibility of splitting when subject to lateral load, it has been recommended that insertion of lag screws in end grain surfaces be avoided."