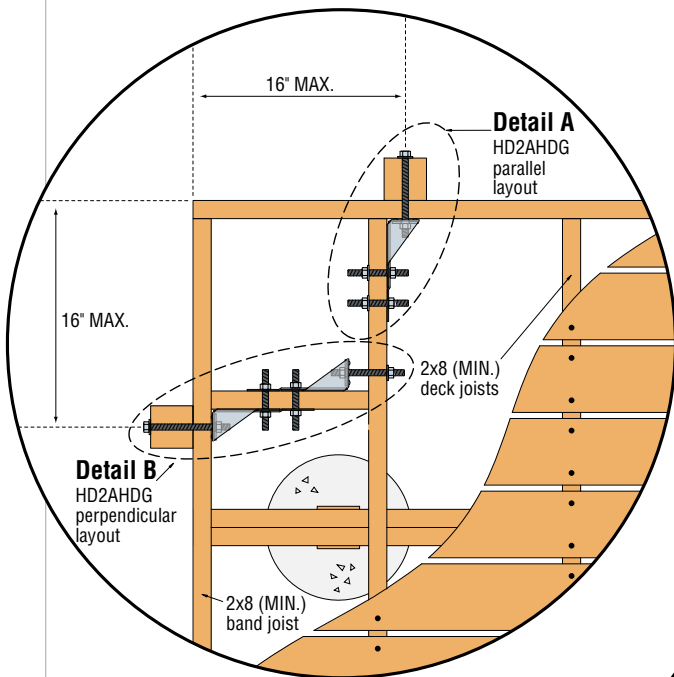
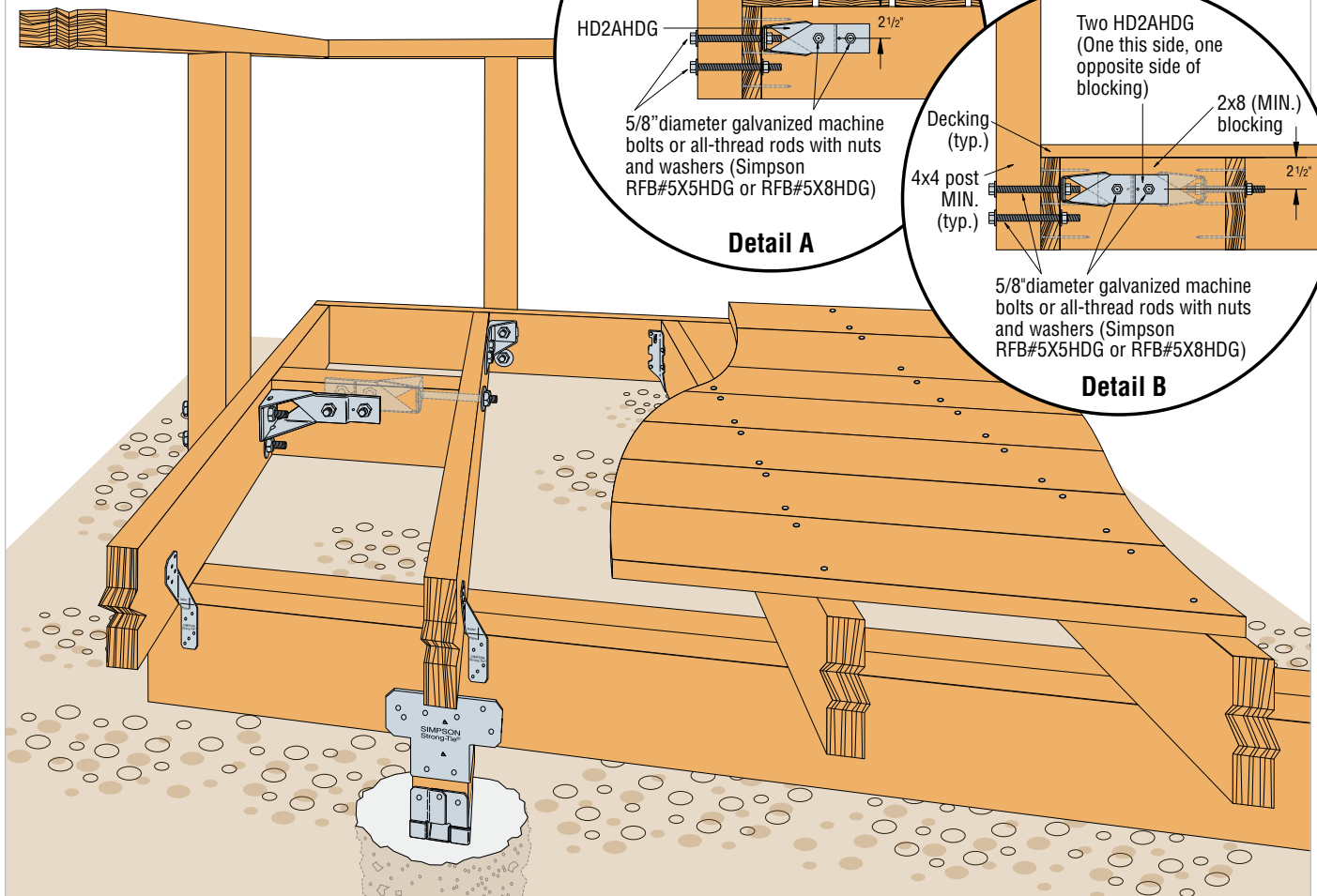
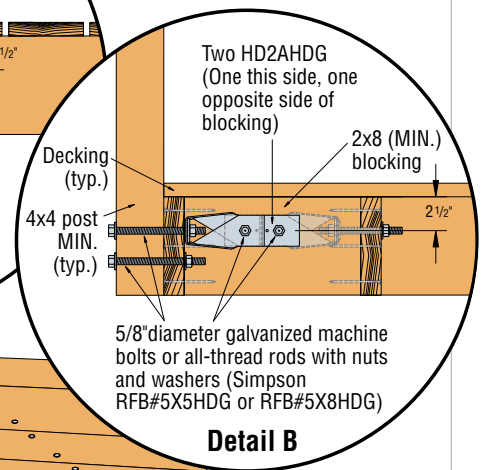
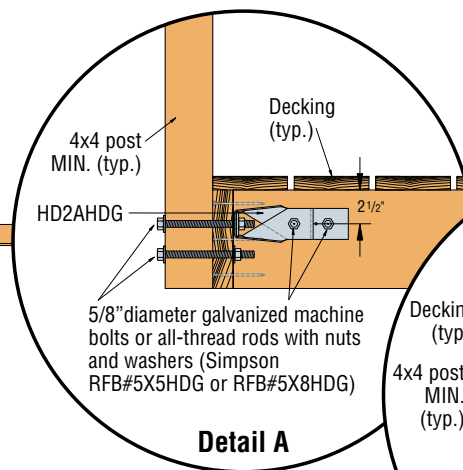


HD2AHDG Holdown Guardrail Post Application



Investigations of injuries due to deck failures indicate that the guardrail post connection to the band joist is the cause in many cases. Testing has shown that typical connections using lag screws or through-bolts do not meet code requirements. The Simpson HD2AHDG holddown has been tested as a lateral anchor for the guardrail post connection. Two configurations were tested: one holdown installed on the joist (Detail A) and two holdowns installed back-to-back on blocking (Detail B). Both configurations meet the code prescribed load of 500 lbs. at a height of 3 feet above the deck surface.

- HD2AHDG holdowns are hot-dip galvanized for added corrosion protection.
- May be used for new construction or retrofitted on an existing deck.
- Meets provisions set by the IRC/IBC 2000, 2003 and 2006.
- Tested within the limits prescribed by ICC's Acceptance Criteria for Handrails and Guards (AC273) and for Joist Hangers and Similar Devices (AC13).





HD2AHDG Guardrails: What the Codes Require

When is a guardrail required?

“When porches, balconies, ramps or raised floor surfaces are located more than 30 inches above the floor or grade below...”

International Residential Code® - 2000, 2003 & 2006 (sections R316.1 – 2000, R312.1 – 2003/2006)

“Guards shall be located along open-sided walking surfaces... that are located more than 30 inches above floor or grade below.”

International Building Code® - 2000, 2004 & 2006 (sections 1003.2.12- 2000, 1012.1 - 2003, 1013.1-2006)

If the guardrail is not required because the deck or porch is not at least 30 inches above the finish grade, does a guardrail have to be code compliant?

Responsibility: “It shall be the duty of every person who performs work for the installation or repair of building, structure... to comply with this code.”

International Residential Code® - 2000, 2003 & 2006 (section R105.8)

Conditions: “Structures or existing equipment that are or hereafter become unsafe...or otherwise dangerous to human life...shall be deemed an unsafe condition. Unsafe structures shall be taken down and removed or made safe, as the building official deems necessary.”

International Building Code® - 2000, 2003 & 2006 (section 115.1)

What is the guardrail height requirement?

“...not less than 36 inches in height...”

International Residential Code® - 2000, 2003 & 2006 (sections R316.1 – 2000, R312.1 – 2003 & 2006)

“Guards shall form a protective barrier not less than 42 inches high.”

Exceptions: “For occupancies in Group R-3, and within individual dwelling units...R-2... height measured not less than 34 inches and not more than 38 inches...”

International Building Code® - 2000, 2003 & 2006 (sections 1003.2.12.1 – 2000, 1012.2 – 2003, 1013.2 – 2006)

How much force must a handrail or guard be capable of resisting?

“Handrail assemblies and guards shall be able to resist a single concentrated load of 200 lbs., applied in any direction at any point along the top, and have attachment devices and supporting structure to transfer this loading to appropriate structural elements.”

International Residential Code® - 2000, 2003 & 2006 (Table R301.4 (d) – 2000, Table R301.5 (d) – 2003/2006)

International Building Code® -2000, 2003 & 2006 (section 1607.7.1.1)

What is the standard used to determine the performance of handrails and guards?

International Code Council Evaluation Service Test Acceptance Criteria 273.

How are handrails and guards tested?

The mounting of the handrails and supporting structure shall be capable of withstanding a load of at least 500 lbs.

When the load reaches 200 lbs., the deflection at the point of loading shall be recorded. The allowable deflection at 200 lbs. shall NOT exceed:

$$h \text{ (height in inches of the guard)} \div 24 + l \text{ (length between posts)} \div 96$$

For example:

Given a 36" rail height and 6' between the posts:

$$36" \div 24 = 1\frac{1}{2}" \text{ plus } 72" \div 96 = \frac{3}{4}"$$

Total deflection must be $\leq 2\frac{1}{4}$ inches

Why have the code requirements changed?

Based on a study conducted at Virginia Tech. on the post-to-rail connection, 1/2" lag screws with washers and 1/2" machine bolts with washers failed to meet the load and deflection criteria as established by AC273.

Why the Simpson Strong-Tie® solution?

The connection details, as shown, have been tested and successfully performed to meet or exceed the criteria as established by the code and AC273.

Post-to-Deck Assembly	Average Deflection at 200 lbs.	Average Test Ultimate
HD2AHDG parallel-to-joist	1.5"	790 lbs.
HD2AHDG perpendicular-to-joist	1.5"	655 lbs.

December 31, 2009

This bulletin is effective until June 30, 2008, and reflects information available as of Sept. 1, 2006. This information is updated periodically and should not be relied upon after June 30, 2008; contact Simpson for current information and limited warranty or see www.strongtie.com.

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