



Which Wall Is Stronger?

by Henry Spies

2x4 vs. 2x6 Walls

Q. *Is there any structural difference between a wall framed with 2x4s 16 inches on-center and a wall with 2x6s 24 inches on-center?*

A. There is almost no difference in the bearing capacity — the wall's ability to support a compressive load, which is how most walls are loaded. Bearing capacity is a function of the footprint area of all the studs in a wall. For example, a 4-foot section of wall would have three 2x4s, but only two 2x6s. The total bearing area of three 2x4s is $15\frac{3}{4}$ square inches; two 2x6s have a bearing area of 16 square inches.

In bending, however, such as from a wind load, a 2x6 wall is considerably stronger.

In tall walls, where column buckling might be a factor, a 2x6 wall would be stronger if a structural sheathing was used. Structural sheathing provides lateral support to the 1½-inch dimension of either 2x4s or 2x6s, but the greater width of the 2x6 makes it stiffer in that direction. If the sheathing is not structural, both wall systems would have equal resistance to buckling, since the buckling would occur across the thickness of the member.

Attic Moisture Mystery

Q. *Last winter, the tenants on the north side of a new duplex we built complained of heavy condensation in the attic. Water dripped on the north side of the attic floor from the underside of the roof sheathing, but nothing like this happened on the south side. The attic is very large, and it is divided by a fire wall. We installed balanced soffit and ridge vents, and all exhaust fans are vented outside. What is causing the condensation?*

A. A considerable quantity of moisture is reaching the north attic from below. Once the moisture is in the attic, it condenses on the coldest surface — usually the roof sheathing. Most condensation occurs at night, when the roof is coldest. The problem occurs only on the north side because the sun evaporates the condensation on the south side on a daily basis. The moist air is then vented through the soffit and ridge vents. On the north side, which is not sufficiently warmed during the day, the frost continues to build, until a really warm day comes along and the entire frost coating melts, producing the problem

you describe.

During the first winter after construction, a major source of moisture can be the construction materials themselves. With a block foundation, there can be at least a ton of moisture lost from the mortar, wood, paint, and drywall taping compound in the house. In a house with a poured concrete basement, the amount may be several tons. The problem often disappears after the first winter.

Additional moisture may be coming from a damp crawlspace or basement, excessive use of a humidifier, or a gas-burning appliance, such as a water heater or furnace that is not venting properly. A plumbing wall or flue chase can provide a direct path to the attic from the basement if these passages are not sealed at the ceiling level.

You may be able to isolate the problem by “reading” the indoor humidity levels in the house on the windows. If there is condensation on double-glazed windows, the indoor humidity is too high and ventilation fans in the kitchen and bathrooms should be run continuously until the condensation goes away. If condensation occurs on the windows on only one side of the house, the problem may be caused by the use of a humidifier or improper venting of gas-burning appliances. If there is no condensation on the windows, the moisture is probably coming from the basement or crawlspace through the plumbing or flue chases.

Perimeter Drain Placement

Q. *What is the best place to run perimeter drains — along the top of the footing, to help keep water out of the cold joint between the foundation wall and footing, or at the base of the footing?*

A. Perimeter drains should be placed at the base of the footing. If the wall is coated with some form of waterproofing and drainage is provided by a gravel backfill or a drainage membrane, there should be no water at the joint between the wall and the footing. The low placement should also drain any ground water in the fill under the slab. ■

Henry Spies is a building consultant formerly with the Small Homes Council-Building Research Council of the University of Illinois.