



Reducing Earthquake Damage to Your Business

Guide for Wall-Mounted Flat Screens

Unlike most other natural disaster events, earthquakes have no season and can cause devastation any time of the year without warning.

While major changes to your building's structure may be costly and time-intensive, there are other more affordable non-structural retrofits that will help reduce interior damage to your business.

Many businesses today have large flat screens mounted on their walls. You'll find them in restaurants, doctor's offices, hotel lobbies, office buildings, hospitals and outpatient centers, as well as many other types of businesses. These screens, which are often more than 60 in. wide and weigh more than 100 lb, could cause significant damage and injuries if they fall during an earthquake. Keeping the flat screens well secured reduces the risk of injuries to anyone sitting underneath or near them, and also reduces the risk of damaging other items in your business if the screen is dislodged from the wall.



Recent Testing

Recent shake testing of a six-story steel-frame building conducted at the University of California at San Diego and supported by a coalition of government agencies, foundations and industry partners, including State Farm and IBHS, successfully demonstrated that IBHS' mounting instructions for flat screens were effective in keeping them attached to the wall during the testing. The earthquake testing included shaking that was as strong as the 1994, 6.7-magnitude Northridge earthquake.



A view of the six-story steel-frame building used for shake testing at the University of California at San Diego.

INSTALLING FLAT SCREENS

Flat screens are often bolted on a support bracket assembly that is in turn mounted on interior drywall-finished walls. In many instances, the support bracket is firmly attached to only a single framing stud behind the drywall. In some cases, the bracket may

be partially or exclusively anchored to the drywall. There is a good chance that any of these attachment methods will be inadequate when an earthquake strikes and these wall-mounted flat screens will fall off the wall.

Procedure

The retrofit procedure outlined below distributes the weight of the flat screen over at least 2 framing studs behind the drywall. The wall framing stud can be either wood 2x members or light-gauge steel studs spaced no more than 24 in. apart. The retrofit targets flat screens with a unit weight of 110 lb or less. For mounting heavier flat screens on walls, heavy-duty support bracket systems are available and should be installed according to the manufacturer's recommendations.

You can retrofit the wall-mounted flat screen using items that are readily available from a local hardware store. Before you start retrofitting, confirm the following:

- The flat screen is less than 110 lb; most newer 60–65 in. flat screens weigh less than 110 lb.
- The framing studs behind the drywall are not more than 24 in. on center apart.

Material Required for Retrofitting

- Stud finder
- A drill with 1/8-, 1/4- and 3/8-in.-diameter drill bits
- 3/4-in.-thick x nominal 12-in.-wide x 28-in.-long (minimum) wood retrofit board (plywood or solid wood; NOT OSB or particle board); refer to Figure 4 (last page) prior to cutting the wood backing
- For wood stud applications, use (10) #14 or 1/4-in.-diameter 3-in.-long wood or deck screws
- For metal stud applications, use (14) 1/4-in. diameter x 2-in.-long self-tapping screws
- (2) or (4) 5/16-in.-diameter carriage bolts at least 1 in. long (or longer depending on the thickness of the wall-mount bracket) with flat washers and lock washers or lock nuts (depends on how many bolts are required for the wall-mount bracket)

Retrofit Procedure

1. Cut a retrofit wood board out of plywood or solid wood (3/4 in. thick x 12 in. x 28 in.) to be anchored to 2 adjacent studs.
 - a. Use a stud finder to locate 2 framing studs where the flat screen is to be mounted. Make sure the studs are no more than 24 in. apart. (Note: You may have to use a metal detector to find locations of metal studs.)
 - b. Measure the existing flat screen wall-mount plate. The width of the wood board should be at least 2 in. greater than the vertical plate dimension (see Figure 4). The minimum nominal width of the board must be 12 in. (actual width 11 1/4 in. for solid wood board).
2. Pre-drill holes in the retrofit wood board.
 - a. Draw straight lines perpendicular to the long side of the board near each end of the wood board so the distance between these 2 lines is the spacing between the center lines of 2 framing studs previously located in the wall. Maintain a minimum 2-in. edge distance between each line and the edge of board.
 - b. Position the flat screen wall-mount plate on the retrofit wood board at the desired location, outline the plate, and locate the bolt holes. Use the 3/8-in. drill bit to create the bolt holes for the 5/16-in.-diameter carriage bolts to secure the wall-mount assembly to the board.
 - c. Measure and locate wood screw installation holes along the 2 lines near each end of the board as shown Figure 4. Use the 1/4-in. drill bit to create holes in the board for the screws that are used to attach the board to the wall.
3. Locate the retrofit wood board on the wall.
 - a. Position the board vertically at the desired position and with the 2 lines near the ends of the board aligned with the centers of the 2 wall studs.
 - b. Mark locations where carriage bolt heads will come in contact with the drywall.
 - c. Mark the locations of the screws that will be used to fasten the board to the wall studs.
 - d. Pre-drill pilot holes for the screws using the 1/8-in. drill bit.
4. Pre-drill the holes on the wall and recess drywall to accommodate carriage bolt heads.
 - a. Use the 1/8-in. drill bit to create screw holes along 2 framing stud locations. There should be more resistance to the drill when it hits the wood or metal stud behind the drywall. All 10 holes [wood studs] or 14 holes [metal studs] must catch the framing stud behind the drywall; otherwise, relocate the board.

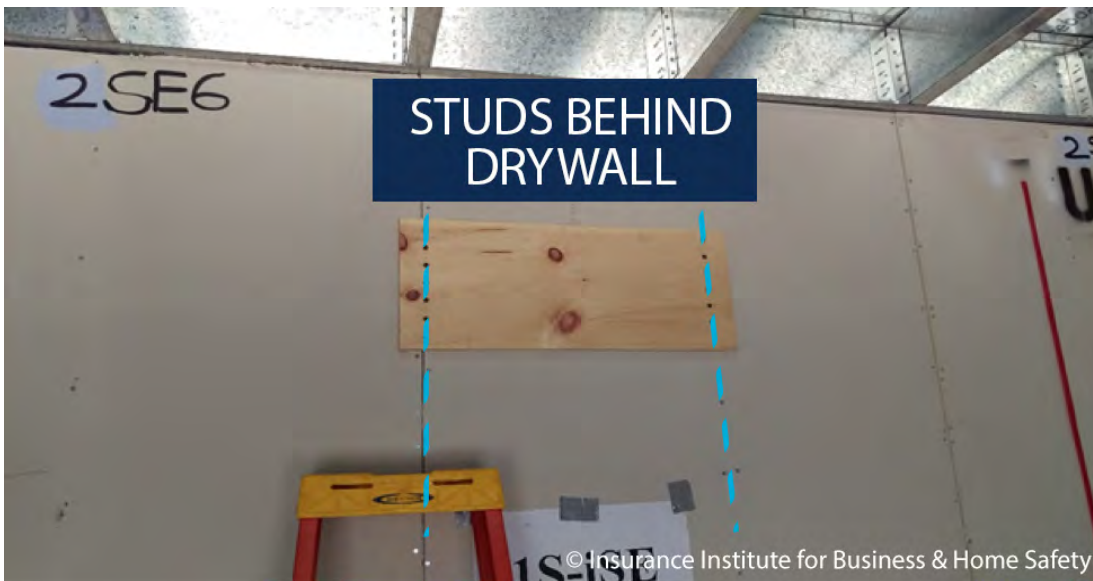


Figure 1. Retrofit wood board must be fastened to metal studs behind drywall.

- b. Use a hard object with a small diameter to create a recess in drywall at the locations marked for the head of each carriage bolt. The drywall recess only needs to be deep enough to accommodate the head of the carriage bolt.
5. Bolt the flat screen wall-mount plate to the retrofit wood board using the 5/16-in.-diameter carriage bolts. Use an appropriately sized flat washer next to the metal wall-mount plate followed by the lock washer and nut or the lock nut.
6. With only the flat screen wall-mount assembly bolted to the retrofit wood board, secure the board to the wall-framing studs with all the screws (10 wood screws for wood stud walls and 14 self-tapping screws for metal stud walls).
7. After the retrofit wood board is secured to the wall, the flat screen can be bolted onto the wall-mount assembly following the manufacturer's recommendations.



Figure 2. Flat screen mount bolted to retrofit board; retrofit board fastened to metal studs behind drywall.



Figure 3. Completed flat screen installation.

