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GYPSUM BOARD PROVIDES STRONG DEFENSE AGAINST FIRE IN WALL ASSEMBLIES

Fire resistance is a vital factor influencing many specifications and building design. This is one of the many reasons gypsum, a naturally fire-resistant mineral, has become a leading construction material. Gypsum is used in the manufacture of gypsum boards and exterior sheathings board products.

When it comes to fire-rated building design and construction, the collective components of the wall assembly are more critical than individual products. CAN/ULC-S101, “Fire Endurance Tests of Building Construction and Materials” and ASTM E 119, “Standard Test Methods for Fire Tests of Building Construction and Materials” require that fire tests be conducted on complete wall assemblies, not only on the gypsum board by itself. This article will give examples of fire-rated gypsum board wall assemblies.

Fire-Resistant Wall Assemblies

There are two main types of fire-resistant wall assemblies – noncombustible and combustible/loadbearing and non-loadbearing. Noncombustible construction shall be constructed of noncombustible materials and permitted minor combustible components, such as paint and electrical outlets. The 2005 National Building Code defines noncombustible and combustible very specifically, based upon performance in accordance with two test methods: CAN4-S114, “Standard Method of Test for Determination of Non-Combustibility in Building Materials” and CAN/ULC-S135, “Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter).” In simple terms, noncombustible materials will not ignite or support combustion and combustible materials will. All combinations of assemblies are tested to CAN/ULC-S101 to establish hourly ratings. Variations of these types of assemblies are:

Typical One-Hour Rated Assembly, ULC Design W415 – Noncombustible/Non-loadbearing

One layer of 15.9mm (5/8”) Type X gypsum board is applied parallel or at right angles to

each side of 25-gauge, 92mm (3-5/8”) steel studs spaced at 600mm (24”) on centre. Board is fastened to steel studs using 25mm (1”) Type S drywall screws at 200mm (8”) on centre. Joints must be offset.

Typical One-Hour Rated Assembly, ULC Design W301 – Combustible/Loadbearing

One layer of 15.9mm (5/8”) Type X gypsum board applied parallel to each side of 38mm x 89mm (2 x 4) wood studs spaced at 400mm (16”) on centre. Board is fastened to studs with 51mm (2”) nails at 175mm (7”) on centre. Joints must be offset.

Typical two-hour wall assemblies can be achieved by using two layers of 15.9mm (5/8”) Type X gypsum board each side with specified orientation of board, fastener, and stud type, and spacing, as per the tested assembly details.

Another important wall assembly demanding fire-resistance performance is the area separation firewall.

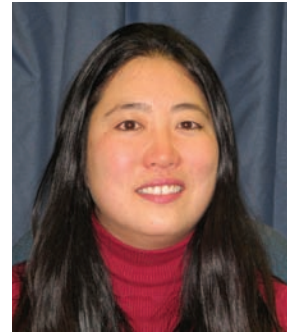
Area Separation Firewalls

Firewalls are required between adjacent dwelling units, such as apartments and townhouses, and in some cases, they are required in commercial and institutional buildings. Gypsum board firewalls – both solid and cavity types – can serve as area separation firewalls between adjacent buildings. These assemblies may be used in buildings up to four storeys high, with total height not exceeding 13 meters, and are intended as non-loadbearing partitions only.

A typical cavity type area separation firewall assembly consists of two layers of 25mm (1”) Shaftliner panels, steel H-studs installed between adjacent panels, 19mm (3/4”) airspace, wood framing, and sacrificial layer of 12.7mm (1/2”) gypsum board. This system is intended to be continuous from the top of the footings to the underside of the roof deck.

Conclusion

When specifying fire-resistance rated assemblies, it is essential to specify materials



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and construction as identified in the tested assemblies. Select assemblies tested or listed by an independent agency acceptable to the authorities having jurisdiction.

Gypsum board wall assemblies offer a strong line of defense against the spread of fire, helping lead to a more sustainable building that will stand the test of time. ■

For more detailed information, consult the CertainTeed Building Science Department website at <www.certainteed.com/buildingscience>.

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