



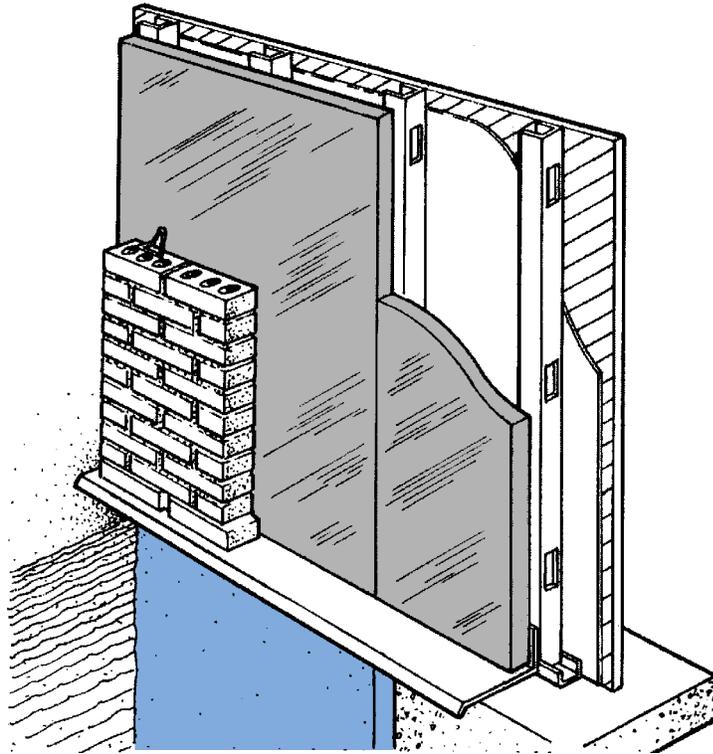
THERMAX Sheathing and TUFF-R Commercial Insulation in Steel Stud Cavity Walls

Steel stud wall assemblies offer high value and versatility for commercial construction. However, steel stud cavity walls can also present unique challenges, due to the thermal shorts created by the highly thermally conductive metal studs. The resulting lower effective wall R-value** from these thermal shorts may also present moisture management issues for the wall system. You can meet these challenges head on with THERMAX* Sheathing or TUFF-R* Commercial (TUFF-R C) insulation.

Two Products, Many Benefits

THERMAX Sheathing and TUFF-R C insulation are specially designed to solve the challenges of steel stud cavity wall construction. With an R-value of 6.5 at 1", THERMAX Sheathing and TUFF-R C insulation are among the most energy-efficient rigid foam insulations available, delivering more R-value in the thinnest profiles possible.

Both THERMAX Sheathing and TUFF-R C insulation feature a glass-fiber-reinforced polyisocyanurate foam core, produced by a unique manufacturing process. Because of their uniform, closed-cell structure, THERMAX Sheathing and TUFF-R C insulation have high R-values and are exceptionally resistant to heat flow. In addition, special facers reduce intrusion by water and water vapor into the foam core, allow the products to stabilize at a higher R-value, and enhance durability and dimensional stability.



THERMAX Sheathing, with aluminum facers on both sides, features improved fire performance due to special chemical modifications of its foam core, making it an ideal choice for many types of facilities. THERMAX Sheathing can be installed exposed to the interior without a thermal barrier in many applications.

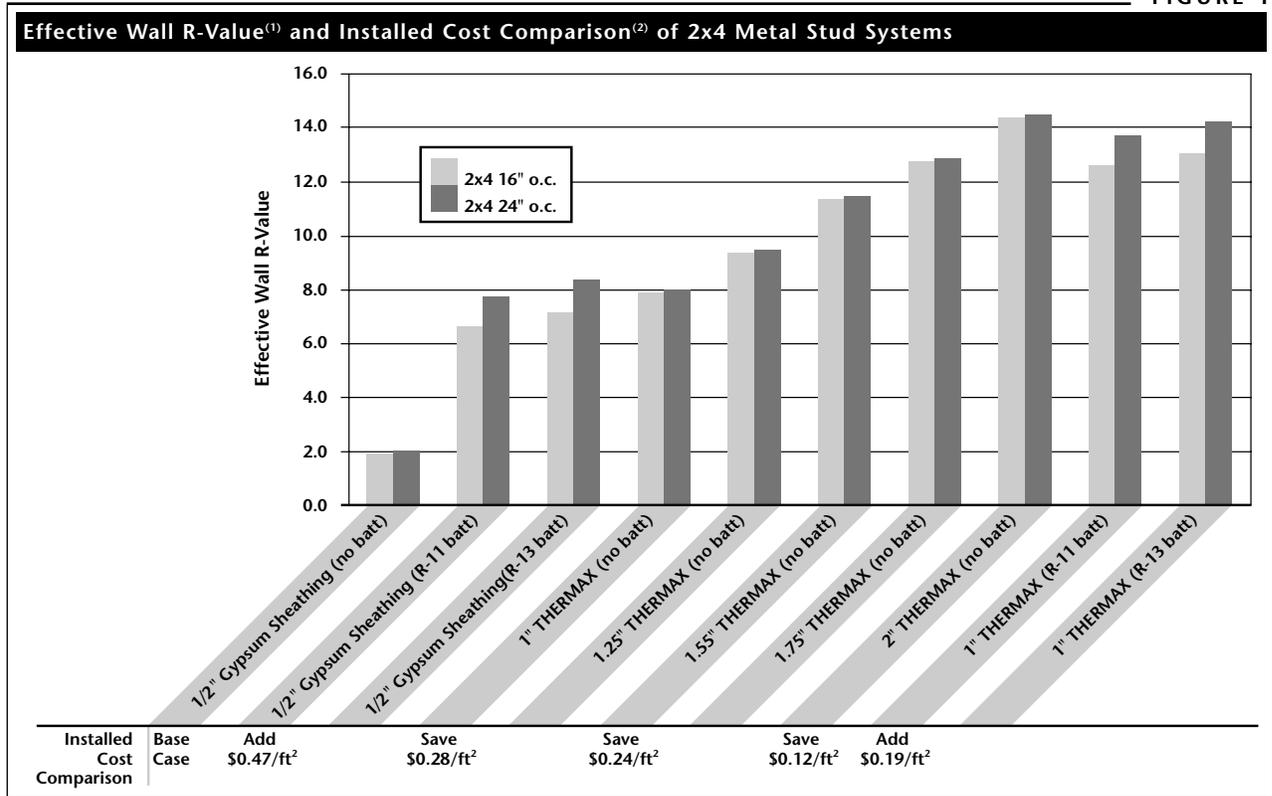
TUFF-R C insulation is also an excellent choice for steel stud assemblies, when fire performance is not the chief consideration. The thermally efficient foam core of TUFF-R C insulation is sandwiched between durable reflective/radiant barrier-quality aluminum facers.

THERMAX Sheathing and TUFF-R C insulation are lightweight, easy to install and cover large areas quickly. Their versatility allows them to be used in load-bearing and non-load-bearing applications. And both can be detailed as an air barrier.

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**R means resistance to heat flow. The higher the R-value, the greater the insulating power.

FIGURE 1



(1) Effective R-value calculations based on ASHRAE 90.1-2004 Table A9.2B. All cases have 1/2" interior gypsum with R-0.56 and no air films or exterior finishes.
 (2) Installed cost differences (compared to base case) determined by substituting 1/2" gypsum with THERMAX or TUFF-R C (in the insulation thickness shown) over 16" o.c. studs. Installed cost comparisons based on 2005 RS Means Building Construction Cost Data.

THERMAX and Fire Performance

To address model building code concerns about flammability of wall constructions with combustible components, the National Fire Protection Association (NFPA) has developed NFPA 285, a pass/fail test for two-story wall assemblies with a window.

NFPA 285 test criteria require that flame not spread either vertically or laterally beyond an acceptable distance from the area of flame plume impingement on the exterior face of the second-floor wall assembly.

THERMAX Sheathing complies with fire-resistive codes and can be used in hourly rated wall assemblies and in structures that must meet NFPA 285.

Wall Performance Maximized

While steel studs offer superior strength and structural integrity, their thermal conductivity can threaten the thermal performance of the entire wall assembly. THERMAX Sheathing and TUFF-R C insulation slow heat transfer and help building owners realize maximum benefits from this form of construction.

R-VALUE AND THERMAL EFFICIENCY

Steel studs transfer heat approximately 10 times faster than wood studs. This can lead to thermal bridging, where heat bypasses the cavity insulation and is transferred through the studs.

During summer months and in hot climates, steel studs can cool the exterior cladding where it is attached to the steel studs.

Similarly, during winter months and in cool climates, interior surfaces on gypsum board can be cooler at stud locations than the rest of the wall. This can cause dust and dirt to deposit at these cold spots, leading to poor exterior aesthetics and increased maintenance costs.

Installing THERMAX Sheathing or TUFF-R C insulation in place of exterior gypsum sheathing makes steel stud wall assemblies much more thermally efficient. Figure 1 shows that adding THERMAX Sheathing or TUFF-R C insulation greatly increases the effective R-value of the wall assembly. Additionally, by eliminating batt insulation, specified R-values can be reached at a lower installed cost.

MOISTURE CONTROL

Moisture that enters the wall cavity can condense if it reaches a cold spot (below the dew point). In a wall that is not properly insulated, a steel stud may provide that cold spot.

Condensation within walls can lead to corrosion of the steel studs, loss of R-value and moisture accumulation.

THERMAX Sheathing and TUFF-R C insulation cover the entire wall and insulate areas cavity insulation can't reach. By reducing air infiltration and keeping the cavity temperature above the dew-point temperature, THERMAX Sheathing and TUFF-R C insulation help reduce condensation. They also help enhance the effectiveness of cavity insulation.

Design Options

Figures 2 and 3 represent two common designs for steel stud cavity wall construction. THERMAX Sheathing and TUFF-R C insulation perform equally well in both wall assemblies, providing excellent thermal efficiency and moisture control. THERMAX Sheathing or TUFF-R C insulation may be installed directly over steel studs or over the structural sheathing. For more information about steel stud wall construction and installation of Dow insulation products, contact your Dow representative.

BRACING AND DEFLECTION CRITERIA

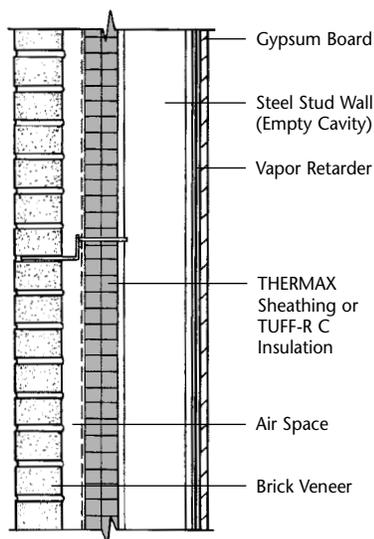
The Brick Institute Association (BIA) Technical Note 28B states that "steel studs must be designed to provide adequate out-of-plane support for all loads imposed on the wall system.

This is done by establishing a maximum deflection limit on the stud while maintaining steel stress values in the stud within permissible limits. The allowable out-of-plane deflection of the studs should be restricted to $L/600$ using service level loads." The service level loads are based on a number of building-specific variables such as location, height and surrounding terrain. Technical Note 28B also states that the flanges of the steel studs must be laterally braced to resist compression in bending.

The bracing and deflection design process is complicated and requires the services of a trained professional. The following points should be kept in mind when designing this type of system:

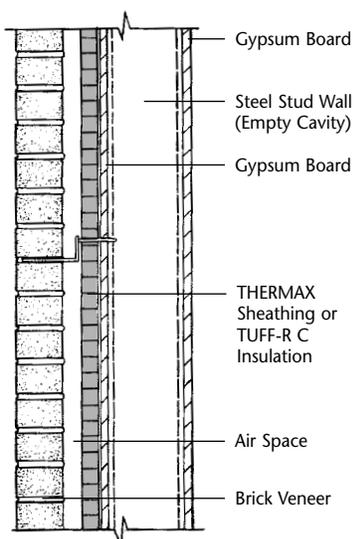
- THERMAX Sheathing and TUFF-R C insulation are not structural sheathing materials and should not be included as part of the structural design.
- Disregard any contribution of the gypsum sheathing in determining the stiffness of the backing.[†]
- Verify that the manufacturer of exterior gypsum sheathing recommends its product as a structural sheathing.
- Many designers recognize that bracing needs to be connected to the studs to be effective and that gypsum interior and exterior cladding is not always reliable for preventing rotation, let alone for composite action.
- Allow use of gypsum sheathing as bracing only in dry conditions. Standard fastening may not be adequate if gypsum sheathing is used as bracing. Ensure that cyclic loading will not render the sheathing ineffective as bracing.

FIGURE 2



Steel stud cavity wall with interior gypsum, air/vapor retarder and uninsulated stud cavity. The designer may want to consider sealing the external joints of the foam by taping or caulking.

FIGURE 3



Steel stud cavity wall with interior and exterior gypsum, uninsulated stud cavity, and no air/vapor retarder. The designer may want to consider sealing the external joints of the foam by taping or caulking.

[†]Brick Institute Recommendations, Progressive Architecture 2.92

IN THE U.S.:

• For Technical Information: **1-866-583-BLUE (2583)**

• For Sales Information: **1-800-232-2436**

THE DOW CHEMICAL COMPANY

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WARNING: THERMAX insulation does not constitute a working walkable surface or qualify as a fall protection product.

Building and/or construction practices unrelated to insulation or housewrap could greatly affect moisture and the potential for mold formation. No material supplier including Dow can give assurance that mold will not develop in any specific system.



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