How ArmorWall™ Plus Properly Manages Moisture and Vapor

With key study findings from M. Steven Doggett, Ph.D. Principal Scientist, Built Environments, Inc. white paper:
Hygrothermal Analysis of Magnesium Oxide as Structural Insulated Sheathing

High-Performance Polyurethane Insulation

The highly dense insulation layer of ArmorWall™ Plus FR SIS works with the MgO sheathing and air and water-resistive coating layers to store moisture and direct vapor transport bi-directionally, alleviating the need for interior vapor retarders under typical conditions. This is an added benefit to a system that provides R-6.5 per inch via exterior continuous insulation.

Study Finding: **The manufacturing process of ArmorWall™ Plus FR SIS bonds the insulation to the MgO at the surface pore level, preventing voids seen in other products that glue or laminate their materials together. Although semi-impermeable, it remains moderately hygroscopic, serving both moisture storage and vapor transport functions.**

Magnesium Oxide (MgO) Sheathing

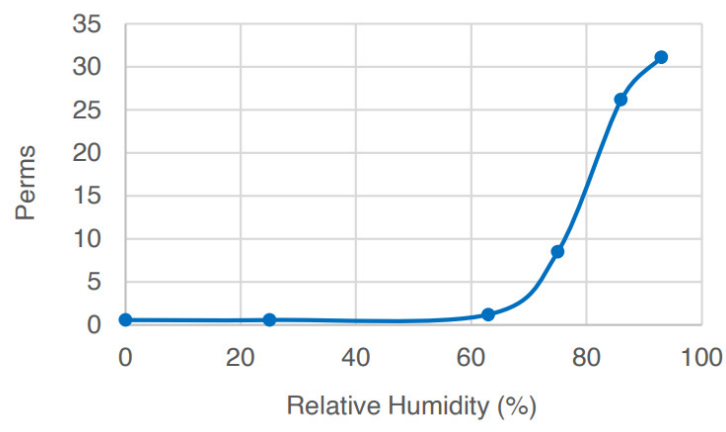
In ArmorWall™ Plus FR SIS, the MgO sheathing layer works with the insulation and coating layers to store moisture and direct vapor bi-directionally to protect the building. Additionally, the MgO provides fire resistance and structural support for cladding attachment.

Study Finding: **MgO is considerably less vulnerable to physical and biological degradation when compared to wood-based panels. MgO is dimensionally stable when exposed to moisture and is both hygroscopic and vapor permeable, aiding in moisture transport and storage. The ArmorWall™ Plus FR SIS formulation exceeds requirements that result in some MgO sheathing weeping in extreme moisture conditions.**

Air & Water Resistive Barrier Coating

The variable vapor permeability of ArmorWall™ Plus FR SIS serves as a "smart" coating that is ideal for designing wall assemblies in all climate zones. In a related study, the coating lasted more than 365 days in a water column test. Because the coating is factory-applied, time and material savings are earned when compared to third-party solutions installed in the field.

Study Finding: **ArmorSeal Coating offers a moisture-dependent vapor permeance (see graph below) that increases as relative humidity increases and can dry to the exterior or interior, depending on prevailing vapor gradients. Even when "open", the coating absorbs little water and is highly resistive to bulk water. The coating serves two functions: protecting from bulk air and water intrusion and managing vapor transport.**



Moisture-dependent permeability of the DuPont™ ArmorSeal Plus Coating.

Interior Vapor Retarders Not Needed

The ArmorWall™ Plus FR SIS composite system simplifies the design and installation of a wall assembly that properly stores and transports vapor without the use of interior vapor retarders. This benefit enables project teams to reduce costs and save time by eliminating costly product layers that introduce complexity and can result in unintended consequences for moisture prevention.

Study Finding: **When using the ArmorWall™ Plus FR SIS system, interior vapor retarders are not necessary regardless of climate zone. Moisture generation rates modeled were too low to pose risks. When needed, ArmorWall™ Plus FR SIS stores moisture while remaining vapor permeable. Vapor retarders may be used in Climate Zones 5 – 8 when desired or for interior climates having moisture loads that differ from the study's inputs.**

The 5-in-1 System as a Panel

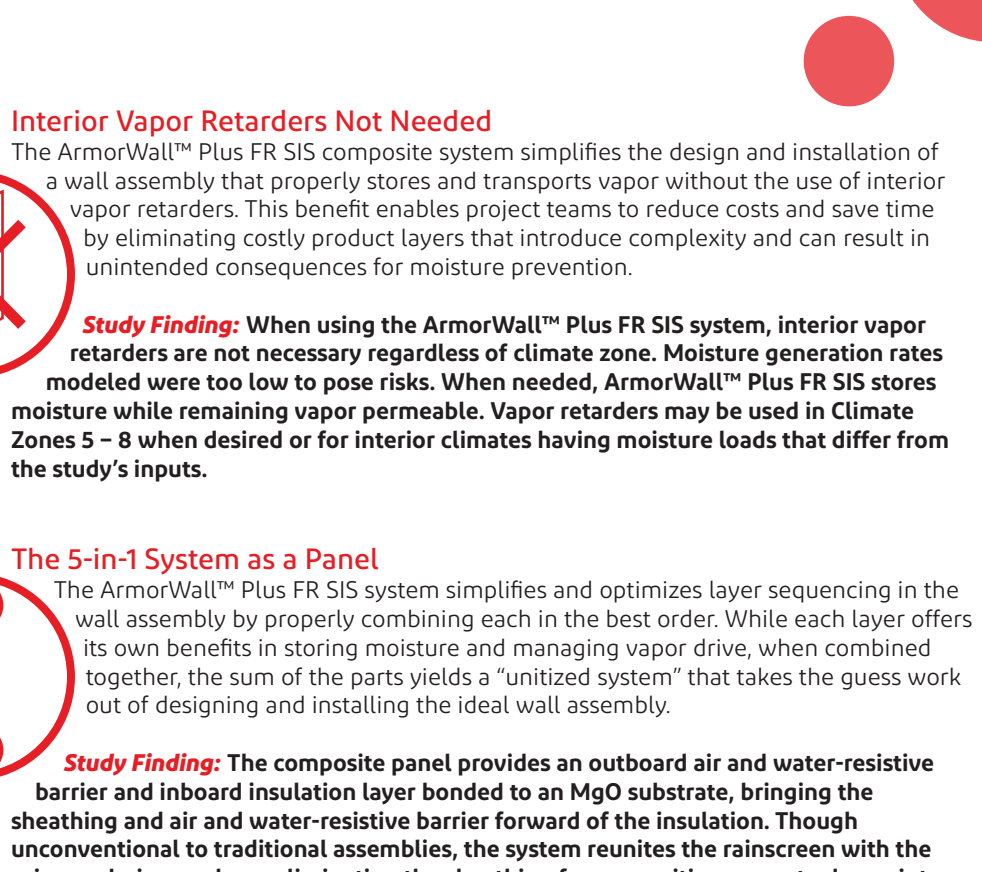
The ArmorWall™ Plus FR SIS system simplifies and optimizes layer sequencing in the wall assembly by properly combining each in the best order. While each layer offers its own benefits in storing moisture and managing vapor drive, when combined together, the sum of the parts yields a "unitized system" that takes the guess work out of designing and installing the ideal wall assembly.

Study Finding: **The composite panel provides an outboard air and water-resistive barrier and inboard insulation layer bonded to an MgO substrate, bringing the sheathing and air and water-resistive barrier forward of the insulation. Though unconventional to traditional assemblies, the system reunites the rainscreen with the primary drainage plane, eliminating the sheathing from a position prone to dewpoints and moisture accumulation.**

5-in-1 System: fire-resistance, air barrier, water-resistive barrier, structural sheathing, and a high-performance continuous insulation layer.

DuPont™ ArmorWall™ Plus Fire-Rated (FR) Structural Insulated Sheathing (SIS) *"...offers real advantages by reuniting the rainscreen with the primary drainage plane. The stud cavity now interfaces with the insulation, eliminating the sheathing from a position prone to dewpoints and moisture accumulation."*

- M. Steven Doggett, Ph.D.



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