Teifs Water Vapor Transmission

Project Name: _____

Project Address: _____

City: _____ State: _____ Zip Code: _____

INTERIOR CONDITIONS:

If winter conditions differ from summer conditions, please note.

Design Temperature: _____°F Relative Humidity: _____ %

WALL DESIGN TYPE:

List all materials and thicknesses from the inside to the outside. (Be very specific, including coaitngs, paint, etc.)

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

*SUBMITTED BY:

Name: _____

Signature: _____

Company: _____

Address: _____

_____

Telephone: (_____) _____

Fax: (_____) _____

Email: _____

How do you want the
results returned? _____

***It is highly recommended that you read the attached WNT Tek Tip prior to submitting your wall assembly. There are extreme limitations to the results of this program.**

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TeifsTek Tips

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WATER VAPOR TRANSMISSION ANALYSIS

Teifs offers a Water Vapor Transmission (WVT) analysis at no cost to determine the potential for condensation in a specific wall. Forms for submitting your project for an analysis can be found on our website at www.teifs.com under technical information. It is available to fill out online and emailed or it can be printed and faxed to us.

How does it work?

The analysis utilizes the steady state method of calculation described in ASHRAE's HANDBOOK OF FUNDAMENTALS using vapor diffusion, by inputting the project specific wall assembly, location, and interior conditions. The program then indicates the possibility of condensation.

The amount of water vapor in the air is known as relative humidity (RH). At 100% RH, air contains the maximum amount of vapor, and such air is said to be saturated. The temperature at which saturation occurs is called the dew point temperature. The concentration of water vapor may also be stated by giving its pressure (VP), commonly expressed in inches of mercury (in. Hg).

Vapor Pressure at Saturation, (VP Sat): Water vapor creates a pressure proportional to the amount of water vapor in the air. The more vapor, the higher the pressure.

A pressure differential will cause the vapor to move toward the lower pressure independently of air until equilibrium is established. The pressure difference between inside and outside will cause vapor to move out either directly through vapor permeable materials or any open spaces within the wall.

Sample Water Vapor Transmission Analysis

Project:	Sample Project		Interior Temp (F):	72	Interior R.H. (%):		40
Location:	City, State						
Condition:	Winter	Date:	Exterior Temp (F):	20	Exterior R.H. (%):		67

Material	Thickness (in.)	Therm Res (h ft^2 f/Btu)	Moist Res (Hg ft^2 h/gr)	Temp (F)	VP Sat (in Hg)	VP Acutal (in Hg)	Cond Rate (gr/h ft^2)
Interior				72.0	0.8020	0.3206	
Inside Air Film Non-Ref (Still Air)	0.01	0.68	0.001	70.1	0.7519	0.3205	
Latex Paint 2 Coats	0.002	0	0.3	70.1	0.7519	0.2396	
Latex Primer	0.0012	0	0.16	68.8	0.7519	0.1964	
Gypsum Wall Board - 2	0.5	0.45	0.027	38.1	0.7191	0.1891	
Fiberglass Batts - unfaced - 2	3.5	11	0.028	36.5	0.2329	0.1815	
Dens Glass Gold - 1	0.5	0.56	0.029	20.4	0.2187	0.1737	
Polystyrene, Expanded (1.0 PCF)	2	7.7	0.4	19.9	0.1058	0.0928	
Teifs Lamina	0.13	0	0.038	20.0	0.1058	0.0698	
Outside Air Film Winter (15 MPH)	0.01	0.17	0.001	20.0	0.1033	0.0695	
Exterior				20.0	0.1033	0.0695	
Total:	6.1532	18.635	0.931				

(OVER)

When should I run an analysis?

Teifs can run one for you at any time, however you should pay special attention if you have any of the following conditions (see table at right).

Exterior	Interior	Example
Cold, dry	warm, moist	Indoor swimming pool in the Northwest
Hot, humid	cool, dry	Cold storage building in the South
Constant cool & damp		Houses in Seattle
High vapor im-permeable coatings		Epoxies and urethanes
EIFS lamina onto an existing lamina		Repairs
Very thick or very thin EIFS insulation		
	Vapor barrier materials	Vinyl wallpaper

What can a WVT analysis tell me?

A WVT analysis can tell you the Condensation Rate. During movement, water vapor may reach its dew point and condense into water within the wall. If multiple condensing planes are indicated, each condensation rate is calculated assuming that it is the only condensing plane. At the most extreme exterior conditions per season, it will show a potential condensation rate at one moment in time in one square foot.

The actual vapor pressure (VP Actual) is compared to the saturation vapor pressure (VP Sat) at each component. If actual vapor pressure is less than the saturation vapor pressure, no condensation occurs. However, if VP actual is more than the VP Sat, the potential for condensation exists.

What are the limitations of the program?

This one-dimensional analysis does not take into consideration the affects of:

- Air infiltration,
- Capillary action,
- Thermal migration, or
- Moisture storage within the building materials.

Air infiltration can be very significant towards the formation of condensation, and should be taken into consideration.

Teifs cannot recommend a wall assembly or guarantee that an analyzed wall assembly will not have condensation within the assembly. It is the responsibility of the designer and engineer to determine the project specifics including the limitations listed above in addition to this analysis to make a determination of the exact wall components.

Basics:

- Water vapor permeability is the permeance of a 1 inch thickness of a homogeneous substance.
- perm: The unit of permeance which states the amount of vapor flow in grains per hour, per square foot of surface, per 1 in. Hg. vapor pressure gradient.
- perm inches: Designation for permeability stating the amount of vapor flow through 1 inch of material, in grains per hour, per square foot of surface, per 1 in. Hg. vapor pressure gradient.
- Vapor Barrier: Materials which have a permeance (perm rating) of 1 perm or less are referred to as vapor barriers.

Is EIFS vapor permeable?

The definition of a vapor permeable is a material that has a water vapor permeance of greater than 1.0 perms. All of Teifs EIFS components are permeable to water vapor and have been tested in accordance with ASTM E 96 to determine the permeance; however, the Teifs systems are water resistant and with some materials water-proof. Materials can be resistant to water; however, it will allow water vapor to pass through.

Should you use a vapor barrier/retarder?

The purpose of a vapor retarder in wall construction is to minimize water vapor diffusion through the wall assembly. Use and placement of a vapor barrier in a wall assembly and where it should be placed must be carefully evaluated, taking into consideration; climate, components of the wall assembly, and interior conditions.

A vapor retarder should not be placed on the interior in hot humid climates, since it will potentially cause condensation by restricting vapor diffusion to the interior.

In cold climates the water vapor direction is from the inside to the outside, as warm humid air from the interior moves towards the cold dry outside air. In hot humid climates the water vapor diffuses from the warm outside environment towards the conditioned interior environment. Generally speaking, buildings in cold northern climates may benefit from having a vapor retarder installed near the interior side of the wall while buildings in warm, humid climates need to avoid low permeance materials at those locations.

This is a very limited, general discussion of water vapor transmission and the use of a water vapor transmission analysis. More detailed information can be found from ASHRAE as well as considerable information online.

For any questions, please contact Teifs' Technical Department at (972) 691-9739 or 1-800-358-4785 or techdept@teifs.com.

Look for more TekTips coming next quarter!

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