

Recap: Guiding Principles for Installation of Exterior Windows and Doors

R. Christopher Mathis

ASTM, April 07, 2008

Objectives-1

➤ Divide and Conquer

- Break the “Principles” out into a stand alone document.
 - ✓ Everything reference the same “base”
- Break other parts into stand alone documents.
 - ✓ Common style.
 - ✓ Minimize repetition.

Objectives 2

➤ Work on it Here

- Do it at ASTM
 - ✓ Versus in multiple organizations and places.
 - ✓ Work to the larger common good.

Objectives 3

➤ Build a Scientific Foundation

- Installation recommendations based on data – not speculation.
 - ✓ Publish lab test results, field test results.
- KNOW the boundary conditions/limits
 - ✓ Say what we know and what we don't!

It is CRITICALLY important to know the limits of each document's knowledge base. Do NOT extend any recommendations beyond the substantiating data we have that backs them up! Plan to prevent Standard misuse!

Objectives 4

➤ Plan for “Customers” of the Standards

- ❑ Know WHO each part is written for.
- ❑ Focus on new construction first.
 - ✓ Don't ignore replacement – parallel path?
- ❑ Focus on the specification community first.

Some Customers

➤ Standards Writers

- ❑ Architects
- ❑ Specifiers

➤ Builders and Remodelers

- ❑ “How To” training aids
- ❑ What a good job looks like
- ❑ What a good job does

➤ Code Officials

- ❑ Possibly, or another document specifically focusing on delivered performance compliance

Guiding Principles

➤ Principles-based

- ❑ Focus on the Goals, NOT the details of “how”
 - ✓ “How” goes into other documents

➤ Simple

- ❑ Easy for the common installer, builder, user to understand

GP Scope

➤ Suitability for Use

- ❑ Product must...

➤ Preparation

- ❑ Wall must...

➤ Installation Basics

- ❑ Square, plumb, level, anchored...

➤ Integration

- ❑ System must...

1. Suitability for Use

➤ The Product Must:

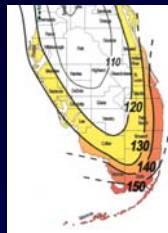
- ❑ Meet the requirements of the code
 - ✓ Air, water, structural, energy, impact, etc.
- ❑ Meet the requirements of its intended use
 - ✓ Where in the wall (mid-wall versus corners)
 - ✓ Where in the building (low versus high)
 - ✓ Type of building (house versus hospital)
 - ✓ Type of exposure (protected versus exposed)
 - ✓ Where in the climate zone (wind/rain exposures)

A lot of this is included in the DP rating...

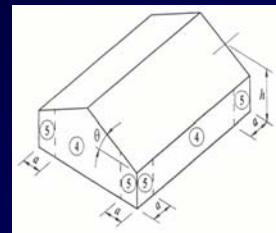
Design Pressure Ratings

Six basic elements are used to calculate design pressure ratings

- Wind speed
- Exposure
- Importance factor
- Mean roof height
- Unit size
- Wall location



Wind speed



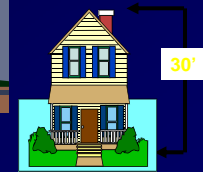
Wall Zone



Exposure (B or C)



Importance factor (building category)



Mean roof height



Unit Size

What Does “Suitability” Mean?

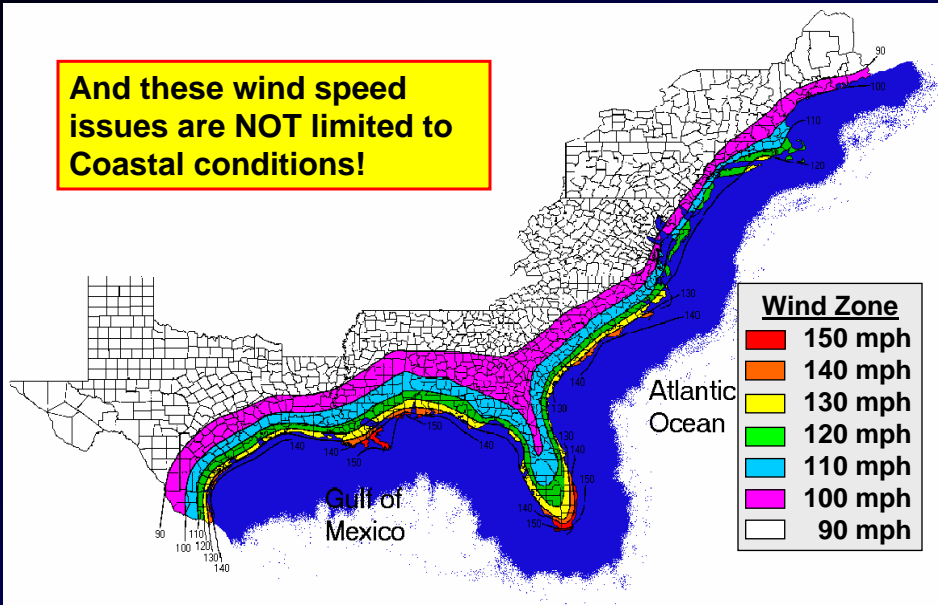
➤ You have to **FIRST** select the right window for the job!

- ❑ Know the Code requirements
- ❑ Know the DP ratings needed for the specific application and location

Gotta know these things before you can even BEGIN to make installation decisions!

Location Matters!

And these wind speed issues are **NOT** limited to Coastal conditions!



Suitability and Water Exposure

- **Make sure the PRODUCT is suitable for the expected water exposure**
- **Make sure the WALL SYSTEM is suitable for the expected water exposure**

Gotta know these things before you can even BEGIN to make suitable installation decisions!

2. Preparation

- **The wall must be APPROPRIATE for the window selected**
 - Structurally, water management, material compatibility, etc.
- **The wall must be READY for the window selected**
 - Proper framing, square, level, etc.
 - Dry?

Yes, we know this is not a standard on how to build walls... But we can't properly install a window if the WALL isn't ready!

Wait a Minute...

- I thought we were here to discuss **WINDOW INSTALLATION?**
- Yes, however we **MUST** address “suitability” and “preparation” first, or we can never hope to have a proper and performing installation
 - (1) Right product for the job, and
 - (2) A wall that is ready for the product

3. Installation Basics

- More than just “water management”
 - ☐ “Square, Plumb, Level”
 - ☐ Anchored
 - ✓ Appropriate for the application and load
 - ☐ Integrated

ALL are required to get ANY of the desired performance...

4. Integrated

➤ Was is Integrated?

- Appropriate for the wall system planned
- Appropriate for the water management system planned
- Successfully integrated with the wall structural and water management systems

Remember: You must KNOW what water management approach is planned BEFORE trying to install the window...

Principles of Water Management

➤ Deflection

- Why we have shingles and siding...

➤ Drainage

- Why we have air spaces and drainage planes

➤ Drying

- Why we don't want to trap moisture in walls

➤ Durability

- How long is this supposed to last?

Jim K's list...

More on Water Management

- How much water do I have to manage?
- Then, TWO choices:
 - (1) DRAIN IT
 - (2) BLOCK IT

BOTH are tough to do right and well...

Choices depend on the window, wall, wind and rain exposure, and risk tolerance...

“Drain It” Principles

- **Gravity is our friend**
 - ☐ And it's the LAW!
- **Give the water a place to go!**
- **Direct the Water!**
 - ☐ Down and out
 - ☐ Many opportunities to direct the water
 - ☐ Must work with overall wall water management plan and system
- **“Be the raindrop”**
 - ☐ Horizontal or vertical furring?
 - ☐ How big is that crack?
 - ☐ Will the wind find this hole?

Don't expect the window to work if the wall doesn't...

“Block It” Principles

- Submarine concept
- Small holes matter
- Wall system must be:
 - ❑ Sealed
 - ❑ Continuous
 - ❑ Robust
 - ❑ Impervious to water
- Everything must be “compatible”
 - ❑ Gotta stick together
 - ❑ For a long time
 - ❑ In a lot of conditions
 - ✓ Hot Temperatures
 - ✓ Cold Temperatures
 - ✓ Rain, Snow, Sleet
 - ✓ Dirt, Mud, Dust

And if you think you can DO this, I have a bridge in Brooklyn I’m trying to sell...

Water Management Standards?

“Drain It” Standard

Fundamentals of water drainage, construction techniques that ensure drainage, minimum air space requirements, impediments to draining, test methods to assess drainage performance, inspection to ensure drainage, durability issues, flashing integration, sealant usage, common problems, performance risks, etc.

“Block It” Standard

Fundamentals of barrier systems, construction techniques that ensure barriers, minimum barrier requirements, impediments to barrier implementation, test methods to assess barrier performance, inspection to determine compliance, durability issues, common problems, performance risks, etc.

Is this “Application of the Guiding Principles”?

Where Do We Go From Here?

➤ New set of “Guiding Principles”

- EXYZ-New-2007 draft 5
- EXYZ-Replace-2007 draft 3

➤ Additional refinement to other Work Tasks?

- Window and Wall Standards
 - ✓ Masonry, wood, etc.
- Supporting Standards
 - ✓ Flashing, sealants, anchors, etc.

Revisions Underway

Guiding Principles

Suitability

Product Selection, Intended Use, Air, Water, Structural, Thermal, Wind Exposure, Code, Climate, etc.

Preparation

Wall basics, water management system to be employed, labor training and skills, material protection, etc.

Fundamentals

Square, Plumb, Level, Anchored, Integrated – each applied to the window and wall system being employed

Integration

Integration with the wall/roof water management system planned, material compatibility, construction scheduling, etc.

Revisions Underway - more

Guiding Principles, continued

Installation Basics

Principles of good installation, window and wall types addressed, etc.

Water Management

Principles, etc.

Air Leakage Management

Principles, etc.

Compliance Assurance

Inspection, Performance verification, Durability of Performance, etc.

Other Standards Will Cover...

Wall Standards

Wood Frame

Structural basics, Water management basics, window integration plan basics

Metal Frame

Structural basics, Water management basics, window integration plan basics

SIPS

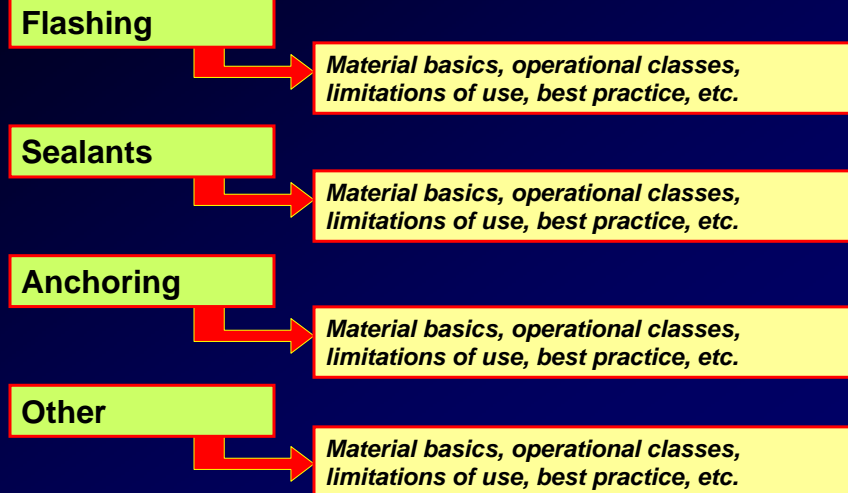
Structural basics, Water management basics, window integration plan basics

Other

Structural basics, Water management basics, window integration plan basics

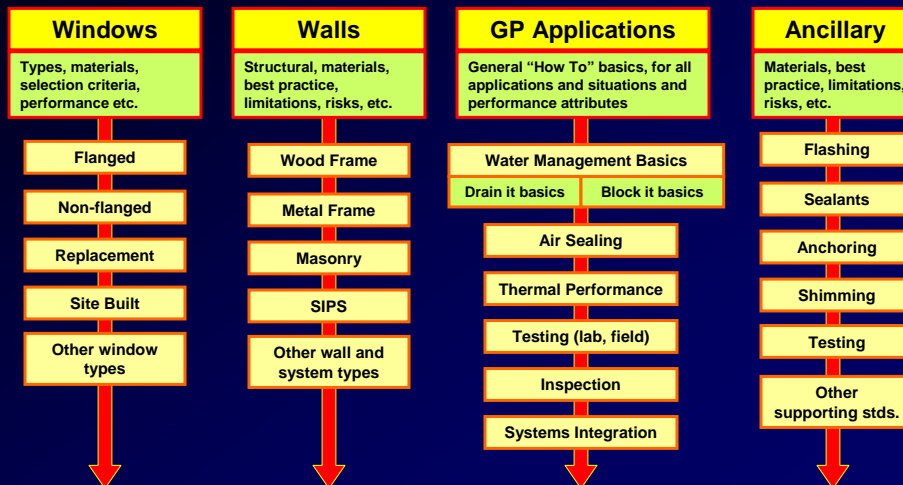
Additional Work in Development

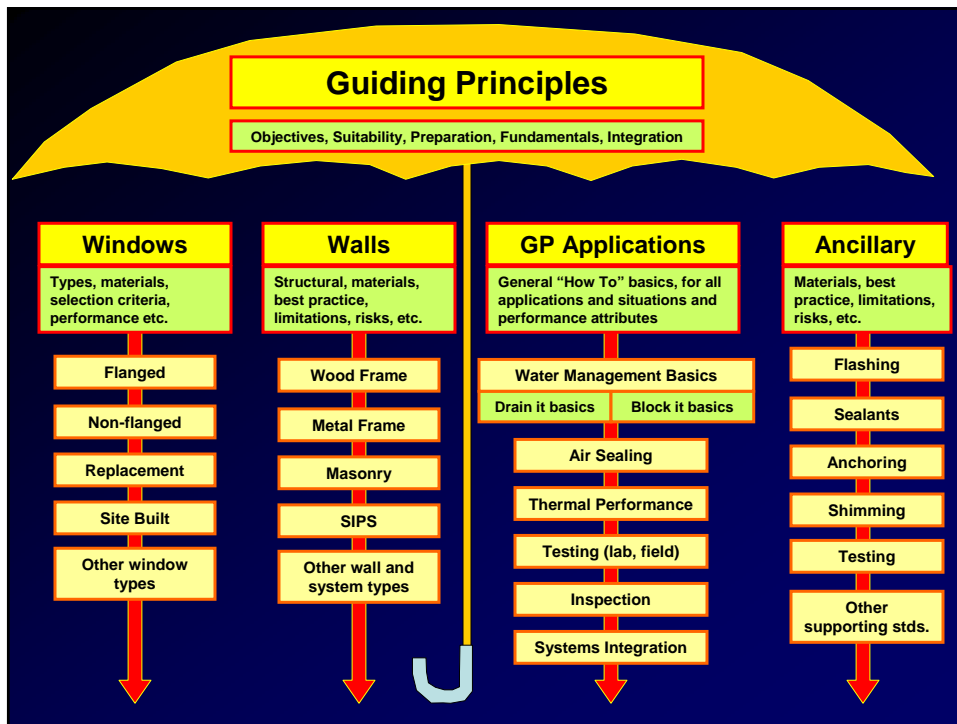
Supporting Standards



Guiding Principles

Objectives, Suitability, Preparation, Fundamentals, Integration





Where Do We Go From Here?

➤ New set of "Guiding Principles"

- ❑ EXYZ-New-2007 draft 5
- ❑ EXYZ-Replace-2007 draft 3

➤ Additional refinement to other Work Tasks?

- ❑ Window and Wall Standards
 - ✓ Masonry, wood, etc.
- ❑ Supporting Standards
 - ✓ Flashing, sealants, anchors, etc.