Window & Door Product Application

Module #12
Product Knowledge Training
Home Center
Testing Standards

Why are testing standards important?

- Ensures Milgard products are built to the highest quality and performance standards.
- Gives us guidelines to ensure each customer gets the right product for each application.
- Gives our customers peace of mind!

Window and Door Test Standards

The main industry associations that set the standards of performance for our windows and doors are listed below.

**ASTM - American Society for Testing and Materials**
A standards development organization that serves as an open forum for the development of international standards.

**AAMA – The American Architectural Manufacturers Association**
Milgard tests to AAMA standards for certification-level performance requirements on:

- Resistance to air infiltration.
- Resistance to water leakage.
- Structural adequacy to withstand wind loads.
- Forced entry.

**NFRC – National Fenestration Rating Council**
Milgard tests to NFRC standards for thermal values (U-Factors) as required by state building codes.

* Please Note: CRF – Condensation Resistance Factor
Milgard does not test to AAMA 1503 CRF ratings.
Milgard tests to NFRC 100 & 200.
AAMA Testing

The American Architectural Manufacturers Association (AAMA) uses the following tests to set standards of performance for windows and doors.

**Air Infiltration Test**
**Purpose:** To measure air infiltration through weeps, joints, sash crack, weather stripping, etc.

**Procedure:**
A test pressure of 1.60 pounds per square foot is applied to window unit. This equates to a steady 25 mph wind. The test measures the amount of air that gets into the home. The amount of air volume that does get through the window is divided by the lineal feet of the sash crack and expressed as cubic square feet of the frame per minute (CFM) per foot of sash crack. Doors and fixed windows are measured by CFM per square foot window or door.

**Water Resistance Test Pressure**
**Purpose:** To test for any water penetration through weeps, joints, sash crack, etc. that will cause spillage into the interior of the home (it’s ok for water to get in the tracks, however it may not spill over into the interior).

**Procedure:**
Water is sprayed at the window in a test chamber to simulate an 8” per hour rain rate. Then, a pressure is applied to simulate a wind rate of 15% of the design pressure. Except R15, which is 2.90 pounds per square foot. This would typically be about 40 mph wind load. In order to pass the test, there must be no leakage into the interior of the home throughout the test cycles. The test calls for 4 cycles of 5 minutes tests with a 1 minute release of the pressure between each cycle. Water can build up in the track, but must drain fast enough to avoid spillage into the interior. Spraying water from a garden hose is not an acceptable test method.
AAMA Testing Standards

**Structural Rating**

**Purpose:**
To measure design load from wind and pressure on a window system.

**Procedure:**
Air pressure, to simulate wind load, is forced against the exterior of the window frame, followed by a vacuum to simulate negative pressure created by currents of wind blowing around the corner. This test has a closest relationship to the final structural class rating. Please refer to the chart for wind loads and their relationship to structural classes.

**Forced Entry Testing**

**Purpose:**
To test security of a window or door using readily available tools and to test forced entry resistance of windows and doors while locked.

**Procedure:**
The technician first uses tools such as putty knives, screwdrivers, coat hangers, etc. to attempt to “break into” the home. The tech can deglaze the window or do just about anything he or she chooses without braking the glass or frame. The remainder of the test involves 200 lbs. of pulling force on the windows and 800 lbs. of pulling force on doors in the opening direction. Each cycle of this force is combined with additional force upwards, inwards or across the frame. For example, a door will have 800 lbs. of force in the opening direction, while another 200 lbs. applied inward on the panel in just one test cycle. The forced entry test is a pass/fail.
Testing Standards

AAMA Labels - KEY

A = Manufacturer’s Code Number
  - As an option, manufacturer may show company name in addition to the required Manufacturer’s Code Number

B = Specification Identification
  - AAMA/WMDA/CSA 101/I.S.2/A440-05
  - NFRC 100-01

C = Manufacturer’s Series number

D = Product, Class, Grade
  - AP Awning, Hopper, Projection Window
  - C Casement
  - FW Fixed Window
  - GH Greenhouse Window
  - H Hung Window (Single, Double, Triple)
  - HS Horizontal Slider
  - SD Sliding Glass Door

E = Maximum Size Tested
Performance Class

The classification given to windows and doors is derived from results achieved under AAMA test standards. Performance Class ratings are listed on all AAMA labels.

Definitions: Examples of the standard industry performance class types are listed below:

- The “R” in an R-20 window refers to “Residential”.
  - Used in one-and two-family dwellings.
- The “LC” in a LC-25 window refers to “Light Commercial”.
  - Used in low/mid-rise multi-family dwellings and other buildings where larger size and higher loading requirements are expected.
- The “CW” in an CW-40 window refers to “Commercial Window”.
  - Used in low/mid-rise buildings where larger size, higher loading requirements, limits on deflection, and heavy use are expected.
- The “AW” in an AW-45 window refers to “Architectural Window”.
  - Used in high/mid-rise buildings to meet increased loading requirements and limits on deflection, and in buildings where frequent and extreme use of the fenestration product is expected.
Testing Standards

Performance Class

The difference between testing for a Residential and Light Commercial is the size of the window tested and minimum performance grade.

- “R” minimum performance grade is 15
- “LC” minimum performance grade is 25

Commercial and Architectural windows have larger test sizes, higher minimum performance grades and must also meet deflection limits of L/175.

The number (i.e., R-20) refers to the performance grade in pounds per square foot that the window was tested to withstand (its 'structural performance'). Under the AAMA test standards, the “test” pressure must be one-and-one-half times the “design” pressure to allow for a 50% safety buffer.

As the design pressure number increases so does the structural performance of that window.

For example, a window that tested in the lab at 155 mph (a test pressure 60 psf) will be rated as a performance grade 40 and can only be used in areas where the UBC calls for 127 mph or less.

*Note: Most of Milgard's windows are rated at “R” or "LC." But the “C" Commercial class ratings have been eliminated from the AAMA standard.*
NFRC Testing Standards

Thermal Testing (U-Factors)
All thermal values are determined by a pair of computer simulation programs called WINDOW 7 / THERM 7, as dictated by the NFRC (The National Fenestration Rating Council). The simulation takes into account the window’s design, frame type, spacer type, etc. to calculate a U-Factor.

Purpose:
The physical tests conducted at the testing lab are ONLY to confirm or deny this predicted U-Factor within 10% either way. For example, a window that simulates a .39 U-Factor in the simulation and tests at a .37 physically will be labeled with a .39. We can’t change a U-Factor simply because we test better at the lab than the computer predicted. In this example the difference between simulated value and the physical test is 0.02 (which is less than 10% of the simulated value) so the simulation is validated.

Procedure:
A window is installed in a sealed chamber to maintain 0 degrees on the exterior of the “home” and 70 degrees on the interior. A 15 mph wind is then applied to the cold side to eliminate a warm blanket from forming along the glass. At least 20 thermocouples, or probes are applied to the window in strategic points to take accurate averaged temperatures. This test is so sensitive, that this 70 degree difference from inside to outside must be maintained for two hours without wavering before the test can begin.

The procedure measures the amount of energy required to maintain the 70 degree side for over 2 hours. The resulting U-Factor then confirms or negates the computer simulation program.

We physically test only one window which must fall within 20% of the best performing glazing option for each window type, as pre-simulated by a computer. The test validates all the other computer-simulated glazing options that we offer (we have many of the different glazing combinations that are computer-simulated for each window).
Product Application

NFRC Label
Testing Standards

**U-Factors**
The U-Factor measures the heat gain or loss caused by differences in indoor and outdoor temperatures and is expressed in BTU/hr. The lower the U-Factor, the slower the rate of heat flow, and the better the insulation performance.

Note: you will find in the data published by glass manufactures that there are Summer and Winter U-Factors. At Milgard, we follow Winter U-Factors per NFRC Guidelines.

**Winter U-Factors:**
Are based on an outdoor temperature of 0 degrees F, and indoor temperature of 70 degrees F and a 15 mph wind velocity with no sun.

**Summer U-Factors:**
Are based on an outdoor temperature of 89 degrees F, and indoor temperature of 75 degrees F, and a 7-1/2 mph wind velocity.

**R-Value**
R-Value measures insulation effectiveness or resistance to heat gain or loss. The higher the R-Value the better the insulation against heat and cold.

The window industry references performance ratings in the form of U-Factors. To calculate the R-Value:

1 DIVIDED BY THE U-FACTOR = R-VALUE.
1 DIVIDED BY THE R-VALUE = U-FACTOR.

0.34 U-Factor = 2.94 R-Value.
Testing Standards

**SHGC – Solar Heat Gain Coefficient**
SHGC indicates the percentage of normal incident solar heat energy that makes its way through the glazing under standard summer conditions. This includes both directly transmitted and indirectly transferred heat from energy initially absorbed by the glazing. Lower values indicate less heat entering the building.

**Title 24 Energy Compliance – California Energy Code**
- Assembly Bill 970 (AB970)

**Prescriptive**
- Requires U-factors (0.32) which Milgard can meet without SunCoatMAX® Low-E and argon in all frame types.
- Requires Solar Heat Gain Coefficients (SHGC) of 0.25 in most instances. Milgard will require SunCoatMAX® Low-E in Vinyl and Fiberglass Frames. Zones 1, 3 and 5 are coastal climate zones and so not have a SHGC requirement.

**Performance Base Requirements**
- Requires U-factors (0.32) in most instances.
- Requires SHGC (0.25) in most instances.
- Energy Consultant will use simulation software to determine trade-offs. For example, windows can be used that do not meet the performance requirements if another building component is specified with a higher performance than the prescriptive requirements.

<table>
<thead>
<tr>
<th>U-factor</th>
<th>SHGC</th>
<th>VT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Prescriptive (2008)</td>
<td>0.38</td>
<td>0.40</td>
</tr>
<tr>
<td>2014 Code - Residential Prescriptive</td>
<td>0.32</td>
<td>0.25</td>
</tr>
<tr>
<td>2014 Code - Non Residential Prescriptive</td>
<td>0.36</td>
<td>0.25</td>
</tr>
</tbody>
</table>
Performance Grade

**Exposure B (Better)**
Has terrain with buildings, forest or surface irregularities covering at least 20% of the ground level area and extending 1 mile or more from the site.

**Exposure C (Caution)**
Has terrain that is flat and generally open, extending 1/2 mile or more from the site in any direction.

**Exposure D (Danger)**
Wind zones of 80 MPH or greater and has terrain that is flat and unobstructed, facing a large body of water over 1 mile in width relative to any direction from the building. Exposure D extends inland from the shoreline 1/4 mile.
### Performance Grade

#### Equivalent Wind Velocities*

<table>
<thead>
<tr>
<th>Structural Design Pressure</th>
<th>Wind Velocity (Mile/Hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lbs/Ft²</td>
<td></td>
</tr>
<tr>
<td>25 psf</td>
<td>100 mph</td>
</tr>
<tr>
<td>30 psf</td>
<td>110 mph</td>
</tr>
<tr>
<td>35 psf</td>
<td>118 mph</td>
</tr>
<tr>
<td>40 psf</td>
<td>127 mph</td>
</tr>
<tr>
<td>45 psf</td>
<td>134 mph</td>
</tr>
<tr>
<td>50 psf</td>
<td>142 mph</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Resistance Pressure</th>
<th>Wind Velocity (Mile/Hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lbs/Ft²</td>
<td></td>
</tr>
<tr>
<td>3.75 psf</td>
<td>39 mph</td>
</tr>
<tr>
<td>4.50 psf</td>
<td>43 mph</td>
</tr>
<tr>
<td>5.25 psf</td>
<td>46 mph</td>
</tr>
<tr>
<td>6.00 psf</td>
<td>49 mph</td>
</tr>
<tr>
<td>6.75 psf</td>
<td>52 mph</td>
</tr>
<tr>
<td>7.50 psf</td>
<td>56 mph</td>
</tr>
</tbody>
</table>

*Basic Wind Speed @ 80 mph
Design Pressure

**DESIGN PRESSURE** is the measure of the structural performance of a window or door measured in psf.

How does it relate to products / projects?

Which Design Pressure Is Correct?
A) 35
B) 45
C) 50
**Design Pressure**

*DESIGN PRESSURE* is the measure of the structural performance of a window or door measured in psf. How does it relate to products/projects?

**Which Design Pressure Is Correct?**

A) 35  
B) 45  
C) 50
Design Pressure- Change
## Design Pressure

**Minimum Performance Grade in Pounds per Square Foot**

<table>
<thead>
<tr>
<th>Window &amp; Door Classes</th>
<th>Design Pressure</th>
<th>Structural Test Pressure</th>
<th>Water Resistance Test Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>15</td>
<td>22.5</td>
<td>2.90</td>
</tr>
<tr>
<td>Light Commercial</td>
<td>25</td>
<td>37.5</td>
<td>3.75</td>
</tr>
<tr>
<td></td>
<td><em>Note: CW &amp; AW must also meet deflection limits L/175</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Window</td>
<td>30</td>
<td>45.0</td>
<td>4.50</td>
</tr>
<tr>
<td>Architectural Window</td>
<td>40</td>
<td>60.0</td>
<td>8.00</td>
</tr>
</tbody>
</table>
Building Codes

IRC – International Residential Code
The IRC has specific requirements for the use of safety glass, egress and handicap accessibility. Please be aware that local codes can vary.

Safety Glazing in Hazardous Locations
Building codes require tempered (or laminated) glass to be used in the following locations:

Doors
- Safety glazing is required in all doors if the glass is larger than 3 inch diameter.
  - All Milgard doors come standard with tempered glass.

Adjacent to Doors
- Safety glazing is required in windows adjacent to a door:
  - Where the nearest exposed edge of the glazing is within a 24 inch arch of either vertical edge of the door in a closed position
  - Where the bottom exposed edge of the glazing is less than 60 inches above the walking surface.

Proximity to Floors
- Safety glazing is required in fixed or operable panels, other than those locations described above, that meet all of the following conditions:
  A. Exposed top edge greater than 36" above the floor.
  B. Exposed area of an individual pane is greater than 9 square feet.
  C. Exposed bottom edge less than 18" above the floor.
  D. One or more walking surfaces within 36" horizontally of the plane of the glazing.
Safety Glazing in Hazardous Locations (cont.)

Tub/Shower Enclosures
- Safety glazing is required in windows where the bottom exposed edge of the glazing is less than 60 inches above a standing surface and drain inlet.

Stairs
- Glazing in walls enclosing stairway landings or within 5 feet of the bottom and top of stairways where the bottom edge of the glass is less than 60in above a walking surface.

Skylights
- Safety glazing is required in all skylights. Check with your local building codes for exact requirements.

PLEASE NOTE: Building codes vary per location. Please check your local building department for location-specific code requirements. See Price Books for Egress calculations.
Egress Requirements

Egress
• Basements with habitable space and all bedrooms (below the fourth story) must have at least one operable egress window or exterior door opening to allow for emergency escape and rescue.

Windows must meet the following four requirements:
• A minimum net clear opening **width** of 20 inches.
• A minimum net clear opening **height** of 24 inches.
• A minimum net clear opening of 5.7 square feet.
• A maximum finished sill height of no more than 44 inches above the finished floor surface.
Building Codes

ADA – American Disability Act Requirements

Hardware

Hardware must not require tight grasping, pinching, or twisting to operate. Our SmartTouch™ window lock does comply. The maximum height from the floor surface to the latch is 48 inches. If the window is above a counter, the max height is 44". Door latches are to be at a minimum of 36 inches and a maximum of 48" above the finished floor surface. The windows have a 5 lb. operating force requirement, including casements and awnings.

Doors

The maximum height of the sill from the finished floor surface is 1/2 inch for swing doors and 3/4 inch for sliding doors. To meet the air and water infiltration requirements, our door sills are taller than these maximums. To remedy this, a builder must build up the finished floor (hardwood, carpet, pads, etc.) or use small ramps. The minimum allowable clear opening width is 32 inches (1/4 inch tolerance). Neither a 6’0 wide standard 2-panel Montecito™/Tuscany™ vinyl door, or a 9 foot, 3 panel door will comply with this minimum clear opening width. ADA also requires a maximum allowable operating force of 5 lbs. of pressure on all sliding glass doors. The operating force on our Montecito™/Tuscany™ sliding doors is between 10 and 11 lbs.

Tuscany®/Montecito® Series 6068 Sliding Glass door to meet ADA code

Milgard has developed an optional exterior handle that will allow our 6068 door to have a clear opening width of 31-3/4" (1/4" tolerance per the Fair Housing Act). The sill or threshold is still 1-1/2" in height and will need to be addressed at the site, by countersinking it into the foundation or by using ramps, being careful not to block the weep system on the exterior.
ENERGY STAR® is an energy program sponsored by the U.S. Environmental Protection Agency, which helps consumers identify products that save energy and help protect the environment.

Milgard has teamed up with the U.S. Environmental Protection Agency (EPA) to classify our products as leaders in energy efficient windows, doors and skylights. All ENERGY STAR® products use less energy that other products, save money on utility bills and help protect the environment.

By labeling our products with the ENERGY STAR® logo, we are educating consumers about the benefits of energy efficiency and informing them that we are in compliance with ENERGY STAR® criteria for energy efficient windows, doors and skylights.

ENERGY STAR® criteria specifies that all windows, doors and skylights must be NFRC rated and certified. All labels must have NFRC ratings on them and must also indicate both U-factor and Solar Heat Gain (SHGC).

ENERGY STAR® requirements for windows, doors and skylights vary by climate zone. To look for ENERGY STAR®-rated window, door and skylight products in your climate zone, go to www.energystar.gov.

You can look up current energy rebates offered in your area at: http://www.energystar.gov/rebate-finder

The Energy Star zone qualification filter in the Milgard Energy Calculator on milgard.com
Lead Based Paint- New Rule

In addition to Building Codes that you must adhere to, there are other rules regarding renovation work with homes with lead based paint in them. In 1978, the Consumer Products Safety Commission banned the sale of lead-based paint for residential use. However, homes built in 1978 could still have lead based paint in them. It is important that you familiarize yourself with the RRP rule to ensure you are compliant with the new regulations. [www.epa.gov/lead.pubs/renovation.htm](http://www.epa.gov/lead.pubs/renovation.htm)


- Intended to ensure that only *Properly Trained* and *Certified Renovators and Firms* can do *renovation, remodeling or painting* activities in target residential dwellings and child-occupied facilities built before 1978 that disturb lead-based paint.

- Applies for owner or occupant of (target housing or child occupied facilities—day care..)
  - Homes built before 1978 that:
    - Serves as a rental
    - Houses a pregnant woman
    - Houses a child under age six

- On or after April 22, 2010, no firm working in target housing or child-occupied facilities, where lead-based paint will be affected by the work, may perform, offer or claim to perform renovations without Firm Certification from EPA, or an EPA-authorized agreement state, territory, or Indian tribe.

- One EPA renovation firm certification is all that is needed for a renovation firm to work in any non-authorized state/territory/tribal area. Firm certification is not the same as the personal certification attained by each renovator’s successful completion of this course.
Lead Based Paint

The RRP Rule: Certification

The Certified firm must ensure that everyone on the renovation, repair or painting job is trained to perform lead-safe work practices during the work. EPA requires all persons on the job to be trained. The person responsible for lead-safe work practices must be a Certified Renovator. Other firm employees (non-certified renovation workers), working on the job, must be trained on-the-job by Certified Renovators, or must be Certified Renovators themselves. This could be accomplished by:

- Having all employees trained as Certified Renovators; or,
- Having at least one person trained as a Certified Renovator, who will then train the rest of the employees in lead-safe work practices.

Firm certification

- On or after April 22, 2010, all covered renovations must be performed by Certified Firms, using Certified Renovators and other trained workers.
- To become certified, firms conducting renovation must submit an application and pay a fee ($300) to EPA. Firms may begin to apply for application on October 22, 2009.
- Certification will be good for 5 years

Individual Certification

- To become a certified renovator, an individual must take an EPA approved, 8-hour training course from an EPA accredited training provider and pass the test.
- The course completion certificate serves to certify renovators. (no application to EPA is required)
- Refresher training is required every 5 years
- Workers do not need certification so long as “on the job training” is received from a Certified Renovator and the work is not HUD regulated.
Lead Based Paint

Importance of Being Certified

Enforcement
- EPA may suspend, revoke or modify a firm’s certification if the Certified Firm or Certified Renovator is found to be in non-compliance
- Firm’s found to be non-compliant may be liable for civil penalties up to $32,000 for each violation
- Firm’s who knowingly or willfully violate this regulation may be subject to fines up to an additional $32,000 per violation, or imprisonment, or both.

Benefits of Completing RRP Training
- Keeps you compliant with the new laws
- Demonstrates your company’s competence to prospective clients
- Can be a marketing advantage that distinguishes your company from the competition.
What is Sound?
Sound, which is defined as anything the ear can hear, originates from something making vibrations and spreading out in all directions. Windows act as barriers to sound by disrupting sound waves.

What is STC?
**Sound Transmission Class (STC)**, measured in decibels, is an average value associated with a material's effectiveness in reducing sound. An STC rating is a quick reference number for the entire frequency band. Generally, **the higher the number, the greater the reduction of sound**.

STC Guidelines
When trying to solve a customer’s noise issues, keep in mind the following:
- Typical residential wall ratings range from STC 40 to 44.
- Sound transmission into a building is generally through the weakest elements such as windows and doors.
- Determine noise intrusions through sources other than windows and doors such as vents and roof soffits.
- Estimate existing single pane windows to be STC 20.
- Estimate existing dual pane windows to be STC 28.
- For high frequency noise (sirens, screeching tires) use **offset glazing**.
- For low frequency noise (trains, planes, freeways) use **laminated glass**.
- The homeowner may need to contact an acoustical consultant or engineer for unusual or extreme noise problems.
Condensation

What Causes Condensation?
Condensation is the result of a simple law of physics. Vapor will turn to liquid when it comes in contact with any surface that is at its dew point or lower. The dew point is determined by the air temperature, its pressure, and the amount of water vapor in the air (relative humidity).

To put it in even simpler terms; when moist, warm air comes in contact with a cooler surface, the moisture condenses — whether it’s on a glass of ice water or a window.

The fact is cool air can’t hold as much moisture as warm air can so the moist air around a cool surface will turn into tiny droplets. This can happen on the interior as well as exterior glass surfaces of a window.

Normal daily activities of an average family (like cleaning, laundry, showering and even breathing) can add up to 18 gallons of water a week to the air in a home. Window surfaces do not “sweat” moisture into the air.

The window is only a “symptom” of a home that’s too humid. The condensation is a result of invisible moisture, or water vapors, already in the home.
Condensation

**Home Construction**
Whether it’s a new home or an old one, it is still at risk. Most older homes were built to be less weather tight than those built today. As a result, they are better ventilated. This actually helps cure some of the problems associated with moisture. However, these same older homes typically have single glazed windows, which result in cold glass surfaces that cause condensation to form with even small amounts of moisture present.

Meanwhile, today’s newer homes usually have better performing windows with dual pane insulated glass. The warmer glass surface allows a greater amount of moisture in the home before it condenses.

But, today’s homes are built so “tight”, moisture will continue to build up in the home unless adequate mechanical ventilation is installed.

**Exterior Condensation**
Condensation can appear on exterior glass surfaces when a higher performing glass, such as Low-E² is used. This glass can allow the outside surface to reach the dew point, because it reflects the heat back indoors and off of the glass surface. As outside air temperature increases, the outdoor condensation should diminish.

This challenge will appear mainly in the morning hours. This is the same phenomenon that is observed on your lawn or your car windows, when left out for the evening.
There is no way to completely eliminate condensation. Today’s energy efficient windows help, but depending on your life style, even the best windows will show some signs of condensation. *Be cautious about overselling benefits of our products against condensation.* A home that is too humid can show condensation on the windows, the floors, and even the walls.

**Reducing Interior Condensation**

- Make sure your home is well ventilated. Open windows or turn on a bathroom fan while showering.
- If the home is brand new, open windows on dry days to allow damp lumber to dry out.
- Make sure gas burners and clothes dryers are vented to the outside of the home.
- Install permanent ventilation. Ventilation systems in heating/cooling equipment or wall vents, fans, etc. will help minimize the humidity of the home.
- Choose vinyl, fiberglass or wood windows, which have a warmer frame surface. This will help reduce the symptoms of condensation.
- Choose Low-E² glass for windows. Low-E² has a warmer interior surface, which will help reduce the visible condensation in the home.
- In the case of exterior condensation, draperies should be open to allow as much heat transfer through the glass as possible. Shrubbery immediately adjacent to the glass can also increase the local humidity.

If the outdoor temperature drops, you should decrease the humidity level in your home.

If you lower your room temperature to conserve energy, you should also lower the humidity levels to reduce condensation.

**Cut the moisture, cut the condensation.** It’s really that simple.
Product Specifications

Product Specifications –Windows

Milgard has specifications (AKA: "spec's") on most product lines. Specifications are used by Architects, Contractors, Dealers and Manufacture’s to give complete product descriptions.

When a product is specified by an architect, that product has a very good chance of actually getting on the project. When a Contractor bids a project, he/she will most likely make a submittal that includes the product specifications.

Product Specification Information

- Summary –product type.
- Submittal information –what should be included when bidding a project (i.e., glass type, energy ratings, etc.)
- Qualifications –(i.e., 5 years experience manufacturing windows)
- Certification –AAMA, NFRC tested.
- Warranty –terms and timelines.
- Material –type of frame and description.
- Specific product description –complete data on each window type including series number, frame thickness, structural ratings, roller, locking information, etc.
- Screens -finish, installation and cleaning information.
Product Specifications

Resources
You can find our specifications in:

- Architectural Manuals
- On-Line Specifications: At milgard.com/professional, in the Architectural Library select “product series", select the “Specs” tab, select word document for "3 part specification", print and submit with bid.
- Marketing and Engineering have data on products that do not yet have published specifications.
- Test Reports - speak with your Milgard sales representatives for more information.
Product Application

Meeting Project Specifications
When Milgard is specified for a project by the architect, we have a great chance of holding specification and getting the job. If the contractor or dealer submits an alternative window, the other window should be “equal” or better. If another product is specified, review the differences to be sure we are submitting an equal product. This also applies if we are specified and the contractor or dealer is submitting a substitute.

Value Engineering
This is the term for finding a less expensive alternative to what is in the original design. It could be looking at the design of the building and re-configuring the windows to less expensive types of operating windows, reducing the size of windows, or selecting a lower priced alternative.

Can We Build It?
When a window configuration is requested that we cannot build, we need to offer up some alternatives. For instance, perhaps they can separate a window that is over our 60 square foot overall size.

For configurations not yet tested, please contact your local Milgard Sales Rep for assistance.
Tips for Take-Offs

- Review the Project Speck Information for window and door specifications and requirement. Work with your Milgard Outside Sales Rep if needed to confirm compliance with the project speck, if needed the Milgard Outside Sales Rep will write an exception letter for the Builder/Architect/Owner to review.
- Assess the project for HEP (High Exposures Projects) requirement – work with your Milgard Outside Sales Rep, if needed they will complete the HEP process for approval.
- Always start at the same place. A good place to start is at the front door. Then, work your way around the floor plan window by window.
- Be sure to compare the floor plans to the elevations and window schedule and note any discrepancies.
- Check the elevations for door handing, window configurations, grid patterns, etc.
- Watch for windows and doors requiring tempered glass. This is one of the top errors made in takeoffs.
- Check windows in bedrooms for egress qualifications.
- Value engineer by making suggestions to the customer on ways to save money on the project (i.e. moving a window 24” away from a door).
- Check the state and local energy code requirements and/or U-Factor and SHGC.
- Check to see if there are any special STC or ADA requirements.