Patients, doctors and medical staff agree that views and daylighting help reduce hospital stays, increase patients’ sense of well-being, and expedite the healing process. Operable windows provide emergency ventilation in patient rooms, and all Wausau products help support LEED® for Health Care sustainability goals.
HIGH-PERFORMANCE WINDOWS
Featured Products 3250i-V and 4250i-V Visuline™ - 4000i-DT Psychiatric

For over 50 years, health care design professionals have relied on Wausau’s operable windows to provide emergency ventilation, controlled cleaning access, security, energy performance, condensation resistance, and noise control. Views and daylighting enhance the therapeutic environment.

- 3" and 4½" Visuline™ frame depth with polyamide thermal barrier
- AAMA AW-100 Architectural Performance Class
- Fixed, project-in hopper, or project-in casement
- Equal sightlines at vents and fixed lites
- Structural “no-sag” glazing allows for large vents
- Multi-lock hardware option for improved accessibility
- 1/8” principal wall thickness
- No vent joinery exposed to the exterior
- 4000i-DT Psychiatric windows are “drop-tested” for human impact, and fitted with tamper-resistant hardware

<table>
<thead>
<tr>
<th>Allowable Air</th>
<th>Water</th>
<th>NFRC U-Factor</th>
<th>CRF₄</th>
<th>STC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10 cfm/sqft at 0.24 psf</td>
<td>15 psf</td>
<td>0.34 to 0.66 BTU/hr sqft °F</td>
<td>54 to 62</td>
<td>33 to 49 OTC 28 to 46</td>
</tr>
</tbody>
</table>

- Available with 1" or 5/8" aluminum slats
- Occupant tilt control with slip-clutch feature
- Concealed raise-lower cords for uniform exterior appearance
- Hinged interior access doors for custodial access
- 16 standard slat colors

BETWEEN-GLASS VENETIAN BLINDS
Available with most Wausau products

Virtually maintenance-free integral blinds, protected by hinged interior access doors, reduce solar heat gain, while offering occupant daylight control and privacy.
Wausau INvision unitized curtainwall and window wall systems are factory glazed for long-term weather resistance and speed of installation. Polyamide thermal barriers reduce conductive heat loss and enhance condensation resistance. Mullions are designed to span most hospital floor heights without reinforcement.

- 2 ½” or 3” face width - 5 ¼” to 8 ¼” frame depth with polyamide thermal barrier
- Interlocking frame design accommodates seismic, live load, and thermal building movements
- Pressure-equalized rain screen design
- Captured, vertical or four-side structural glazed
- Glazing and sealing in a controlled factory environment
- Zero sightline vents, exterior sun shades, and interior light shelves available
- Recycled aluminum framing available upon request

<table>
<thead>
<tr>
<th>Allowable Air</th>
<th>Water</th>
<th>NFRC U-Factor</th>
<th>CRF</th>
<th>STC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06 cfm/sqft at 6.24 psf</td>
<td>15 psf</td>
<td>0.29 to 0.63 BTU/hr.sqft°F</td>
<td>73</td>
<td>31 to 34</td>
</tr>
</tbody>
</table>

- Often used as a curtainwall and storefront add-on for blinds or enhanced performance
- Side-hinged access doors with custodial locks
- 5/8” or 1” between-glass Venetian blinds available, with slip-clutch tilt control knob and concealed raise-lower
- Mitered frame construction, corner-blocked tubular vents
- Dual glazed 2500 Series I.C.U. observation windows
- Drop tested 2187-DT Series accepts psychiatric glazing, ideal for adaptive re-use

S.E.A.L.™ Interior Accessory Windows

When existing windows are weather-tight, and ventilation is unnecessary, S.E.A.L. interior accessory windows can improve Sound, Energy, Air and Light control - economically, and with a minimum of occupant disruption.
SUSTAINABLE MANUFACTURING PROCESSES

- Minimized packaging materials in receiving and shipping
- Scrap recycling: Aluminum, steel, cardboard, wood, glass, fluorescent bulbs, paper, beverage containers, toner cartridges, electronic equipment
- “Paperless” environment supported by Wausau ShopView™ software
- 100% VOC-capture spray painting of durable AAMA 2605-tested fluoropolymer
- No-VOC finish options: Powder coatings and durable Class I anodic finishes
- Resource-wasting internal rework minimized through Lean/Six Sigma

SUSTAINABLE BUSINESS PRACTICES

- Leadership within industry trade organizations and research groups
- Design charrettes supported with engineering resources
- All operable windows are durable, cycle-tested AW-Class
- LEED-GAs on staff

How can windows contribute to LEED® for Health Care?

- Low U-Factor
- Low Solar Heat Gain
- Natural ventilation
- Daylighting and views
- Noise control
- Aluminum frames with recycled content averaging 70% or greater

Why aluminum windows?

- Long-term durability
- Weather resistance
- Material stability
- Large operating vents
- VOC-free finishes
- Thermal barrier frames

Download comprehensive details and specifications at www.wausauwindow.com
High interior humidity in cold climates

Condensation Resistance

Finite element computer models, and the AAMA 1503 Condensation Resistance Factor (CRF) can both be useful in comparing products, or as a basis for performance specifications. Exercise caution when using these to predict or prevent condensation on installed products.

Field condensation on interior surfaces is affected by many variables, including component thermal performance, thermal mass of surrounding materials, interior trim coverage, as well as air flow conditions, weather and mechanical system design.

CRF applies only to pre-defined configurations under controlled and steady-state laboratory conditions, and assumes some condensation is acceptable under the severest of wintertime conditions.

<table>
<thead>
<tr>
<th>ASHRAE 99.6% Winter Design Temperature</th>
<th>Maximum Recommended Interior RH%</th>
<th>15%</th>
<th>20%</th>
<th>25%</th>
<th>30%</th>
<th>35%</th>
<th>40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20 °F</td>
<td>20%</td>
<td>45</td>
<td>52</td>
<td>58</td>
<td>63</td>
<td>68</td>
<td>72</td>
</tr>
<tr>
<td>-10 °F</td>
<td>25%</td>
<td>38</td>
<td>46</td>
<td>53</td>
<td>59</td>
<td>64</td>
<td>68</td>
</tr>
<tr>
<td>0 °F</td>
<td>30%</td>
<td>29</td>
<td>39</td>
<td>47</td>
<td>53</td>
<td>59</td>
<td>64</td>
</tr>
<tr>
<td>+10 °F</td>
<td>35%</td>
<td>28</td>
<td>42</td>
<td>49</td>
<td>56</td>
<td>63</td>
<td>68</td>
</tr>
<tr>
<td>+20 °F</td>
<td>40%</td>
<td>34</td>
<td>42</td>
<td>49</td>
<td>56</td>
<td>63</td>
<td>68</td>
</tr>
</tbody>
</table>

Relative Humidity higher than that shown is not recommended for outside air temperatures equal to or lower than that shown, unless specifically taken into account in the building design. (AAMA; Curtainwall Manual #9)

RECENT PROJECTS - MINNESOTA

- Boynton Health Service
- Cambridge Medical Center
- Centra Care Clinic
- Cornerstone Medical Center
- Edizon Hospital Building 2
- Fairview Riverside
- Kanabec Hospital
- Lakewood Health System
- Long Term Care Facility
- MCF Vocational Building
- Memorial Hospital
- Mercy Hospital
- Minnesota Children’s Hospital
- New Prague ESD
- New Ulm Hospital
- North Country Hospital
- Olmsted Community Hospital
- Ortonville Health Services
- Owatonna Hospital
- Riverwood Health
- St. Elizabeth Medical Center
- St. Gabriels Hospital
- St. Louis Park Methodist Hospital
- Swift County Hospital
- Tri-County Hosp
- VAMC Minneapolis
- Welcome Memorial
Enhanced Condensation Performance

In critical applications, where no visible condensation is acceptable, more rigorous analytical methods are recommended. This is especially important in Climate Zones 6, 7, or 8, or when interior Relative Humidity is kept elevated, for specialized occupancy such as ICUs, CCUs, therapy pools, and outpatient surgical suites.

Wausau design engineers have the tools and knowledge to assist the AEC team in product selection and application, including air and vapor barrier interface design.

Wausau offers high-performance, NFRC-certified products, to address the most stringent requirements:

- 2250i-XLT in.vent™
- 2250i-XP in.vent.PLUS™
- *3250i-V Visuline™
- *4000i-DT
- SuperWall™
- HP-Wall™
- *6250i-HRX
- *INvision™ Unitized Walls

Condensation Resistance Factors (CRFs) up to 83 are available.

* Products featured elsewhere in...
To properly engineer windows and curtainwall to withstand earthquakes, parameters specific to the building and site must be considered. Hospitals are Occupancy Category IV, considered essential facilities, with the highest Importance Factor multipliers applied to movements and forces.

Windows and curtainwall must elastically accommodate lateral seismic drift without loss of weather resistance or glass breakage. Under inelastic movements, safety of occupants and passersby is critical. In addition, inertial forces must be safely transferred to the building structure.

Early design coordination with adjacent wall system movement and anchorage provisions is essential, to maintain overall envelope integrity.

<table>
<thead>
<tr>
<th>Allowable Story Drift $\Delta a$ (Where h is story height)</th>
<th>Occupancy Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>I or II</td>
</tr>
<tr>
<td>Structures, other than masonry shear wall, four stories or less with interior walls, partitions, ceilings and exterior wall systems that have been designed to accommodate the story drift</td>
<td>0.025h</td>
</tr>
<tr>
<td>Masonry cantilever shear wall structures</td>
<td>0.010h</td>
</tr>
<tr>
<td>Other masonry shear wall structures</td>
<td>0.007h</td>
</tr>
<tr>
<td>All other structures</td>
<td>0.020h</td>
</tr>
</tbody>
</table>

Design movements may be less than these maximum allowable design movements.

<table>
<thead>
<tr>
<th>Occupancy Importance Factor (I) (Table 11.5-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupancy Category</td>
</tr>
<tr>
<td>--------------------</td>
</tr>
<tr>
<td>I or II</td>
</tr>
<tr>
<td>III</td>
</tr>
<tr>
<td>IV</td>
</tr>
</tbody>
</table>

Importance Factor is a direct multiplier when forces for the building are determined.

**Integrated Design Support for OSHPD**

Wausau systems have been approved by the California Office of Statewide Health Planning and Development (OSHPD) on more than 40 hospital projects in the past 10 years, helping ensure health care services remain available during and after major seismic events.

Through strict adherence to OSHPD administrative and technical requirements, project approvals are obtained in a timely manner.

Special attention is given to integrated design aspects of system interface, coordination of detailing and structural calculations, and Building Information Modeling (BIM) protocols. Wausau is often called on to take the technical lead in envelope seismic design.

In addition, Wausau offers high-performance, NFRC-certified products, to address the most stringent energy efficiency requirements of California Code of Regulations (CCR) Title 24.

Wausau offers architects, engineers and designers Revit® 3D models and 2D drawings of its most popular window and curtainwall systems through Autodesk® Seek.

**RECENT PROJECTS - CALIFORNIA**

CEDARS SINAI
COTTAGE HOSPITAL
EL CAMINO HOSPITAL
HOAG HOSPITAL
HOLY CROSS HOSPITAL
HOWARD KECK CENTER
HUNTINGTON MEMORIAL HOSPITAL
KAISER PERMANENTE
LAGUNA HONDA HOSPITAL
LIMA LINDA HOSPITAL
LOS ANGELES CHILDREN'S HOSPITAL
LUCILE PACKARD CHILDREN'S HOSPITAL
MILLER CHILDREN'S HOSPITAL
MISSION HOSPITAL
REGIONAL MEDICAL CENTER SAN JOSE
SALINAS VALLEY HOSPITAL
SAN BERNARDINO MEDICAL CENTER
SAN FRANCISCO GENERAL HOSPITAL
SANTA CLARA VALLEY MEDICAL CENTER
SANTA MONICA HOSPITAL
SHRINERS HOSPITAL FOR CHILDREN
ST JUDE MEDICAL CENTER
STANFORD UNIVERSITY MEDICAL CENTER
VACAVILLE SURGERY CENTER
WEST HILLS MEDICAL CENTER

Mission Hospital      Mission Viejo, California    RBB Architects
In hurricane-prone regions of the U.S., up and down the Atlantic coast and along the Gulf of Mexico, wind-borne debris protection is essential. Keeping hospital windows intact keeps hospital buildings serviceable, and protects occupants, since evacuation is not usually a realistic option. Hospitals in these regions require “large missile”-tested products. Basic hurricane wind speeds vary widely by location, even within the same code jurisdiction.

Miami-Dade Product Control approval criteria are explicit with regard to size, configuration and anchorage variations. Authorities having jurisdiction in other areas, for example, the Florida Building Code (FBC) and Florida Agency for Health Care Administration (AHCA), adopt, interpret and enforce the International Building Code (IBC), as well as the requirements of ASTM E 1996.

Wausau’s registered professional engineers help navigate the technical and administrative details of codes and testing requirements for specific projects, ensuring compliance verification in a timely manner.
Coastal Safety and Code Compliance

- Wausau’s fixed and operable windows have been the product of choice for dozens of hospitals in hurricane-prone regions, and are Miami-Dade Product Control Approved:

  - **Invent 3250i-HP-XLT and 4250i-HP-XLT**
    
    Fixed window, large D and E missile
    Notice of Acceptance (NOA) #130917.06
    Miami-Dade County, Florida, 25Apr23

    PO casement window, large D and E missile
    Notice of Acceptance (NOA) #13-0917.05
    Miami-Dade County, Florida, 25Apr23

    PI casement window, large D and E missile
    Notice of Acceptance (NOA) #13-0917.04
    Miami-Dade County, Florida, 25Apr23

    PI hopper window, large D missile
    Notice of Acceptance (NOA) #13-0917.08
    Miami-Dade County, Florida, 25Apr23

    PO awning window, large D and E missile
    Notice of Acceptance (NOA) #13-0917.07
    Miami-Dade County, Florida, 25Apr23

  - **3250-HP**
    
    Fixed window, large D missile
    Notice of Acceptance (NOA) #12-0416.7
    Miami-Dade County, Florida, 25Apr17

    Fixed window, small missile
    Notice of Acceptance (NOA) #12-0416.09
    Miami-Dade County, Florida, 25Apr17

    Casement window, large D missile
    Notice of Acceptance (NOA) #12-0416.09
    Miami-Dade County, Florida, 25Apr17

    Casement window, small missile
    Notice of Acceptance (NOA) #12-0416.08
    Miami-Dade County, Florida, 25Apr17

- Wausau’s 6250 and 8250 Series SuperWall™ systems have been tested to meet the large missile requirements of ASTM E 1996 for Wind Zone 1, including module sizes up to 5'-6" x 10'-1".
Antimicrobial Protection

24/7 PROTECTION:
Antimicrobial protection is infused into select Wausau 70% PVDF-based fluoropolymer product finishes provided by Linetec, helping to inhibit the growth of stain- and odor-causing bacteria that may affect the surface of the coating. It protects product finishes from microorganisms such as bacteria that may cause odor and deterioration of the physical properties of the coating.

WHERE IT’S USED
The antimicrobial product protection offered by Linetec in its finishes works continuously to help prevent the growth of damaging stain- and odor-causing bacteria on the coating of aluminum surfaces for such facilities as hospitals, schools or anywhere the growth of such microorganisms is a concern.

HOW IT WORKS:
When moisture is present, the ion exchange mechanism in the antimicrobial finish is activated and silver cations are released. The released silver acts on odor-causing bacteria by disrupting metabolism and reproduction.

LASTING PERFORMANCE BACKED BY AN INDUSTRY LEADER:
Utilizing the latest technology in antimicrobial PVDF-based finishes that meet stringent AAMA 2605 specifications, Linetec provides Wausau products with extra protection that exceeds that of other conventional finishes.

HOW TO SPECIFY
Call for, “PVDF-based, AAMA 2605, fluoropolymer finish containing minimum 70% Kynar® resin, three-coat system with antimicrobial protection, [insert paint color code].”
ADA Accessibility for Windows

Wausau’s accessible projected windows are laboratory-proven capable of operating with one hand using a force of five pounds or less, to unlock, open, close, and lock, without tight grasping, pinching or twisting of the wrist.

- All INvent™ Series and the 4250-Z Zero Sightline Series
- Project-out awning, in-swing or out-swing casement
- AAMA Architectural AW-100 Performance Class
- No reductions in air, water or structural performance for laboratory testing of accessible vents
- Low U-Factors - Triple glazing available on the INvent family
- Between-glass blinds optional on the INvent family
- 1/8” wall thickness at hardware attachment points
- Recycled aluminum content averaging 70% or greater
- More than 30,000 finish colors, including two-color option
- Several muntin grid options for historical renovation
- 4250-Z Zero Sightline windows offer unobtrusive ventilation as curtainwall insert vents

Operating Force Test
Roto-operator force-to-open

Reach Diagram
Illustrative Example Only

Make sure operable windows are located and detailed in a way that meets the “reach” limitations of ICC/ANSI A117.1. One typical diagram is shown. Different height requirements apply to “obstructed” and “front” reach. There are also physical limits on clearances and protrusions, as well as approach area and threshold height (for terrace doors and sliding glass doors).

AAMA Guide Specification

“Accessibility: As indicated on architectural drawings, one operable window in each occupied space shall meet the operating force limits and motion restrictions of ICC/ANSI A117.1 Section 309.4, when tested by an AAMA-accredited lab in accordance with AAMA 513-12.”

Specifiers Note:
All code-required operable windows in a given occupied space may be required to meet these restrictions.