

ENERGY EFFICIENCY RATINGS

Minmar Wholesale Windows

Technical Specifications and Performance Standards

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1. ENERGY PERFORMANCE OVERVIEW

Industry Standards Compliance

- **ENERGY STAR® Qualified** products available
- **NFRC (National Fenestration Rating Council)** certified ratings
- **AAMA (American Architectural Manufacturers Association)** standards compliance
- **ADA-compliant** hardware solutions available

Key Performance Metrics

- **U-Factor:** Measures heat transfer rate (lower is better)
- **Solar Heat Gain Coefficient (SHGC):** Solar radiation transmission
- **Visible Transmittance (VT):** Visible light transmission
- **Air Leakage (AL):** Air infiltration rate

- **Condensation Resistance (CR):** Moisture control rating

2. DOUBLE HUNG WINDOWS - 3000 SERIES

Technical Specifications

- **Frame Material:** Multi-chambered vinyl construction
- **Glass Capability:** Up to 1" insulated glass units
- **Frame Depth:** 3 1/4" mulling capability
- **Balance System:** Block & tackle balances for superior operation

Energy Performance Ratings

Configuration	U-Factor	SHGC	VT	AL	CR
Standard IG	0.28-0.32	0.25-0.30	0.50-0.60	≤0.30	60+
Low-E IG	0.24-0.28	0.20-0.25	0.45-0.55	≤0.30	65+
Low-E + Argon	0.22-0.26	0.18-0.23	0.45-0.55	≤0.30	70+
Triple Glazed	0.18-0.22	0.15-0.20	0.40-0.50	≤0.30	75+

Standard Features

- **Tilt sash** for ease of cleaning
- **Maintenance-operated tilt-release mechanism**
- **Extruded automatic head and sill latches**
- **Full-length extruded lift handles**
- **Dual weather sealing system**

3. SLIDER WINDOWS

Technical Specifications

- **Frame Options:** 2-lite, 3-lite, and 4-lite configurations
- **Operation:** Horizontal sliding with no roller tracks
- **Glass Options:** Standard and high-performance glazing available
- **Security:** Multi-point locking systems available

Energy Performance Ratings

Configuration	U-Factor	SHGC	VT	AL	CR
2-Lite Standard	0.30-0.34	0.28-0.32	0.55-0.65	≤0.30	58+
2-Lite Low-E	0.26-0.30	0.22-0.26	0.50-0.60	≤0.30	63+
3-Lite Standard	0.32-0.36	0.30-0.34	0.60-0.70	≤0.30	55+
3-Lite Low-E	0.28-0.32	0.24-0.28	0.55-0.65	≤0.30	60+

Performance Features

- **No roller track design** eliminates failure points
- **Easy side-to-side operation**
- **Wide view and full ventilation capability**
- **Weather-tight sealing system**

4. CASEMENT WINDOWS

Technical Specifications

- **Operation:** Outward cranking, left or right hinge
- **Ventilation:** Full top-to-bottom airflow
- **Hardware:** Multi-point locking systems
- **Configurations:** Single, 2-lite, 3-lite, and 4-lite options

Energy Performance Ratings

Configuration	U-Factor	SHGC	VT	AL	CR
Single Casement	0.25-0.29	0.22-0.26	0.50-0.60	≤0.25	65+
2-Lite Equal	0.27-0.31	0.24-0.28	0.55-0.65	≤0.25	62+
3-Lite 50% Center	0.29-0.33	0.26-0.30	0.60-0.70	≤0.25	60+
4-Lite Casement	0.31-0.35	0.28-0.32	0.65-0.75	≤0.25	58+

Casement Window Anatomy

- **Head jamb:** Superior structural integrity
- **Side jamb:** Enhanced weather sealing
- **Sill:** Integrated drainage system
- **Top rail:** Reinforced construction

- **Bottom rail:** Multi-chamber design
- **Keeper:** Secure locking mechanism
- **Lock:** Multi-point security system
- **Operator track:** Smooth operation mechanism

5. BAY & BOW WINDOWS

Technical Specifications

Feature	Bay Windows	Bow Windows
Window Size	40+ inch exterior walls	80+ inch corners or more
Number of Windows	3 windows (30° and 45° angles)	4+ windows (subtle curve)
Ventilation	Picture center + operable sides	Fixed picture windows
Cost	\$\$\$ (Less expensive)	\$\$\$\$ (More expensive)
Home Style	Transitional/Contemporary	Traditional/Victorian

Energy Performance Ratings

Configuration	U-Factor	SHGC	VT	AL	CR
30° Bay - DH Sides	0.28-0.32	0.24-0.28	0.55-0.65	≤0.30	62+
45° Bay - Casement Sides	0.26-0.30	0.22-0.26	0.50-0.60	≤0.28	65+
30° Bow - Multi DH	0.30-0.34	0.26-0.30	0.60-0.70	≤0.30	60+
45° Bow - Multi DH	0.32-0.36	0.28-0.32	0.65-0.75	≤0.30	58+

6. PICTURE WINDOWS

Technical Specifications

- **Design:** Single pane of glass, no operating sashes
- **View:** Unobstructed panoramic viewing
- **Sizes:** Custom sizing available
- **Integration:** Combines with operable windows

Energy Performance Ratings

Glass Type	U-Factor	SHGC	VT	AL	CR
Standard IG	0.26-0.30	0.28-0.32	0.60-0.70	0.00	65+
Low-E IG	0.22-0.26	0.20-0.24	0.55-0.65	0.00	70+
Low-E + Argon	0.20-0.24	0.18-0.22	0.50-0.60	0.00	75+
Triple Glazed	0.16-0.20	0.15-0.19	0.45-0.55	0.00	80+

Performance Features

- **Zero air leakage** (fixed installation)
- **Maximum thermal performance**
- **Optimal natural light transmission**
- **Superior condensation resistance**

7. EUROPEAN SYSTEMS - 4500 SERIES

Tilt-Turn Windows 4500

Technical Specifications

- **Glazing Capability:** Up to 1 3/8" (35mm) thickness
- **Frame Depth:** 3 1/4" (83mm) North American / 2 3/8" (60mm) European
- **Chamber Design:** Multiple locking points and dual weather seals
- **Hardware:** Secure top venting and inward casement operation

Energy Performance Ratings

Configuration	U-Factor	SHGC	VT	AL	CR
Standard Performance	0.22-0.26	0.20-0.24	0.50-0.60	≤0.20	70+
High Performance	0.18-0.22	0.17-0.21	0.45-0.55	≤0.20	75+
AAMA AP-HC100 Rating	0.17	0.19	0.52	≤0.15	80+

Bi-Fold Door 4500

Technical Specifications

- **Glazing Capacity:** Up to 1 3/8" (35mm) thickness
- **Sash Capability:** Up to 7.5 ft high × 3 ft wide, 175 lbs max

- **Frame Design:** Four-chambered sashes and frames
- **Security:** Lever-locking mechanism with multiple compression seals

Energy Performance Ratings

Configuration	U-Factor	SHGC	VT	AL	CR
Standard IG	0.24-0.28	0.22-0.26	0.55-0.65	≤0.25	68+
High Performance	0.20-0.24	0.18-0.22	0.50-0.60	≤0.25	72+

8. PATIO DOORS - 200.200 SERIES

Technical Specifications

- **Configurations:** 2-panel to 4-panel options
- **Glass Capability:** 1" insulated glass units
- **Hardware:** Multiple configuration options
- **Operation:** Dual roller system for smooth operation

Energy Performance Ratings

Configuration	U-Factor	SHGC	VT	AL	CR
2-Panel Standard	0.28-0.32	0.26-0.30	0.60-0.70	≤0.30	62+
2-Panel Low-E	0.24-0.28	0.22-0.26	0.55-0.65	≤0.30	67+
3-Panel Standard	0.30-0.34	0.28-0.32	0.65-0.75	≤0.30	60+
4-Panel Standard	0.32-0.36	0.30-0.34	0.70-0.80	≤0.30	58+

Standard Features

- **Field reversible** operation
- **Heavy interlocks** for security
- **Dedicated transom and sidelite frames**
- **Mechanical frame options**

9. GLASS OPTIONS & PERFORMANCE

Low-E Glass Technology

- **Function:** Reflects infrared heat while allowing visible light

- **Summer Benefit:** Reduces heat gain, lowers cooling costs
- **Winter Benefit:** Retains indoor heat, reduces heating costs
- **UV Protection:** Blocks harmful UV rays

Glass Performance Comparison

Glass Type	U-Factor	SHGC	VT	Energy Savings
Standard Clear	0.50-0.60	0.75-0.85	0.85-0.90	Baseline
Low-E	0.30-0.35	0.25-0.35	0.70-0.80	15-25%
Low-E + Argon	0.25-0.30	0.20-0.30	0.65-0.75	25-35%
Triple Low-E	0.18-0.23	0.15-0.25	0.55-0.65	35-45%

Specialized Glass Options

Frosted Glass

- **Privacy:** Obscures view while maintaining light transmission
- **Performance:** Same thermal properties as base glass
- **Applications:** Bathrooms, entries, privacy areas

Tempered Glass

- **Safety:** 4-5x stronger than standard glass
- **Applications:** Large panels, safety-critical areas
- **Performance:** Identical thermal properties

Argon Gas Fill

- **Thermal Enhancement:** 34% better insulation than air
- **Cost-Effective:** Significant performance improvement
- **Longevity:** Maintains performance for window lifetime

10. INSTALLATION GUIDELINES

New Construction

- **Nailing Fins:** Semi-flexible vinyl strips for stud attachment
- **Flashing:** Proper water management critical
- **Insulation:** Continuous insulation around frame perimeter

- **Air Sealing:** Complete seal between frame and rough opening

Replacement Installation

- **Measurement:** Precise sizing for optimal performance
- **Weatherization:** Update sealing and insulation
- **Integration:** Coordinate with existing wall systems

Climate Zone Recommendations

Zone	Recommended U-Factor	Recommended SHGC
Northern	≤0.27	Any
North-Central	≤0.30	≤0.40
South-Central	≤0.35	≤0.30
Southern	≤0.65	≤0.25

11. CERTIFICATION STANDARDS

Quality Assurance

- **NFRC Certified:** Independent testing and rating
- **ENERGY STAR:** EPA partnership for energy efficiency
- **AAMA Standards:** Structural and performance requirements
- **ICC Compliance:** International Code Council standards

Performance Testing

- **Structural Load:** Wind and seismic resistance
- **Water Infiltration:** Weather resistance testing
- **Air Infiltration:** Controlled environment testing
- **Thermal Cycling:** Long-term performance validation

Warranty Coverage

- **Glass Seal:** 10-20 years against seal failure
- **Frame:** Lifetime warranty on material defects
- **Hardware:** 5-10 years on mechanical components
- **Finish:** 10+ years on color retention

ENERGY EFFICIENCY SUMMARY

Maximum Performance Configurations

1. **Highest Efficiency:** European 4500 Series with triple glazing
 - U-Factor: 0.17 | SHGC: 0.19 | Potential AAMA AP-HC100 rating
2. **Best Value Performance:** 3000 Series with Low-E + Argon
 - U-Factor: 0.22-0.26 | SHGC: 0.18-0.23 | ENERGY STAR qualified
3. **Standard Performance:** All product lines with Low-E glass
 - U-Factor: 0.24-0.30 | SHGC: 0.20-0.26 | Code compliant nationwide

Regional Optimization

- **Cold Climates:** Prioritize low U-Factor for heating savings
- **Hot Climates:** Balance U-Factor and SHGC for cooling efficiency
- **Mixed Climates:** Optimize for year-round performance

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All performance ratings are representative ranges. Actual performance may vary based on specific configurations, installation quality, and environmental conditions. Consult with Minmar technical specialists for project-specific recommendations.