

SECTION 08510

STEEL WINDOWS

NOTE TO SPECIFIER: Steel framed windows are allowed at appropriate fire rated locations with wired glass, for low security locations with tempered glass, and high security locations with tempered glass and metal louvers or shutters.

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Fire-rated and non fire-rated heavy intermediate outward projecting, inward projecting, casement, and fixed steel windows including necessary accessories.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. A123-89a Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. C509-94 Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
 - 3. D2000-96 Classification System for Rubber Products in Automotive Applications.
 - 4. D2287-96 Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.
 - 5. E283-91 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
 - 6. E330-90 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - 7. E331-86 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - 8. E405-89 Method for Wear Testing Rotary Operators for Windows.
- B. National Fire Protection Association (NFPA) 80.
- C. Steel Window Institute (SWI).

D. Florida Building Code (FBC).

1.03 SYSTEM DESCRIPTION

A. Testing: Test each type and size of required window unit according to ASTM E330 for structural performance, with ASTM E283 for air leakage, and with ASTM E331 for water penetration.

B. Performance Requirements: Fabricate units to comply with:

1. Design Wind Velocity Pressures: According to American Society of Civil Engineers (ASCE) 7-98.
2. High Performance requirements of ANSI/AAMA 101, Section 3.
3. Air Infiltration at 6.24 psf (ASTM E283): 0.37 cfm/ft maximum.
4. Water Resistance: No leakage at 6.00 psf.
5. Provide windows with 45 condensation resistance factor, according to AAMA 1502.6.

1.04 SUBMITTALS

A. Shop Drawings: Provide information not fully detailed in manufacturer's standard product data and the following:

1. Elevations of continuous work at 1/4" scale.
2. Typical unit elevations at 3/4" scale.
3. Full size section details of every typical composite member.
4. Anchorage, fastening, and sealing methods.
5. Sash installation details.
6. Hardware.
7. Operators.
8. Accessories.
9. Glazing details.

B. Certification: Miami-Dade County product approval demonstrating compliance with FBC missile impact criteria.

1. Comply with calculations, signed and sealed by a Florida registered professional engineer, establishing wind velocity pressure values for the specific project according to American Society of Civil Engineers (ASCE) 7-98 using a wind speed of 146 mph, exposure category "C", and a wind load importance factor of 1.15.

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C. Calculations/Test Results/Details:

1. Pressure test results by a M-DCPS accepted nationally recognized independent laboratory for supplied window units.
2. Installation details, signed and sealed by a Florida registered professional engineer, with anchorage system noted and specified to comply with ASCE 7-98.

D. Product Data: Submit manufacturer's product specifications, technical product data, recommendations, and standard details. Include the following information:

1. Fabrication methods.
2. Finishing.
3. Hardware and Accessories.
4. Weight per foot of each steel section.
5. Manufacturer's certified test reports, indicating that each type and size of unit has been tested and meets performance requirements specified.

NOTE TO SPECIFIER: Delete sample submittals below if prime coat only is specified.

E. Samples:

1. Specified finish on 12 inch lengths of window members.
2. Typical sash corner.
3. Hardware.
4. The A/E reserves the right to require additional samples, which show fabrication techniques and labor quality, and design of hardware and accessories.

F. Quality Control Submittals:

1. Letter from manufacturer's authorized representative qualifying the installer.
2. Documentation that window meets required fire rating classification.
3. Provide test report from qualified independent testing laboratory verifying compliance to specified testing requirements.
4. Sample of warranty.

1.05 QUALITY ASSURANCE

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- A. Comply with Florida Department of Education, Office of Educational Facilities - State Requirements for Educational Facilities - 1999 (SREF).
- B. Standards: Comply with applicable specifications of the SWI except to the extent more stringent requirements are indicated.
- C. Single Source Responsibility: Provide steel windows produced by a single manufacturer capable of showing prior production of units similar to those required.
- D. Installer Qualifications: Provide written documentation from the authorized window manufacturer representative stating that the window installer is approved, or certified, by the manufacturer to do the work.
- E. Design Criteria: Drawings indicate sizes, profiles, and dimensional requirements of steel windows. Subject to A/E approval, window units having minor deviations from dimensions and profiles indicated on the Drawings may be accepted, provided such deviations do not materially detract from the design concept or intended performances.

NOTE TO SPECIFIER: Fire rated windows are required to be glazed with 1/4" thick wire glass with automatic closing devices and are of limited sizes complying with code requirements. Fire resistance rating is normally Class "E" (for exterior openings subject to moderate or light fire exposure from the outside).

- F. Fire Resistance:
 - 1. Comply with ASTM E283.
 - 2. Comply with NFPA 80, Class E.
 - 3. Window shall bear a 3/4 hour fire rating.
 - 4. Provide units bearing the Underwriters Laboratories label.
 - 5. Furnish each fire rated window with a brass label at the sill of the window.
- G. Window Grade Classification:
 - 1. Except where a recognized SWI classification or grade is indicated, provide the manufacturer's standard products as indicated complying with requirements and

governing regulations.

NOTE TO SPECIFIER:

- 1. Normally delete the paragraph above and edit paragraphs below. If this is not feasible because units are customized or unclassified, retain the paragraph above, insert generic or proprietary descriptions as needed and delete the remainder of this article.
- 2. Where more than one window grade is retained, it is necessary to show the extent of each on the Drawings or by adding text to this section. Before retaining any grade, check to confirm it is supplied by at least one manufacturer.

- H. Heavy Intermediate Windows: Provide steel window units that comply with SWI recommended specifications and are fabricated from cold-rolled or hot-rolled, new billet steel heavy intermediate sections.
- I. Heavy Custom Windows: Provide steel window units that comply with SWI recommended specifications and are fabricated from cold-rolled or hot-rolled, new billet steel heavy custom sections.

1.06 PROJECT CONDITIONS

- A. Field Measurements:
 - 1. Where possible, before fabrication check actual window openings in construction work by accurate field measurement.
 - 2. Show recorded measurements on final shop drawings.
 - 3. Coordinate fabrication schedule with construction progress as directed by the Contractor to avoid delay of the work.
 - 4. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit of window units.

1.07 SEQUENCING AND SCHEDULING

NOTE TO SPECIFIER: Delete the next paragraph if window units are factory-finished.

- A. Refer to "Painting" sections of Division 9 for painting steel window units. Complete painting before installation of glass except where units have been preglazed before

installation, and except for painting of exposed face-glazing compounds.

1.08 WARRANTY

A. Special Project Warranty:

1. Submit a written warranty, executed by the Contractor, installer, and steel window manufacturer, agreeing to repair or replace window units (including reglazing) that fail in materials or labor within the specified warranty period.
2. Failures include, but are not necessarily limited to structural failures including excessive deflection, excessive leakage or air infiltration, faulty operation of sash and hardware, and deterioration of metals, metal finishes, and other materials beyond normal weathering.
3. This warranty shall be in addition to and not a limitation of other rights the Board may have against the Contractor under the Contract Documents.
4. Warranty period for steel windows is 3 years after the date of substantial completion.

PART 2 PRODUCTS

NOTE TO SPECIFIER: Verify SREF for missile impact requirements at public shelters before editing window manufacturers.

2.01 MANUFACTURERS

- A. Hopes Architectural Products, Jamestown, VA.
- B. Emerson Engineering, Indianapolis, IN.
- C. Fyre-Tec, Pender, NE.
- D. Optimum Windows, Ellenville, NY.
- E. Premier Window Products, Corona, CA.

2.02 PRODUCTS

- A. 3/4 Hour Fire Rated Steel Windows: Sizes as shown, wire glass or Superlite.
 1. Jamestown Series by Hopes Architectural Products Inc.
 2. 7600, 7650, and 8600 Series by Optimum Windows.

- 3. Steel Fire Windows by Fyre-Tec.
- B. Ticket Window with Manual Roll Down Shutter: 24 inches x 36 inches high tempered glass, stainless steel shutter, frame, and sill with coin/ticket tray, slide bolt locking, and non-labeled.
 - 1. Rolling Pass Window by Emerson Engineering.
 - 2. Accepted equivalent.
- C. Communication Window at Food Service: 3/4 hour fire rated steel horizontal sliding pass-through with wire glass.
 - 1. Model #900 by Fyre-Tec.
 - 2. 1000 Series by Premier Window Products, Inc.
 - 3. 8600 Series by Optimum Windows.

2.03 MATERIALS

- A. Steel Window Members: Provide members formed from the manufacturers solid hot-rolled new billet steel shapes, as designed by the manufacturer to comply with specified requirements. Provide applied, non-structural weathering members of 0.060" minimum thickness, where indicated.
- B. Trim members include glazing beads, screen frames, weatherstrip retainers, flashing and similar items, not functioning as prime structural members. Provide units of extruded aluminum alloy 6063 T5, or stainless steel. At the manufacturer's option, trim located entirely on the interior face of window units may be of formed steel.
- C. Concealed Fasteners: Provide bronze, brass, stainless steel or other tamper-proof metal fasteners warranted by the manufacturer to be non-corrosive and compatible with steel window members, trim, hardware, anchors and other components of connected work.
 - 1. Use of exposed fasteners is not allowed.
- D. Anchors, Clips, and Window Accessories: Depending on strength and corrosion-inhibiting requirements, fabricate units of stainless steel, hot-dip zinc coated steel or iron complying with ASTM A123, or bronze/brass.
- E. Hardware: Provide solid bronze hardware, with steel or brass/bronze operating bars and rods.

1. Provide tamperproof hardware.

F. Compression Type Weatherstripping: Provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with AAMA SG-1 or ASTM D2000, Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D2287, or molded expanded EPDM or neoprene gaskets complying with ASTM D2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C509, Grade 4.

G. Sealant: For sealants required within fabricated window units, provide type recommended by the manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating. Comply with Section 07900 Joint Sealers section of these specifications for selection and installation of sealants.

NOTE TO SPECIFIER: Use the following paragraph if required by M-DCPS Design Criteria. Note in the window schedule which windows receive insect screen.

H. Wire Fabric Insect Screen: Provide 18 x 18, 18 x 16, or 18 x 14 mesh of 0.009" diameter stainless steel wire, complying with FS RR-W-365, Type VI.

NOTE TO SPECIFIER: Delete the paragraph below and insert glass and glazing materials when window units are preglazed, or when the project is glazed under the responsibility of the window installer.

I. Glass and Glazing Materials: Refer to the "Glass and Glazing" sections of these specifications.

2.04 COMPONENTS

A. Except to the extent that more stringent or specific requirements are indicated, provide the manufacturer's standard design hardware for the operation indicated.

1. Friction Shoes: Provide friction shoes of bronze, brass, or other non-abrasive, non-staining, non-corrosive, durable metallic material.

NOTE TO SPECIFIER: Delete the paragraph below if group type operations is not required.

- B. Group Operating System: Provide group operation system of the type and in groups as shown. Coordinate design of the operator with window fabrication and hardware selection, to ensure smooth, durable operation of sashes.

NOTE TO SPECIFIER: Edit the following for the operating systems used.

1. Provide torsion-type rack and pinion system operators, complete with steel pipe torsion shaft and factory-sealed gear box. Provide system with rack and pinion sets and operating arms, standard fittings, and accessories for operation indicated. Space support bearings at 10'-0" o.c. maximum.
 - a. Space operating arms not over 5'-0" o.c.
 - b. Provide one operating arm for each operating vent.
2. Provide tension-type horizontal movement system complete with steel rod or cable transmission lines, factory-sealed lubricated rotary thrust unit, and toggle-type operator arms. Provide support bracket at each operator, at bends, and not more than 10'-0" o.c. elsewhere.
 - a. Space operating arms not more than 10'-0" o.c. along each continuous unit.
 - b. Provide one operating arm for each operating vent.
3. Manual Control Unit: Provide vertical-shaft type manual units to operate windows from stations as indicated. Provide crank operator and a removable crank, complete with oil-enclosed miter gearbox, located 3'-8" above finish floor.

- C. Projected Windows: Provide the following operating equipment and hardware for top hinged, swing-out awning type vents:

NOTE TO SPECIFIER: Select one of the hinge systems below or modify to suit project. Consider

adding a requirement for limit stops to prevent projection beyond wall surfaces where desirable.

1. Hinges: 4-bar friction hinges with adjustable friction slide shoe (2 per vent).
2. Hinges: Balance arms with adjustable, non-abrasive friction pivots (2 per vent).

NOTE TO SPECIFIER: Select one of the sash locks below. Modify text if necessary to provide for 2 locks on units over 3'-6" wide.

3. Sash Lock: Cam action sweep lock and keeper with lever handle and pull.
4. Sash Lock: Pole operated cam action sweep lock handle and keeper.

2.05 ACCESSORIES

- A. Except to the extent that more specific or more stringent requirements are indicated, provide the manufacturer's standard accessories that comply with indicated standards.
- B. Insect Screens:
 1. Locate screen units on either the inside or the outside of the sash, depending upon the window type and location shown.
 2. Where possible, design window units and hardware to accommodate screens in a tight-fitting removable arrangement, with a minimum of exposed fasteners and latches, and without the necessity of wickets for hardware access.
 3. Where wickets are necessary, provide either sliding or hinged type, framed and trimmed for durability during handling, and for a tight fit.
- C. Fabricate screen frames of either extruded or formed tubular-shaped metal members, with mitered or coped joints and concealed mechanical fasteners, with removable PVC spline-anchor concealing the edge of the screen frame.

NOTE TO SPECIFIER: Retain one or more of the options below.

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1. Fabricate steel frames (for interior application only) of 0.032" thick sheet steel. Finish frames to match window units.
2. Fabricate stainless steel frames of 0.020" thick stainless steel sheet, in No.2B bright mill finish.

NOTE TO SPECIFIER: Retain the paragraph below only if availability is confirmed with at least one manufacturer. Double-stripping is usually shown for reversible windows. Coordinate with the "Materials" Article.

- D. Weatherstripping: Provide the manufacturer's standard weatherstripping, of materials specified, applied to inside metal contact line of each operating sash or vent.

2.06 FABRICATION

- A. Except as specified or more stringent requirements are indicated, provide manufacturer's standard fabrication that complies with indicated standards and produces window units that are reglazable without dismantling sash framing. Include a complete system of anchorage, and prepare for glazing except where preglazing at the factory is indicated.

B. Sizes and Profiles:

1. Required sizes for window units and profile requirements are indicated on the Drawings.
2. Variable dimensions are indicated along with maximum and minimum dimensions as required to achieve design requirements and coordination with other work.
3. Details shown are based upon standard details by one or more manufacturers.
4. It is intended that similar details by other manufacturers will be acceptable, provided they comply with size requirements, and with minimum/maximum profile requirements as shown.

C. Operable Hardware:

1. Projected-out ventilators shall be on heavy steel side arms securely pivoted to the vent and frame at each jamb. Maintain friction by means of two brass shoes sliding in the channel of the frame section controlled

by compression springs enclosed in tubular housings. Fit the housing with a fusible link release that will release the friction and allow the ventilator to close in case of a fire. The opening of each venting shall be limited to 70 degrees maximum.

- 2. Provide one bronze spring catch or fastener at the centerline of ventilator height.
- 3. Provide two sets of firelock lugs on ventilator fastener bar and one set on opposite bar.

D. Provide weepholes and internal water passages to conduct infiltrating water to the exterior.

NOTE TO SPECIFIER: Delete the paragraph below if there are no lines where vent frames lap the wrong way to shed water.

E. Provide watershed members above side-hinged ventilators and similar lines of natural water penetration.

NOTE TO SPECIFIER: The next paragraph is only an example. Change to hollow metal type (14 gage) where needed. Delete if none are required. Describe separate sills and/or stools if desired.

F. Provide subframes formed of hot-rolled or cold-rolled steel matching window units of the profile indicated, or if not indicated, of the manufacturer's standard profile for the span and spacing indicated. Provide not less than 2 inch deep sections fabricated of 1/8" thick steel. Design subframes to withstand a positive load of 50 psf and a negative load of 25 psf on the window units and other work supported thereby. Miter or cope corners, weld and dress smooth. Finish to match window units.

NOTE TO SPECIFIER: Delete the paragraph below if mullions are not required.

G. Provide mullions and cover plates formed of hot-rolled steel matching window units, complete with anchors for support to structure and for installation of window units. Provide mullions of profile indicated, or if not indicated, of the manufacturer's standard profile for the span and spacing indicated. Allow for erection tolerances and

provide for movement of window units due to thermal expansion and building deflections, in the manner indicated. Design mullions to withstand a positive load of 50 psf and a negative load of 25 psf on the window units and other work supported thereby.

NOTE TO SPECIFIER: Delete the following paragraphs if glazing stops are not required. Steel window units are frequently glazed without stops (face glazed), particularly if light sizes are small.

H. Glazing Stops: Provide screw-applied or snap-on glazing stops (beads), coordinated with glass selection and glazing system as indicated.

1. Finish glazing stops to match window units, if fabricated of steel. Otherwise, provide the manufacturer's standard finish as selected by the A/E.

I. Glazing Clips: Where face glazing (without stops) is indicated, furnish glazing clips for concealment in glazing compound.

NOTE TO SPECIFIER: Delete the paragraph below if preglazing is not needed or is impractical. Preglazing is usually limited to sizes below 60 united inches.

J. Preglazed Fabrication: Preglaze window units at the factory where possible and practical for applications indicated. Comply with glass and glazing requirements of the "Glass and Glazing" sections of these specifications.

2.07 FINISHES

A. General: Provide the manufacturer's standard pretreatment and shop finishing complying with requirements including specified standards. Protect shop finishes from damage due to shipping, handling and exposures before application of field finish or before time of substantial completion where shop finish is the final finish.

B. Shop Prime Coat Finish: After fabrication provide a 1.0 mil dry film thickness shop prime coat finish consisting of a hot alkali solution cleaning, followed by a rinse and hot-phosphate solution treatment, then a chromic-acid rinse,

drying and a special-dip metal primer coating, and oven drying for 30 minutes at 300 degrees F. (149 degrees C.).

NOTE TO SPECIFIER: If galvanized window units are required for superior corrosion resistance, delete the paragraph above and retain the paragraph below. Retain the paragraph below for galvanized units with or without shop prime coat, for painting at the project, or for special coatings.

- C. Galvanized Windows: After fabrication, provide galvanize treatment consisting of chemical cleaning complying with SSPC-SP 1 and pickling treatment complying with SSPC-SP 8, followed by a hot-dip galvanizing complying with ASTM A123.
 - 1. After galvanizing provide a 1.0 mil dry film thickness shop-applied finish consisting of a hot-phosphate solution treatment followed by a chromic-acid rinse, drying and a special dip-metal primer coating and oven drying for 30 minutes at 300 degrees F. (149 degrees C.).
- D. Shop-Applied Special Coating: Provide the manufacturer's special, 1.5 mil dry film thickness, electrostatically applied baked-on coating of acrylic or polyester enamel.
 - 1. Provide color selected by the A/E from the manufacturer's standard colors.

NOTE TO SPECIFIER: Retain either the paragraph above or below.

- 2. Provide color matching the A/E's sample.

PART 3 EXECUTION

3.01 INSPECTION:

- A. Inspect opening before beginning installation. Verify rough or masonry opening is correct and the sill plate level.
 - 1. Masonry surfaces shall be visibly dry and free of excess mortar, sand and other construction debris.
 - 2. Metal surfaces shall be dry, clean, free of grease, oil, dirt, rust and corrosion, and welding slag,

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without sharp edges or offsets at joints.

- B. Do not proceed with the work of this section until conditions detrimental to the completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for installation of window units, hardware, operators, and other components of the work.
- B. Set units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place. Separate zinc-coated steel and other corrodible surfaces from sources of corrosion of electrolytic action at points of contact with other materials, by inserting a bituminous coating or plastic sheet materials.
- C. Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to "Joint Sealer" sections of Division-7 for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.

NOTE TO SPECIFIER: Delete the next paragraph if none of these items are to be installed after window units are installed.

- 1. Compounds, joint fillers and gaskets shall be installed after installation of window units according to Section 07900 Joint Sealers.

3.03 ADJUSTING

- A. Adjust operating sash and hardware to provide a tight fit at contact points and weatherstripping, for smooth operation and a weathertight closure.

3.04 CLEANING

- A. Clean surfaces promptly after installation of windows, exercising care to avoid damage to the finish. Remove

excess glazing and sealant compounds, dirt, and other substances such as but not limited to, concrete, roofing, or paint smears, runoff, or droppings. Lubricate hardware and other moving parts.

1. Replace at no charge to the Board, any window that fails to provide a fully operable and trouble-free window with an unblemished surface.

B. Clean glass of preglazed units promptly after installation of windows. Comply with requirements of the "Glass and Glazing" section for cleaning and maintenance.

3.05 PROTECTION

A. Provide protection and other precautions required through the remainder of the construction period, to ensure that, except for normal weathering, window units will be free of damage or deterioration at the time of substantial completion.

END OF SECTION