COUNTY OF TUSCOLA

DEPARTMENT OF BUILDINGS & GROUNDS

125 W. Lincoln St
Caro, Michigan 48723-1660
(989)672-3756

MICHAEL MILLER
Director

THOMAS McLANE
Assistant Director

TO: INTERESTED CONTRACTORS
FROM: MIKE MILLER
DATE: April 20, 2023
RE: Window replacement

Tuscola County will be accepting bids on the replacement of the exterior windows at the County Adult Probation Building at 449 Wells ST Caro MI 48723. The following specifications shall be considered in your bid:

A. Contractor shall be responsible for any needed permits.
B. Contractor shall field measure the windows before bidding.
C. There are 18 windows to be replaced. 5 sliders and 13 fixed.
D. Fixed windows shall be Tubelite 14000 Series Storefront. 1 inch insulated glass, tinted. Bronze finish.
E. Sliding windows shall be EFCO Series SX45 Thermal AW-PG45-HS Horizontal Sliding. 1 inch insulated glass tinted. Bronze finish.
F. Contractor shall furnish and install the windows complete with hardware.
G. Contractor shall include all necessary sealant and weather-stripping.
H. All work is to be completed by qualified personnel
I. Contractor shall be insured and provide copy of liability insurance and workmen's comp.
J. Contractor shall clean up all debris from the jobsite and dispose of in a proper manner following Federal, State and Local rules and laws.

Please call ahead to set an appointment to view the project. 989-672-3756

Please do not stop at the building without calling first.

Proposals shall be submitted to Buildings and Grounds at the Tuscola County Controllers office at 125 W. Lincoln St. STE 500 Caro Michigan 48723, no later than 4:00 p.m. on May 5, 2023. Please label bid "Window Replacement"

Please call 989-672-3756 if you have questions.

Disclaimer

Tuscola County reserves the right at its sole discretion to reject any and all proposals received without penalty and not to enter a contract as a result of this RFP. The County also reserves the right to negotiate separately with any source whatsoever in any manner necessary to attend to the best interests of the County, to waive irregularities in any proposal and to accept a proposal which best meets the needs of the County, irrespective of the bid price."

By submitting a bid, the bidder is acknowledging that there will be no contractual relationship between Tuscola County and the bidder until both parties have formally approved and signed a written contract to be developed by Tuscola County legal counsel.

The County reserves the right to make an award without further discussion of any proposal submitted. Therefore, the proposal should be submitted initially on the most favorable terms which the offer can propose. There will be no best and final offer procedure. The County does reserve the right to contact an offer for clarification of its proposal."

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes Tubelite aluminum storefront and all components and installation accessories supplied with the system.
   1. Tubelite 14000 Series Storefront systems: 2" x 4-1/2"
      ~~a. E14000 Storefront (non-thermal)~~
      b. T14000 Storefront (thermal)

1.02 RELATED PRODUCTS

A. Single Manufacture: All products in divisions listed below shall be supplied by a single manufacturer. To ensure consistency in quality, warranty, finish, and product compatibility, products supplied by different manufacturers are not acceptable.
   a. Division 08 42 13 - Aluminum Framed Entrances: *<insert Tubelite entrance products>.*
   b. Division 08 44 13 - Glazed Aluminum Curtainwalls: *<insert Tubelite curtainwall / window wall products>.*
   c. Division 08 51 13 - Aluminum Windows: *<insert Tubelite aluminum window products>.*
   d. Division 08 13 16 – Aluminum Terrace Doors: *<insert Tubelite light shelf products>.*
   e. Division 10 71 13 - Exterior Sun Control Devices: *<insert Tubelite sunshade products>.*
   f. Division 12 26 00 - Interior Daylighting Devices: *<insert Tubelite light shelf products>.*

SPECIFIER NOTE: Review the following suggested Pre-installation Meeting and Agenda information and confirm that this Work is extensive enough to justify this meeting and edit for project specific meeting requirements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.
B. Pre-installation Meeting:
   a. Attendees: Owner's Representative, Architect, General Contractor, Structural Engineer, Mechanical Engineer, Consultants, Storefront Installer. Storefront Manufacturer's Representative, structural support installers, and installers whose work interfaces with storefront and glazing, [_____].
   2. Agenda:
      a. Review and finalize construction schedule.
      b. Review code and project performance compliance documentation and testing requirements including product certification for energy (U-value, SHGC), condensation, ADA, acoustics, etc.
      c. Review product specific mockups and field testing requirements.
      d. Verify availability of materials, installer's personnel, equipment, and facilities required to maintain schedule.
      e. Review means and methods related to installation, including manufacturer's written instructions.
      f. Examine support conditions for compliance with requirements including alignment and attachment to structural members.
      g. Review flashings, membrane interface with storefront, wall penetrations, openings, and conditions of other construction affecting this Work.
      h. Review temporary protection requirements for during and after installation of this Work.

1.04 PERFORMANCE REQUIREMENTS

A. Design Wind Loads
   1. Provide aluminum storefront system with all structural components including but not limited to anchors and mullions based on the following wind load design pressures and the deflection and stress criteria of paragraph 1.04 B. Pressures based on Allowable Stress Design (ASD).
      a. [___] psf positive and negative - typical zones
         [___] psf negative - corner zones.
      b. Basic Wind Speed of [___] mph
         i. Exposure Category [I],[II], [III]
         ii. Importance factor [1], [1.15], [___]
      c. Design criteria based on [___] building code *or* wind pressure diagram.

NOTE: Tubelite is not responsible for determining design loads; this is the responsibility of the Engineer of Record for the building.

1.04 PERFORMANCE REQUIREMENTS (continued)

B. Air, Water and Structural Performance:
   1. Air Infiltration Performance:
      a. Shall not exceed 0.060 cfm/ft² at 6.24 psf static air pressure differential, when tested per ASTM 283.
   2. Water Infiltration Performance:
      a. Static: No uncontrolled water entry at a 10 psf static pressure differential with water applied at a minimum rate of 5 gal/ft² hr when tested per ASTM E 331.
      b. Dynamic: No uncontrolled water entry at 10 psf dynamic pressure with water applied at a minimum rate of 5 gal/ft²hr when tested per AAMA 501.1.
   3. Structural Performance at design loads:
      a. System to withstand +/- 30 psf when tested per ASTM E330.
         i. Maximum allowable deflection of L/175 of the clear span for spans up to 13'-6" or L/240 of clear spans plus ¼" for spans greater than 13'-6" or an amount that restricts edge deflection of individual glazing lites of glass to ¾" whichever is smaller.
   4. Structural Performance at 1.5x design loads:
      a. System to withstand +/- 45 psf when tested per ASTM E330.
         i. There shall be no permanent deformation of main frame members in excess of 0.2% of its clear span, glass breakage, or permanent damage to fasteners or anchors.
   5. Interstory Differential Horizontal Movement per AAMA 501.4.
      a. 3 cycles: 0.75" left, back to zero, 0.75" right, back to zero (one complete cycle)
         i. There shall be no failure or gross permanent distortion of anchors, frame, glass, or panels. Glazing gaskets may not disengage and weather seals may not fail.
   6. Seismic Horizontal Movement at 1.5X design displacement per AAMA 501.4.
      a. 3 cycles: 3" left, back to zero, 3" right, back to zero (one complete cycle).
         i. There shall be no glass breakage, permanent damage to frame members or anchors.

C. Acoustic Performance:
   1. The system shall have a sound transmission class (STC) and an outdoor-indoor transmission class (OITC) rating when tested per ASTM E90 and ASTM E1332. Coordinate performance with 08 80 00 Glazing.
      a. 1" glazing: STC [32], OITC [26] *< 1/4" glass, 1/2" air space, 1/4" glass >*
   2. Test results using glass-only values are not acceptable.

D. Thermal Transmittance and Condensation Resistance Performance Requirements
   1. Thermal transmittance (U-factor) for window system shall not exceed [____] BTU/hr-ft²-°F per NFRC 100.
      (Coordinate performance with 08 80 00 Glazing)
      a. U-Factor performance reference data per NFRC 100 thermal simulations:

	14000 SYSTEM U-FACTOR (BTU/hr-ft²-°F)					
CENTER OF GLASS U-FACTOR (BTU/hr-ft²-°F)	**E14000** (non-thermal) *aluminum spacer*	**E14000** (non-thermal) *warm edge spacer*	**T14000** (thermally insulated) *aluminum spacer*	**T14000** (thermally insulated) *warm edge spacer*	**T14000** (thermally broken) *aluminum spacer*	**T14000** (thermally broken) *warm edge spacer*
0.30	0.52	0.53	0.44	0.43	0.41	0.39
0.29	0.51	0.50	0.43	0.42	0.40	0.38
0.28	0.50	0.49	0.42	0.41	0.39	0.37
0.26	0.49	0.48	0.41	0.39	0.38	0.35
0.24	0.48	0.47	0.39	0.38	0.36	0.33
0.22	0.46	0.48	0.36	0.35	0.33	0.30
0.20	0.45	0.44	0.35	0.34	0.32	0.29
0.18	0.44	0.43	0.34	0.32	0.31	0.28

NOTE: The above table for reference only. Please contact a Tubelite representative for system U-Factors using project specific glass and framing. Values based on 4 ½" standard system and determined in accordance with NFRC 100 for a glazed wall configuration. Glass makeup: 1" IGU with ¼" lites, and ½"gap.

   2. Solar Heat Gain Coefficient (SHGC) for the window area shall not exceed [____] as determined in accordance with NFRC 200.
      (Coordinate performance with 08 80 00 Glazing)

1.04 PERFORMANCE REQUIREMENTS (continued)

3. Condensation Resistance Factor (CRF) shall meet or exceed [____]CRF_{frame} and [____]CRF_{glass} as determined in accordance with AAMA 1503.
   a. CRF performance data:

	CONDENSATION RESISTANCE FACTOR (CRF)	
SYSTEM	**FRAME**	**GLASS**
T14000 (thermally insulated)	**54**	**61**
T14000 (thermally broken)	**62**	**68**

NOTE: The formation of condensation on interior surfaces is affected by many different variables outside of Tubelite's control. Variables include but are not limited to: surrounding conditions, air flow / air circulation issues, extreme weather, HVAC settings, and unusual humidity levels. Tubelite cannot guarantee performance of system as stated above unless conditions are identical to those present in the testing procedure specified above.

1.05 SUBMITTALS

A. Product Data:
   1. Manufacturer's literature for each specified system.
   2. Components within assembly, including material descriptions, component profiles, finishes, anchorage and fasteners, glazing, and internal drainage.

B. Shop Drawings:
   1. Shop drawings must be prepared by a qualified engineering service under the employ of the [window wall manufacturer] [installer].
   2. Include system dimensions, framed opening requirements and tolerances, affected related Work, anchorage, expansion and contraction joint location and details, and field welding required.
   3. Include scaled shop drawings showing detailed relationships with glazing, flashing, internal drainage, joinery, and provisions for thermal expansion.

C. Design Data: Submit framing member structural and physical characteristics, [engineering calculations], and [dimensional limitations].

D. Samples:
   1. System components: Submit corner samples, anchors, fasteners, trim, and other materials as requested by the architect.
   2. Finish: Submit [two] aluminum sheet stock samples [2" x 3"] for each finish type.

E. Warranty: Submit manufacturer sample warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

F. Optional [Sustainable Design Submittals] or [LEED Reports]:
   1. *MR4.1 and MR4.2 Recycled Content*: Submit documentation from manufacturer for amounts of pre-consumer and post-consumer recycled content by weight for the products specified.
   2. *EA Credit 1 Optimize Energy Performance*: Submit documentation from manufacturer showing energy performance of system(s) beyond the prerequisite standard.
   3. *IEQ Credit 7.1 Thermal Comfort*: Submit documentation from manufacturer reflecting use of natural ventilation products.
   4. *IEQ Credit 8.1 Daylight and Views*: Submit documentation from manufacturer showing the introduction of daylight and views into regularly occupied areas as a function of percentage of these spaces exposed to such daylight and views.
   5. *MR5.1 and MR5.2 Regional Materials*: Submit documentation from manufacturer showing a minimum of 10% up to 20% (based on cost) of building materials or products extracted, harvested, recovered or manufactured within 500 miles of the project site.
   6. *MR3.1 and MR3.2 Resource Reuse*: Submit documentation from manufacturer reflecting use of a minimum of 5% up to 10% [based on weight] salvaged, refurbished or reused materials.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least twenty years of documented experience.
B. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State that the Project is located.
C. Installer: Company approved by manufacturer and specializing in performing work of this section with at least [___] years of [documented] installation experience.
D. Source Limitations: Obtain the storefront and all products listed in Section 1.02 from a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Materials to be packed, loaded, shipped, unloaded, stored and protected in accordance with AAMA CW-10.
B. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work to be performed according to manufacturer's installation instructions and warranty requirements.
B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before fabrication of storefront framing and indicate measurements on Shop Drawings.
C. Install sealant according to sealant manufacturer guidelines.
D. Coordinate installation with other applicable trades.

1.09 WARRANTY

A. Aluminum Storefront Framing Warranty:
   1. Manufacturer agrees to repair or replace defective storefront components for a period of 2 [3][5][10] years from the date of shipment. *<3, 5, and 10 years optional>.*
B. Finish Warranty:
   1. Warranty covers factory-applied organic and anodic finishes on exposed extruded aluminum surfaces without standing water accumulation, against peeling, checking, cracking, chalking and change of color, per applicable AAMA specifications.
      a. Paint Coatings
         i. AAMA 2605 70% PVDF: 10 [20] years *<20 years optional>*
         ii. AAMA 2604 50% PVDF: 5 [10] years *<10 years optional>*
         iii. AAMA 2603 Baked Enamel: 1 year (adhesion only)
      b. Anodized Coatings
         i. AAMA 611 Class I: 5 [10] years *<10 years optional>*
         ii. AAMA 611 Class II: 2 years

NOTE: Refer to Tubelite Limited Warranty and Finish Warranty for detailed exclusions, qualifications and limitations. When warranties are required, verify with Owner's counsel that warranties stated under this article are not less than remedies available to Owner under prevailing local laws. Verify the length of available warranties on the actual finish being specified.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis of Design: Aluminum Framed Storefront
   1. Tubelite Inc. E14000 Series Storefront: 2" x 4-1/2" non-thermal
   2. Tubelite Inc. T14000 Series Storefront: 2" x 4-1/2" thermally broken [thermally insulated] *<select>*
   3. Substitutions
      a. Manufacturer's products that meet specified design requirements may be considered as a substitution. Substitution requests / submittals must include the following, and be submitted at least ten working days prior to the bid date.
         i. Submittal information must include test reports as specified in performance sections.
         ii. Copy of manufactures warranty
         iii. Any additional information as requested
         iv. System details / samples

2.02 ALUMINUM FRAMED STOREFRONT

A. Aluminum Framed Storefront: Factory or field fabricated, field glazed, factory finished aluminum, screw spline construction with infill and related flashings, anchorage and attachment devices.
   1. System dimensions: 2" x 4-1/2"
      a. Exterior face dimensions
         i. Primary mullions: 2"
         ii. Expansion mullion: 2-5/8"
         iii. Optional sill: [4-1/2"] 6-1/2"][other] *< contact Tubelite representative for other options>.*
      b. Depth: 4-1/2"
      c. Corner mullions
         i. 90°: 4-1/2" [inside][outside][3-way] *<select>*
         ii. 135°: 4-1/2" [inside][outside] *<select>*
         iii. Vertical splay mullion: [135°][variable degree] *< contact Tubelite representative for variable degree options>.*
   2. Glazing:
      a. Position: center of system
      b. Thickness: 1" [1/4" to 1-1/8"] *< contact Tubelite representative for thickness options>.*
      c. Method: captured and retained with gaskets on all four sides
         i. outside glazed [inside glazed] *<specify>*
   3. T14000 thermal barriers:
      a. Standard: Thermally Broken
         i. Primary frames: pour-debridge
         ii. Vertical snap-in filler: polyamide strut
         iii. PVC filler at head and sill
      b. Optional: Thermally Insulated
         i. Primary frames: pour-debridge
         ii. Vertical snap-in filler: slotted filler [pour-debridge filler] *<select>*

2.03 FINISHES

A. Finish all exposed areas of aluminum storefront components in accordance with applicable AAMA Voluntary Finish Guide Specification: *<select from list below>.*

SPECIFICATION	DESCRIPTION	DESIGNATION	COLOR
AAMA 2605	70% PVDF [2][3][4] coat *<select>*	Exterior Paint	[_____] *<specify color name/number>*
AAMA 2604	50% PVDF [2][3][4] coat *<select>*	Exterior Paint	[_____] *<specify color name/number>*
AAMA 2603	Baked enamel	Interior Paint	[_____] *<specify color name/number>*
AAMA 611	Class I - Color anodize coating, Eco-friendly etch (0.7 mils thick min)	AA-M10C21A44	[Light Bronze],[Medium Bronze],[Dark Bronze] [Extra Dark Bronze] [Black],[Champagne], [Copper] [other] *<select >*
AAMA 611	Class I - Clear anodize coating, Eco-friendly etch (0.7 mils thick min)	AA-M10C21A41	Clear
AAMA 611	Class II - Clear anodize coating Eco-friendly etch (0.4 mils thick min)	AA-M10C21A31	Clear

A. Combination anodic oxide and transparent organic coatings as defined in AAMA 612 are not equivalent substitutions for the AAMA 611 anodized finishes shown above due to surface hardness disparities.
B. Applicator Qualifications: Certified by AAMA and listed on AAMA Verified Components List.
C. Verify accuracy of components, quantities, and sizes prior to application of finishes.
D. Applicator – PVDF Based Finishes:
   a. Use regenerative thermal oxidizer to destroy VOC's.
   b. Utilize chrome-based five –stage pretreatment system applied in accordance with AAMA and ASTM standards. Use of a chrome-based five-stage system ensures long-term adhesion and an option for an extended warranty.
   c. Possess in-house blending capabilities, allow for only specific amount of paint needed for each project.

d. Utilize automated rotary atomization spray bell application providing uniform coverage with manual spray reinforcement for coverage in areas unreachable by automation.
e. Employ skilled professional field service division to repair warranty or application issues arising at Project site.
f. Utilize documented quality control protocol in accordance with AAMA procedures.

E. Applicator – Anodize Finishes
a. Offer both caustic (traditional) and eco-friendly (acid) etching technologies.
b. Utilize fully automated, computer-controlled process lines for consistency through Project.
c. Utilize documented quality control protocol in accordance with AAMA 611 procedures.
i. Online quality assurance inspection:
1. Random sample check for color uniformity, maximum difference of 5AE.
2. Random coating thickness testing:
a. Class I clear and color anodize – 0.7 mils (18 microns)
b. Class II clear anodize – 0.4 mils (10 microns)

2.04 MATERIALS

A. Aluminum extrusions: Alloy 6063-T6 or 6063-T5 in accordance with ASTM B221, and extruded within commercial tolerances and free from defects that impair strength and/or durability.
1. Optional recycled aluminum: *<specify as required>*
a. Provide EcoLuminum™ by Tubelite containing 70% recycled aluminum comprised of 55% pre-consumer and 15% post-consumer material.
B. Primary extruded framing members will be a minimum 0.075" thick.
C. Extruded or formed trim components will be a minimum 0.060" thick.
D. Exposed Flashings: [____"] thick aluminum sheet; finish matching framing members.
E. Concealed Flashings: [____"] thick [galvanized steel] [stainless steel] or [aluminum] sheet. *<select>*
F. Structural Steel Reinforcement and anchors necessary to meet the performance requirements of 1.04.
1. ASTM A36/A36M; [galvanized per ASTM A123/A123M] or [shop primed]. *<select>*
2. Where galvanizing is not compatible with alloy of component parts, apply heavy coating of epoxy paint where necessary to prevent galvanic action with dissimilar materials.
G. Galvanizing Repair Paint: High zinc content paint for over welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight and in compliance with SSPC Paint 20.
H. Bituminous Paint: Cold applied asphalt mastic, containing no asbestos fibers.
I. Thermal Break:
1. Pour and debridge thermal barrier shall be a two part chemically curing polyurethane casting resin poured in place. specified. Thermal barrier extrusion pour cavities shall be mechanically lanced or azo-braded to secure the thermal break material. *<required for T14000>*
2. Continuous extruded polyamide with 25% glass fiber reinforcing, mechanically crimped into cross-knurled cavities at vertical filler extrusion. *<required for T14000>*
J. Glazing and Sealant material:
1. Setting blocks and Edge Blocking: Provide in sizes and locations recommended by GANA Glazing Manual. Setting blocks used in conjunction with soft-coat low-e glass shall be silicone.
2. Glazing gaskets shall be EPDM [silicone], weather-resistant, and compatible with all materials in contact.
3. All sealants shall comply with applicable provisions of AAMA 800 and/or Federal Specifications FS-TT-001 and 002 Series.
4. Frame joinery sealants shall be suitable for application specified and as tested and approved by the window wall manufacturer.

2.05 FABRICATION

A. Ensure joints and corners are flush, hairline and weatherproof, accurately fitted and secured.
1. Prepare framework to receive anchors and hardware.
2. Conceal fasteners and attachments from view.
3. Reinforce framework as required for imposed loads.
B. Expansion and Contraction: Fabricate to allow for thermal movement of materials when subjected to project temperature differential requirements.
C. System Internal Drainage: Drain to exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
1. Fabricate drainage system so weeps and flashings are integral to system and others are not required.
D. Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
E. Provide for membrane interface as indicated on architectural drawings.

2.06 COMPONENTS

A. Glass
   1. Provide in accordance with Section 08 80 00.
B. Glazing
   1. Glazing method shall be in accordance with manufacturer installation instruction and the GANA Glazing Manual for specified glass type, or as approved by the glass fabricator.
   2. Refer to Section 08 80 00 for requirements.
C. Operable Windows: Provide operable windows at locations indicated on the architectural drawings.
   1. Basis of design: Tubelite 3700 Series Windows
      a. [3700 Awning] [3700 Casement] [3700 Concealed] *<select>*
      b. Refer to Section 08 51 13 for requirements.
D. Light Shelves: Provide interior light shelves at locations indicated on the architectural drawings.
   1. Basis of design: "aLuminate™ Light Shelves" by Tubelite, Inc.
   2. Refer to Section 12 26 00 for requirements.
E. Sun Shades: Provide sun shades to help reduce natural daylight and solar heat gain.
   1. Basis of design: "Maxblock™ Sun Shades" by Tubelite, Inc.
   2. Blade: [round] [airfoil] [z-blade] *<select>*
   3. Outrigger projection: [20"] [25"] [30"] [35"][other] *<select – contact a Tubelite representation for other options>*
   4. Refer to Section 10 71 13 for requirements.
F. Muntins:
   1. Provide muntin grids as shown on architectural drawings. Finish to match storefront frames.

PART 3 – EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of this Work.
B. Notify Contractor in writing, with a copy sent to Owner and Architect, of any conditions detrimental to proper and timely completion of this Work.
C. Proceed with installation only after unsatisfactory conditions have been corrected.
D. Start of this Work shall indicate acceptance of areas and conditions as satisfactory by the Installer.

3.02 INSTALLATION

A. Preparation: Coordinate and furnish anchors, concrete inserts, sleeves, anchor bolts, and other accessories to be embedded in concrete or masonry construction or welded to structural steel. Coordinate delivery of these items to project site.
B. Install aluminum storefront framing in accordance with manufacturer's installation instructions, reviewed product data, approved shop drawings, and as indicated on Drawings (per Professional Engineer review when applicable).
C. Do not install damaged components.
D. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
E. Provide alignment attachments and shims to permanently fasten system to building structure.
F. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, [aligning with adjacent work].
G. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
H. Coordinate attachment and seal of membrane materials per architectural drawings. Refer to section 07 25 00.
I. Install accessories with positive anchorage to building, weather tight mounting, provisions for thermal expansion, and coordinate installation with flashings and other components.
J. Install hardware using templates provided.
   1. Refer to Section 08 71 00 for hardware installation requirements.
K. Install glass in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
L. Install perimeter sealant in accordance with Section 07 92 00.
M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.
N. Adjust operating hardware for smooth operation.
O. Tolerances:
   1. Maximum variation from plumb: [1/16"] every 3' non-cumulative, or [1/16"] per 10', whichever is least.
   2. Maximum Misalignment of two adjoining members abutting in plane: [1/32"].

3.03 CLEANING

A. Comply with AAMA 609 and 610 for methods, equipment, and materials to clean finished aluminum after installation and for subsequent periodic maintenance.
B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths.
C. Take care to remove dirt from corners, and wipe surfaces clean.
D. Remove excess sealant from glass and aluminum by method acceptable to sealant and finish manufacturer.

3.04 PROTECTION

A. Protect installed products from damage during subsequent construction.
B. Protect anodized finishes from prolonged exposure to alkaline, such as lime in masonry mortar, or acidic and other corrosive materials.

DISCLAIMER STATEMENT

This guide specification is intended to be used by a qualified construction specifier. The guide specification is not intended to be verbatim as a project specification without appropriate modifications for the specific use intended. The guide specification must be used and coordinated with the procedures of each design firm, and the particular requirements of a specific construction project. Tubelite reserves the right to change configuration without prior notice when deemed necessary for product improvement. Tubelite takes no responsibility for product selection or application, including but limited to, compliance with laws, codes, merchantability or fitness for a particular purpose; and further disclaims all liability for the use in whole or in part, of these Guide Specifications in preparation of project specifications or other documents.

END OF SECTION 08 43 13

This document supersedes all previous versions.

SECTION 08 51 13 ALUMINUM WINDOWS

PART 1 GENERAL

1.01 Work Included

A. Furnish and install aluminum architectural windows complete with hardware and related components as shown on drawings and specified in this section.

B. All windows shall be EFCO® Series SX45 Thermal AW-PG45-HS Horizontal Sliding. Other manufacturers requesting approval to bid their product as an equal must submit the following information fifteen days prior to close of bidding.
   1. A sample window, 36" (914 mm) x 24" (610 mm) single unit, as per requirements of architect.
   2. Test reports documenting compliance with requirements of Section 1.05.
   3. An NFRC Bid Report must be provided to ensure compliance with the specified thermal performance..
   4. Approved equals for bidding purposes include:
      a. Wausau Window and Wall Systems
      b. Oldcastle Building Envelope

C. Glass and Glazing
   1. All units shall be factory glazed.

D. Single Source Requirement
   1. All products listed in Section 1.02 shall be by the same manufacturer.

1.02 Related Work

A. Section 08 32 13 – Sliding Aluminum – Framed Glass Doors
B. Section 08 41 13 – Aluminum – Framed Entrances and Storefronts
C. Section 08 44 13 – Glazed Aluminum Curtain Walls

1.03 Items Furnished but Not Installed

1.04 Items Installed but Not Furnished

1.05 Laboratory Testing and Performance Requirements

A. Test Units
   1. Air, water, and structural test unit shall conform to requirements set forth in AAMA/WDMA/CSA 101/I.S.2/A440 – 17 and manufacturer's standard locking/operating hardware and insulated glazing configuration.
   2. Thermal test unit sizes shall be 72" (1828 mm) x 48" (1219 mm). Unit shall consist of a single horizontal sliding window.

B. Test Procedures and Performances
   1. Windows shall conform to all AAMA/WDMA/CSA 101/I.S.2/A440–17 requirements for the window type referenced in 1.01.B. In addition, the following specific performance requirements shall be met.
   2. Life Cycle Testing
      a. Test in accordance with AAMA 910. There shall be no damage to fasteners, hardware parts, support arms, activating mechanisms, or any other damage that would cause the window to be inoperable. Air infiltration and water resistance tests shall not exceed specified requirements.
   3. Air Infiltration Test

a. With ventilators closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 6.27 psf (300 Pa).
b. Air infiltration shall not exceed .30 cfm/SF (1.5 l/s•m²) of unit.

4. Water Resistance Test
   a. With ventilators closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 15.0 psf (720 Pa).
   b. There shall be no uncontrolled water leakage.
5. Uniform Load Deflection Test
   a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 45.0 psf (2155 Pa), positive and negative pressure.
   b. No member shall deflect over L/175 of its span.
6. Uniform Load Structural Test
   a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 60.2 psf (2880 Pa), both positive and negative.
   b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.
7. Forced Entry Resistance
   a. Windows shall be tested in accordance to ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 40.
8. Condensation Resistance Test (CRF)
   a. Test unit in accordance with AAMA 1503.1.
   b. Frame Condensation Resistance Factor (CRF) shall not be less than 69.
9. Thermal Transmittance Test (Conductive U-Factor)
   a. With ventilators closed and locked, calculate U factor in accordance with NFRC 100-2014.
   b. Conductive thermal transmittance (U-Factor) shall not be more than .40 BTU/hr•ft²•°F (3.58 W/m²•K) when glazed with .24 center of glass U-Factor.

C. Project Wind Loads

1. The system shall be designed to withstand the following loads normal to the plane of the wall:
   a. Positive pressure of 25 psf at non-corner zones.
   b. Negative pressure of 32 psf at non-corner zones.
   c. Negative pressure of 32 psf at corner zones.

1.06 Field Testing and Performance Requirements (Not Required)

1.07 Quality Assurance

A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.05.

B. Test reports shall be accompanied by the window manufacturer's letter of certification, stating the tested window meets or exceeds the referenced criteria for the appropriate window type listed.

1.08 References

1.09 Submittals

A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
   1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.

B. Manufacturer must provide NFRC certified and labeled energy performance values for U-factor, Solar Heat Gain Coefficient (SHGC), and Visible Transmittance (VT) for the aluminum windows. The label certificate shall be project specific and will contain the energy performance values of the manufacturer's approved framing as used on the project, combined with the job specific glass and glass spacer to be used in the fabrication of the glass. Certified framing sizes and configurations are defined in NFRC 100-2014 table 4-3.

1.10 Warranties

A. Total Window Installation
   1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water, and structural adequacy as called for in the specifications and approved shop drawings.
   2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at their expense during the warranty period.

B. Window Material and Workmanship
   1. Provide written guarantee against defects in material and workmanship for 10 years from the date of final shipment.

C. Glass
   1. Provide written warranty for insulated glass units that they will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship.
   2. Warranty period shall be for 10 (ten) years.

D. Finish
   1. Warranty period shall be for 10 years from the date of final shipment.

PART 2 PRODUCTS

2.01 Materials

A. Aluminum
   1. Extruded aluminum shall be 6063-T6 alloy and tempered.

B. Hardware
   1. Concealed plunger lock in the meeting rail with a flush mounted actuating handle.
   2. Sash shall ride on steel ball bearing rollers and a raised track, so dirt will not interfere with normal operation.

C. Weather-Strip
   1. All primary weather-strip shall be E-Ion or equal.

D. Glass
   1. Insulated glass shall be 1" thick with a center of glass U-Factor of .24 constructed as follows:
      a. Exterior lite – ¼" thick, clear color, tempered glass, with a surface coating of SB60 on the number 2 surface.

b. Air space of ½" inch argon filled.
c. Interior lite – ¼" thick, clear color, tempered glass.

E. Thermal Barrier
1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
2. The thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions.
3. Poured and debridged urethane thermal barriers shall not be permitted.

2.02 Fabrication

A. General
1. All aluminum frame and sash extrusions shall have a minimum wall thickness of .062" (1.5 mm). Frame sill members shall have a minimum wall thickness of .094" (2.3 mm).
2. Depth of frame shall not be less than 4-1/2" (98 mm).
3. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.
4. All frame and vent members shall be able to accommodate separate interior and exterior finishes and colors.

B. Frame
1. Frame components shall be mechanically fastened.
2. Frame and sash shall have a continuous interlock at the meeting rail.

C. Sash
1. Sash vertical members shall telescope into the sash horizontals and be mechanically fastened.
2. The sash shall be single or double weather-stripped.

D. Screens
1. Half screens only shall be permitted. The screen shall not be surface mounted.
2. Screen frames shall be extruded aluminum.
3. Screen mesh shall be aluminum or fiberglass.

E. Glazing
1. All lites (both sash and fixed) of the horizontal sliding window shall be inside glazed and weeped.
2. All units shall be glazed with the manufacturer's standard sealant process provided the glass is held in place by a removable, extruded aluminum, glazing bead. The glazing bead must be isolated from the glazing material by a gasket.
3. All units shall be glazed with a minimum of 1/2" glass bite.
F. Receptors:
a. Provide extruded aluminum receptors to receive windows, as shown on architectural drawings.
b. Finish to match window frames.

2.03 Finishes

1. Anodic
a. Finish all exposed areas of aluminum windows and components with electrolytically-deposited color in accordance with Aluminum Association Designation.
2. Finish to be dark bronze anodized, Class I

PART 3 EXECUTION

3.01 Inspection

A. Job Conditions
   1. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface, and are in accordance with approved shop drawings.

3.02 Installation

A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.

B. Plumb and align window faces in a single plane for each wall plane, and erect windows and materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

C. Adjust windows for proper operation after installation.

D. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

3.03 Anchorage

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.04 Protection and Cleaning

A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the general contractor.
B. A bi-annual sweet water rinse is recommended to prohibit dirt, dust, and debris from accumulation on the surface of the coating and to help maintain the aesthetic of the coating.