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UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated October 2014

SECTION 08 52 00

WOOD WINDOWS 08/11

NOTE: This guide specification covers the requirements for wood windows of the following types: single-hung, double-hung, awning, casement, horizontal sliding, and non-operative (stationary window unit).

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically
be deleted from this section of the project
specification when you choose to reconcile
references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF45 (2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 2603 (2002) Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

AAMA 2604 (2010) Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels

AAMA/WDMA/CSA 101/I.S.2/A440 (2011) Standard/Specification for Windows, Doors, and Skylights

ASTM INTERNATIONAL (ASTM)

ASTM D1784 (2011) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

ASTM D1972 (1997; R 2005) Standard Practice for Generic Marking of Plastic Products

ASTM D3656/D3656M (2013) Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns

ASTM D6007 (2002; R 2008) Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber

ASTM D6330 (1998; R 2008) Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions

ASTM E1333 (2010) Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber

ASTM E2129 (2010) Standard Practice for Data Collection for Sustainability Assessment of Building Products

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001 (2000) Principles and Criteria for Forest Stewardship

GREEN SEAL (GS)

GS-36 (2011) Commercial Adhesives

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100 (2014) Procedure for Determining Fenestration Product U-Factors

NFRC 200 (2014) Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

SCREEN MANUFACTURERS ASSOCIATION (SMA)

SMA 1004 (1987; R 1998) Aluminum Tubular Frame Screens for Windows

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168 (1989; R 2005) Adhesive and Sealant Applications

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Energy Star (1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED NC (2009) Leadership in Energy and Environmental Design(tm) New Construction Rating System

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

WDMA I.S.4 (2013) Preservative Treatment for Millwork

1.2 SUBMITTALS

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government

approval, due to their complexity or criticality, with a "G". Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy projects.

An "S" following a submittal item indicates that the submittal is required for the Sustainability Notebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REQUIREMENTS. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wood windows[; G][; G, [____]]

Indicate elevations of units, full-size sections, fastenings, methods of installation and anchorage, method of glazing, locations of operating hardware, mullion details, method and material for weatherstripping, [bar and muntin layouts,] method of attaching [insect screens] [storm windows], details of installation, and connections with other work.

SD-03 Product Data

Wood windows[; G][; G, [____]]

Documentation for Energy Star Qualifications.

[Engineered Wood Products; (LEED NC)

Submit documentation verifying that no urea-formaldehyde resins were used.]

[Metal] [Plastic] [____]; (LEED NC)

Fasteners; (LEED NC)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

[Adhesives; (LEED NC)

Submit manufacturer's product data, indicating VOC content.]

[Environmental Data]

SD-07 Certificates

Forest Stewardship Council (FSC) Certification; (LEED NC)

SD-08 Manufacturer's Instructions

Wood windows

Submit manufacturer's written instructions for installation.

SD-10 Operation and Maintenance Data

Wood windows, Data Package 1[; G][; G, [____]]

Submit data package in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

Plastic Identification

When not labeled, identify types in Operation and Maintenance Manual.

SD-11 Closeout Submittals

[Local/Regional Materials; (LEED NC)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.]

1.3 DELIVERY AND STORAGE

Deliver windows to site in sealed undamaged cartons or in palletized multiple units. Protect from damage, dampness and extreme temperature or humidity changes. Store under cover in well-ventilated enclosed space. Do not store in a building under construction until concrete, masonry, and plaster are dry. Replace defective or damaged windows.

1.4 SUSTAINABLE DESIGN REQUIREMENTS

1.4.1 Local/Regional Materials

 NOTE: Using local materials can help minimize transportation impacts, including fossil fuel consumption, air pollution, and labor. Using materials harvested and manufactured within a 500 mile radius from the project site contributes to the following LEED credit: MR5. Coordinate with Section 01 33 29 LEED(tm) DOCUMENTATION. Use second option if Contractor is choosing local materials in accordance with Section 01 33 29 LEED(tm) DOCUMENTATION. First option shall not be used for USACE projects. Army projects shall include second option only if pursuing this LEED credit.

[Use materials or products extracted, harvested, or recovered, as well as manufactured, within a [800] [_____] kilometer [500] [_____] mile radius from the project site, if available from a minimum of three sources.] [See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Window materials may be locally available.]

1.4.2 Environmental Data

 NOTE: ASTM E2129 provides for detailed documentation of the sustainability aspects of products used in the project. This level of detail may be useful to the Contractor, Government, building occupants, or the public in assessing the sustainability of these products.

[Submit Table 1 of ASTM E2129 for the following products: [____].]

1.4.3 Forest Stewardship Council (FSC) Certification

 NOTE: Use of FSC-certified wood contributes to the following LEED credit: MR7. Coordinate with Section 01 33 29 LEED(tm) DOCUMENTATION.

Use FSC-certified wood where specified. Provide letter of certification signed by lumber supplier. Indicate compliance with FSC STD 01 001 and identify certifying organization. Submit FSC certification numbers; identify each certified product on a line-item basis. Submit copies of invoices bearing the FSC certification numbers.

1.4.4 Plastic Identification

 NOTE: The marking system indicated below is intended to provide assistance in identification of products for making subsequent decisions as to

handling, recycling, or disposal.

Verify that plastic products to be incorporated into the project are labeled in accordance with ASTM D1972. Where products are not labeled, provide product data indicating polymeric information in Operation and Maintenance Manual.

Type 1: Polyethylene Terephthalate (PET, PETE).

Type 2: High Density Polyethylene (HDPE).

Type 3: Vinyl (Polyvinyl Chloride or PVC).

Type 4: Low Density Polyethylene (LDPE).

Type 5: Polypropylene (PP).

Type 6: Polystyrene (PS).

Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

PART 2 PRODUCTS

2.1 MATERIALS

NOTE: Wood is a renewable resource.

Non-sustainable harvesting of wood can produce soil erosion, pollutant runoff, increased levels of atmospheric carbon dioxide, global warming, and habitat loss. Supplies of clear grades and large-dimension timbers are limited. Specify lower grades and engineered wood products for large-dimension timbers when appropriate.

2.1.1 Virgin Lumber

NOTE: Old growth timber comes from trees over 200 years old. In industry, it is high quality lumber in "upper" or "architectural" grades. Lumber suppliers should know which timber is old growth and which is not, but sources are not always tracked.

Lumber fabricated from old growth timber is not permitted. Avoid companies who buy, sell, or use old growth timber in their operations, when possible. [Lumber shall be FSC-certified.]

2.1.2 Engineered Wood Products

NOTE: Engineered wood products include plywood, OSB, composite wood panels, fiberboard, particleboard, glue-laminated beams, structural composite lumber, including laminated veneer lumber and parallel strand lumber, as well as I-joists and metal plate connected wood trusses. The use of engineered wood products can result in higher resource efficiencies than conventional lumber/timber construction. Waste is minimized due to uniformity of product. Spans and/or spacing may

be increased for engineered joists over spans for same depth dimensional lumber. However, adhesive binders used in engineered wood products are any of several synthetic resins that pose varying degrees of human health risks. Engineered wood products might be more difficult to recycle than standard, solid sawn lumber due to the binders used in manufacturing. FSC-certified engineered wood products are available by special order. Army projects shall specify certified wood products only if pursuing this LEED (tm) credit. Designer must verify availability and adequate competition before specifying product certified wood requirements. Use second option if Contractor is choosing wood products in accordance with Section 01 33 29 LEED (tm) DOCUMENTATION.

NOTE: Choose one of the formaldehyde options. If products are known to contain no added formaldehyde, testing for formaldehyde concentration is not required. Formaldehyde can be harmful (as an allergen or carcinogen) at any level of concentration above zero. At concentrations of about 40 ppb (cumulative for the indoor air space), formaldehyde can cause eye, nose, and lung irritations.

NOTE: Using formaldehyde-free interior wood window products contributes to the following LEED credit: EQ4. Exterior windows that are part of the building weatherproofing system are not included in this LEED (tm) credit. Army projects shall specify formaldehyde free requirements only for wood windows that are not part of the building weatherproofing system and only if pursuing this LEED credit.

[Products shall contain no added urea-formaldehyde. [Determine formaldehyde concentrations in air from engineered wood products under test conditions of temperature and relative humidity in accordance with ASTM D6007 or ASTM E1333. Products shall not be used if formaldehyde concentration is found to be greater than [0] [____].]Determine Volatile Organic Compounds (VOCs), excluding formaldehyde, emitted from manufactured wood-based panels in accordance with ASTM D6330. Products shall not be used if VOC emissions exceed [____].][Products shall be FSC-certified.][See section 01 33 29 LEED (TM) DOCUMENTATION for cumulative total certified wood requirements. This item may be available made form certified wood.]

2.1.3 [Metal] [Plastic] [____]

NOTE: Use of materials with recycled content, calculated on the basis of post-industrial and post-consumer percentage content, contributes to the

following LEED credit: MR4. Coordinate with Section 01 33 29 SUSTAINABILITY REQUIREMENTS. Designer must verify suitability, availability and adequate competition (including verification of bracketed percentages included in this guide specification) before specifying product recycled content requirements. Use second option if Contractor is choosing recycled content products in accordance with Section 01 33 29 LEED (TM) DOCUMENTATION. Army projects shall specify recycled content only if pursuing this LEED credit.

[Minimum [5][10][_____] percent post-consumer recycled content, or minimum [20][40][_____] percent post-industrial recycled content.][See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Metal and plastic materials may contain post-consumer or post-industrial recycled content.]

2.2 WOOD WINDOWS

NOTE: If window cleaning anchors are required, add:

"Window cleaning anchors to be stainless-steel double-head base with stainless steel installation hardware. Reinforce windows and frames for reception of anchors, and securely anchor window frames to wall construction for window cleaning anchors."

NOTE: Where operating hardware is located 1980 mm 6 feet 6 inches or more above floor, specify poles and pole-operated handles to operate windows.

NOTE: Show locations where storm units are to be installed. Windows for equipment rooms, laundry rooms, and similar spaces should not be provided with storm units. Storm windows are not required over double-glazed insulating type windows.

Specify window screens in medical facilities, food preparation areas, dining areas, sleeping areas, and similar locations. Locations should be shown.

NOTE: Window properties are critical to energy performance and visual satisfaction. Specify low U value (rate of heat transfer) to reduce winter heat loss and summer heat gain.

Energy Star labeling is applicable to residential units only. For non-residential applications, designer shall input SHGC and U values based on

ASHRAE 90.1 - SI ASHRAE 90.1 - IP, using either prescriptive envelope option or energy performance modeling as applicable to project design. Coordinate with Section **08 81 00 GLAZING**. Designer must verify availability and adequate competition for products meeting bracketed energy performance requirements before specifying and edit as needed.

Wooden sashes have relatively high R-values, but require relatively high maintenance. Energy-efficient windows contribute to the following LEED credits: EA Prerequisite 2; EA1.

Wood windows shall consist of complete units including sash, glass, frame, weatherstripping, [insect screen,] and hardware. Window units shall meet the Grade 40 requirements of **AAMA/WDMA/CSA 101/I.S.2/A440**, except maximum air infiltration shall not exceed **0.00016 cu m per second 0.34 CFM per linear foot** of sash crack when tested under uniform static air pressure difference of **75 pascals 1.57 psf**. [Residential glazed systems (including frames and glass) shall be **Energy Star** qualified products as appropriate to [Northern] [North/Central] [Southern] climate zone.] [Non-residential glazed systems (including frames and glass) shall be certified by the National Fenestration Rating Council with a whole-window Solar Heat Gain Coefficient (SHGC) maximum of [_____] determined according to **NFRC 200** procedures and a U-factor maximum of [_____] **W per square m by K Btu per square foot by ht by degree F** in accordance with **NFRC 100**.] In addition to general hardware requirements of **AAMA/WDMA/CSA 101/I.S.2/A440**, provide hardware for various window types as indicated below. Glass and glazing materials shall conform to Section **08 81 00 GLAZING**. For good sash insulation performance, preference shall be given to engineered wood core clad in wood veneer or PVC-wood composite (uninsulated), using post-industrial wood fiber and 100 percent post-consumer HDPE plastic. [Storm windows shall conform to Section **08 51 69.10 ALUMINUM STORM WINDOWS**]. [Wood members which will receive transparent finish shall be in one piece, not finger-jointed.]

2.2.1 Single-Hung and Double-Hung Windows

NOTE: Double-hung or single-hung windows should be used for living quarters, where storm sash are to be provided or window air-conditioners used. Single-hung have less air leakage and should be considered over double-hung where feasible.

Provide with one sash fastener and two sash lifts, except provide one sash lift when window is fitted with a balance that counterbalances weight of sash.

2.2.2 Awning Windows (Top Hinged)

Awning window ventilators in same bay shall operate [separately] [in unison]. Provide two or more hinges, pivots, or sash-supporting arms for each operative sash to allow easy operation, substantial support and cleaning of both sides of sash from inside. Provide latches for securing each sash if operating devices do not include locking features. Provide operating devices for controlling position of sash, including full open, tight close, and intermediate firm hold. Operating devices shall include

rotary operators of worm-gear type with wear-resistant and impact-resistant gears or lever operators of lever handle, off-set arm type. Venting sash shall have corrosion resistant steel hinges connected to top and bottom rails of sash. When lever operators are used, operating arms shall be adjustable so that even sash edge contact can be maintained. Provide compression-type weatherstripping.

2.2.3 Casement Windows

Provide two or more hinges, pivots, or sash-supporting arms for each operative sash to allow easy operation, substantial support and cleaning of both sides of sash from inside. Provide latches for securing each sash if operating devices do not include locking features. Provide operating devices for controlling the position of the operative sash, including full open, tight close, and intermediate firm hold. Operating devices shall include rotary gears and adjustable operating arms so that even sash contact can be maintained. Provide compression-type weatherstripping.

2.2.4 Horizontal-Sliding Windows

Provide latches, pulls, and corrosion resistant steel slides necessary to control and secure window. Provide for cleaning of both sides of sash from inside.

2.2.5 Stationary Windows

Provide fixed sash and basic frame in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

2.3 ACCESSORIES

2.3.1 Adhesives

NOTE: Adhesives are potential sources of VOCs in indoor air. Using interior low-VOC products contributes to the following LEED credit: EQ4. Designer must verify suitability, availability and adequate competition (including verification of bracketed requirements) before specifying product VOC requirements. Coordinate with Section 01 33 29 LEED (TM) DOCUMENTATION. Army projects shall specify bracketed LEED VOC option only if pursuing this LEED credit.

[Comply with applicable regulations regarding toxic and hazardous materials, GS-36, [SCAQMD Rule 1168,] and as specified in Section 07 92 00 JOINT SEALANTS.] [Adhesives must meet the requirements of LEED low emitting materials credit.]

2.3.2 Fasteners

NOTE: Designer must verify that products meeting the indicated minimum recycled content are available, preferably from at least three sources, to ensure adequate competition. If not, write in suitable recycled content values that reflect

availability and competition.

Fabricated from 100 percent re-melted steel.

2.4 FINISHES

NOTE: Factory-applied finishes are typically more durable and release fewer solvents to the environment than field-applied finishes.

2.4.1 [Paint

Furnish windows with factory-primed surfaces which will be exempt from first paint coat application required in Section 09 90 00 PAINTS AND COATINGS.

]2.4.2 [Vinyl (PVC) Cladding

NOTE: Select the applicable paragraphs(s) from the following:

Preservative treat all basic wood frame and sash members in accordance with WDMA I.S.4 and Section 06 10 00 ROUGH CARPENTRY, except do not use pentachlorophenol. Clad all exterior surfaces with rigid polyvinyl sheathing, complying with ASTM D1784, class 14344-C, not less than 0.9 mm 35 mil average thickness.

]2.4.3 [Aluminum Cladding

Preservative treat all basic wood frame and sash members in accordance with WDMA I.S.4, except do not use pentachlorophenol. Clad all exterior surfaces with roll formed aluminum with joints sealed during assembly. Aluminum clad frames and sash shall meet performance requirements of AAMA/WDMA/CSA 101/I.S.2/A440.

2.4.3.1 Aluminum Finish

Factory finish with [anodic coating] [or] [organic coating].

2.4.3.2 Anodic Coating

NOTE: Select the applicable paragraphs(s) from the following:

Conform to AA DAF45. Finish shall be [clear (natural), designation AA-M10-C22-A31, Architectural Class II 0.010 to 0.0175 mm 0.4 mil to 0.7 mil] [clear (natural), designation AA-M10-C22-A41, Architectural Class I 0.0175 mm 0.7 mil or thicker] [integral color-anodized, designation AA-M10-C22-A32, Architectural Class II 0.010 to 0.0175 mm 0.4 mil to 0.7 mil] [integral color-anodized, designation AA-M10-C22-A42, Architectural Class I 0.0175 mm 0.7 mil or thicker] [electrolytically deposited color-anodized designation AA-M10-C22-A34, Architectural Class II 0.010 to 0.0175 mm 0.4

mil to 0.7 mil] [electrolytically deposited color-anodized, designation AA-M10-C22-A44, Architectural Class I 0.0175 mm 0.7 mil or thicker]. [Color shall be [_____] [as indicated].]

2.4.3.3 Organic Coating

Clean and prime exposed aluminum surfaces. Provide [baked enamel finish in accordance with AAMA 2603 with total dry film thickness not less than 0.020 mm 0.8 mil] [high performance finish in accordance with AAMA 2604 with total dry film thickness of not less than 0.030 mm 1.2 mils]. Finish color [_____] [as indicated].

]2.5 [INSECT SCREENS

ASTM D3656/D3656M, Class 2, 18 by 14 mesh, color [charcoal] [grey] [_____] . Aluminum frames to meet SMA 1004.

]2.6 [STORM SASH

As specified in Section 08 51 69.10 ALUMINUM STORM WINDOWS.

]2.6.1 [Finishes

Factory finish exposed aluminum surfaces with anodic coating or organic coating.

]PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Wood and Wood Clad Windows

Install in accordance with the approved installation instructions. Securely anchor windows in place. Install and seal windows in a manner that will prevent entrance of water and wind.

3.1.2 [Insect Screen

Install screen panels in accord with manufacturer's instructions. Install aluminum framed screens in accord with SMA 1004.

]3.1.3 [Storm Windows

Install storm windows in accordance with manufacturer's standards and instructions.

]3.2 ADJUSTMENTS

Make final adjustment for proper operation of ventilating unit after glazing. Make adjustments to operating sash or ventilators to assure smooth operation. Units shall be weathertight when locked closed. Verify products are properly installed, connected, and adjusted.

3.3 CLEANING

Clean windows on both exterior and interior in accordance with manufacturer's recommendations.

3.4 WASTE MANAGEMENT

NOTE: Diverting waste from the landfill contributes
to the following LEED credit: MR2. Coordinate with
Section 01 74 19 CONSTRUCTION AND DEMOLITION WASTE
MANAGEMENT. Designer shall verify that items are
able to be disposed of as specified. Army projects
include bracketed text only if pursuing this credit.

Separate corrugated cardboard and protective materials in accordance with
the Waste Management Plan and reuse or recycle. Place materials defined as
hazardous or toxic waste in designated containers and dispose of properly.
Close and seal tightly all partly used sealant containers and store
protected in well ventilated fire-safe area at moderate temperature. Place
used sealant tubes and containers in areas designated for hazardous
materials and dispose of properly.

-- End of Section --