
USACE / NAVFAC / AFCEA / NASA

UFGS-08 52 00 (July 2006)

Preparing Activity: NAVFAC

Superseding

UFGS-08550 (August 2001)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2011

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SECTION 08 52 00

WOOD WINDOWS 07/06

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 DAF-45 (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 (2005) 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 (2008; Update 1 2008; Update 2 2008; Update 3 2009) North American Fenestration Standard/Specification for Windows, Doors, and Skylights

ASTM INTERNATIONAL (ASTM)

ASTM D 1784 (2008) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

ASTM D 1972 (1997; R 2005) Standard Practice for Generic Marking of Plastic Products

ASTM D 3656 (2007) Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns

ASTM D 6007 (2002; R 2008) Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber

ASTM D 6330 (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 E 1333	(2010) Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber
ASTM E 2129	(2005) 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	(2000) Commercial Adhesives
NATIONAL FENESTRATION RATING COUNCIL (NFRC)	
NFRC 100	(2010) Procedure for Determining Fenestration Product U-Factors
NFRC 200	(2010) 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
U.S. GREEN BUILDING COUNCIL (USGBC)	
LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)
WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)	
WDMA I.S. 4	(2009) Water-Repellent Preservative Non-Pressure Treatment for Millwork

1.2 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an

item in the project should be one of the primary factors in determining if a submittal for the item should be required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" 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.

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.] The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wood windows; 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, [_____]

Documentation for Energy Star Qualifications.

[Engineered Wood Products; (LEED)

Submit documentation verifying that no urea-formaldehyde resins

were used.]

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

Fasteners; (LEED)

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)

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

[Environmental Data]

SD-07 Certificates

Forest Stewardship Council (FSC) Certification; (LEED)

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, [____]

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)

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 E 2129 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 E 2129 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 D 1972. 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 D 6007 or ASTM E 1333. 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 D 6330. 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 LEED(TM) DOCUMENTATION. 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, conforming to ASME A39.1. 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 D 1784, 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 DAF-45. 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 D 3656, 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 --