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USACE / NAVFAC / AFCEA UFGS-08590 (November 2003)  
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Preparing Activity: USACE Superseding  
UFGS-08590 (August 1997)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 22 December 2004

Latest change indicated by CHG tags

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### SECTION 08590

#### WOOD WINDOWS - REPAIR AND REHABILITATION 11/03

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NOTE: This guide specification covers the requirements for repair and rehabilitation of wood windows in historic buildings.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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## PART 1 GENERAL

### 1.1 REFERENCES

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NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

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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.

ASTM INTERNATIONAL (ASTM)

ASTM C 1184	(2000ae1) Structural Silicone Sealants
ASTM C 742	(1999) Degree of Set for Wood Sash Glazing Compound

1.2 SUBMITTALS

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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.

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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 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings[; G][; G, [\_\_\_\_\_]]

Shop drawings as specified.

SD-03 Product Data

Hardware  
Weatherstripping

Manufacturer's installation instructions for each type of hardware and weatherstripping.

Qualifications

Documentation showing qualifications of personnel proposed to perform the window repair and rehabilitation work, and a listing identifying prior installations completed by the Contractor.

#### SD-04 Samples

Hardware

Representative sample of each type of hardware with identifying tags.

Moldings

A 300 mm 12 inch long piece of each molding type required for each window and casing with specified finish.

Weatherstripping

A 300 mm 12 inch long sample of each type of weatherstripping required with fasteners.

### 1.3 QUALIFICATIONS

The Contractor shall provide qualified workers trained and experienced in repairing, restoring, replicating, and replacing windows in historic buildings and shall submit documentation of 5 consecutive years of work of this type. A list of installations made shall also be provided identifying when, where and for whom the installations were made.

### 1.4 STORAGE

Materials shall be stored out of contact with the ground and under weathertight covering.

### 1.5 SHOP DRAWINGS

The Contractor shall submit shop drawings indicating 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, insect screen, details, connections with other work and window schedules showing location of each window unit.

## PART 2 PRODUCTS

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**NOTE:** Deteriorated historic windows should be repaired rather than replaced wherever possible. In the event replacement is necessary, the new windows should match the historic ones in design, color, size, configuration, reflective qualities, shadow lines, detail, and material. Only when it is not

feasible to match the historic fabric should  
substitute window material be considered.

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## 2.1 MATERIALS

Existing materials shall be reused whenever possible in the repair and rehabilitation of historic wood windows. This includes all wood elements, hardware and glazing that are determined to be of historic significance. Replacement of window elements with new material shall be done only when originals are so deteriorated as to prohibit their useful function.

## 2.2 WOOD

Wood used to replace deteriorated window members shall be of the same species and grade as the original, unless otherwise noted. Finger-jointed stock may be used for interior casing and trim only where scheduled to be painted.

## 2.3 GLASS AND GLAZING

Existing intact original glass shall be reused. Any removed lights shall be reused in their original frames and positions. New glass and glazing materials shall conform to Section 08800 GLAZING.

## 2.4 HARDWARE

Existing original hardware shall be reused, when it is salvageable. Replacement hardware shall match original in design, material, and finish.

## 2.5 FASTENERS

Fasteners shall be stainless steel, galvanized, or non-ferrous metal.

## 2.6 GLAZING COMPOUND

Glazing compound for single pane glass shall be oil-based, non-staining and non-bleeding, and shall pass the test requirements of ASTM C 742. Existing insulated glass units shall be reglazed with silicone sealant complying with ASTM C 1184 and shall be compatible with the unit seal on the glass unit.

## 2.7 GLAZING POINTS

Glazing points shall be stainless steel or galvanized steel.

## 2.8 EPOXY CONSOLIDANTS

### 2.8.1 Liquid Consolidant

Liquid wood consolidant shall consist of a two-part, low-viscosity liquid epoxy that meets the criteria of Table A.

### 2.8.2 Epoxy Paste

Epoxy paste shall consist of a two-part, thixotropic paste that meets the criteria of Table A.

TABLE A  
LIQUID CONSOLIDANT

	LIQUID CONSOLIDANT	EPOXY PASTE
Properties	Low-Viscosity Liquid	No-Slump, Thixotropic Paste
Toxicity	Low	Very Low
Toxicity Cured	Non-Toxic	Non-Toxic
Ratios	1:1 by Volume	1:1 by Volume
Pot Life @ Room Temp.	30 min. minimum	50 min. minimum
Hardening @ Room Temp.	1 hr. or longer	1 hr. or longer
Hardening @ 60 deg. C	16 min. or less	18 min. or less
Viscosity Poises @ 22 deg. C	4.7 max.	Thixotropic paste
Solids	95% min.	98% min.
Tensile Strength	26 MPa 4000 psi	16.2 MPa 2500 psi
Elongation (%)	50	4

### PART 3 EXECUTION

#### 3.1 GENERAL

The Contractor shall repair wood windows as indicated, and shall return them to proper operation and sound condition.

#### 3.2 EVALUATION

A complete evaluation survey of the existing conditions of each wood window shall be made to determine the extent of repairs necessary. The evaluation survey may be in the form of a schedule and shall note at a minimum:

- a. window location
- b. condition of the paint
- c. condition of the frame and sill
- d. condition of the interior and exterior trim
- e. condition of the sash (including rails, stiles, and muntins)
- f. glazing problems
- g. window hardware and operating system
- h. the overall condition of the window

### 3.3 REPAIRS

#### 3.3.1 Example Window

An existing window of each type to serve as an example of the quality of repairs to be provided shall be prepared for inspection and approval by the Contracting Officer.

#### 3.3.2 Sash Removal

The interior stops shall be removed first in a method so as to not scar the wood. Connecting hardware and operating mechanisms shall then be detached and the sash shall be removed from the frame. Removed sashes and frames shall be identified as to location to assure reinstallation in their original positions. Windows with counter-weight systems shall have the sash cords detached from the sides of the sash and their ends pinned with a nail or tied in a knot to prevent them from falling into the weight pocket; the lower sash can then be removed. The parting bead shall be removed so as to not scar the wood. Plastic covering or plywood shall be installed to cover the window opening during repairs.

#### 3.3.3 Paint Removal

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**NOTE: When testing determines that paint on windows contains lead, the following sentence will be added to the beginning of the paragraph: "Paint removal shall comply with the procedures described in Section 13283N REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD."**  
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Areas on frame, sill, sash and muntins where paint or varnish has peeled, alligatored, blistered or crazed shall have paint removed to bare wood or first sound paint layer, using non-destructive means such as a chemical stripper or heat gun. If chemical strippers are used, wood shall be neutralized after stripping to a litmus pH of 5 to 8.5. Wood shall be allowed to dry to a moisture content of 8 to 12 percent before repainting. If heat methods are used for paint removal, glass shall be protected from sudden temperature change to avoid breakage.

#### 3.3.4 Wood Repair

Badly decayed areas (with more than 30 percent wood decayed) shall be removed from wood sash, sill, frame, and trim assemblies. Moderately decayed areas (less than 30 percent decayed), weathered, or gouged wood shall be patched with approved patching compounds, and shall be sanded smooth. Intact sash rails and stiles that are loose shall be repaired with new dowels to make joints tight.

#### 3.3.5 Epoxy Wood Repair

Epoxy wood repair materials shall be applied in accordance with manufacturer's written instructions. Health and safety instructions shall be followed in accordance with the manufacturer's instructions. The source or cause of wood decay shall be identified and corrected prior to application of patching materials. Wet wood shall be completely dried to a moisture content of 8 to 12 percent to its full depth before patching.



Wood that is to be patched shall be clean of dust, grease, and loose paint.

Clean mixing equipment shall be used to avoid contamination. Mix and proportions shall be as directed by the manufacturer. Batches shall be only large enough to complete the specific job intended. Patching materials shall be completely cured before painting or reinstallation of patched pieces.

#### 3.3.5.1 Epoxy Liquid Wood Consolidant

Epoxy liquid wood consolidant shall be used to penetrate and impregnate deteriorated wood sections to reinforce wood fibers that have become softened or absorbent.

#### 3.3.5.2 Epoxy Paste

Epoxy paste shall be used to fill areas where portions of wood are missing such as holes, cracks, gaps, gouges, and other voids. Areas to receive epoxy paste patching material shall be primed with compatible epoxy liquid wood consolidant or a primer recommended by the manufacturer.

#### 3.3.6 Wood Replacement

Pieces decayed beyond repair shall be replaced with new pieces that match originals in all respects. Joinery shall match that of existing. Muntins shall have coped mortise and tenon joints. Molded members shall have mitered or coped joints.

#### 3.3.7 Hardware

Existing hardware which is in good condition shall be reused unless otherwise noted. Reused existing hardware shall be stripped of paint down to bare metal. New hardware shall be installed where original is missing, damaged, or unsuitable for new operation, per manufacturer's directions to provide a secure and smoothly operating window assembly.

#### 3.3.8 Glazing

Lights to be reused shall be reinstalled in their original frames and positions. Rabbeted integral glazing recesses shall be brushed with boiled linseed oil prior to the application of bed glazing compound. Broken glass shall be replaced as specified in Section 08800 GLAZING.

#### 3.3.9 Operating System

Windows with counter-weight systems shall be repaired to original operating function. Original sash weights (and sash chains, if applicable) shall be reused wherever possible. Missing weights and sash cords or chains shall be replaced. Missing or deteriorated sash cords shall be replaced with new cotton-polypropylene cord rated for sash weight. When new weights are required, they shall match the originals in weight. Replacement weights shall be cast iron or square milled steel bar stock.

#### 3.3.10 Weatherstripping and Moldings

Weatherstripping shall be installed on all operable windows.

Weatherstripping shall consist of brass, compression or interlocking weather strips designed for permanent sealing under bumper or wiper action.

Weatherstripping shall be provided at the perimeter of each sash including meeting rails and shall be installed per manufacturer's instructions.

Weatherstripping shall be completely concealed when sash is closed.  
Moldings shall be installed per manufacturer's instructions.

#### 3.4 PAINTING PREPARATION

Areas where paint was removed or where existing paint shows crazing, wrinkling, and intercoat peeling shall be scraped, sanded, and shall have edges feathered. Paint shall be removed to bare wood or first sound paint layer. All parts shall be cleaned by brush using bleach and/or trisodium phosphate (TSP) solution, and let dry. Existing finish shall be deglossed. Open joints and cracks shall be filled with epoxy repair materials. Perimeter of fixed sash shall be caulked.

#### 3.5 PAINTING

Wood elements shall be primed and painted in accordance with Section 09900 PAINTS AND COATINGS.

#### 3.6 REASSEMBLY

After repairs are completed, the window shall be reassembled with all parts tight, true and functioning properly. Wood surfaces shall be free of blemishes.

#### 3.7 ADJUSTMENTS

Final adjustment for proper operation of ventilating unit shall be made after reassembly. Adjustments shall be made to operating sash or ventilators to assure smooth operation and weathertight performance when locked closed.

#### 3.8 CLEANING

Windows shall be cleaned on both exterior and interior.

-- End of Section --