

SECTION 08114

CUSTOM STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes custom-fabricated, commercial-quality steel doors and frames for doors and related openings, hollow metal panels, and louvers in these doors and frames.
- B. Standard steel doors and frames are specified in Division 8 Section "Steel Doors and Frames."
- C. Customized hollow metal work for other than doors, panels, and frames are specified in Division 5 Section.
- D. Building in of anchors and grouting of frames in masonry construction are specified in a Division 4 Section.
- E. Door hardware installation is specified in Division 8 Section "Door Hardware".
- F. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 8 Section "Door Hardware" for door hardware installed in doors and frames.
 - 2. Division 8 Section "Flush Wood Door" for solid-core wood doors installed in steel frames.
 - 3. Division 9 Section "Painting" for field painting of doors and frames.
- G. Products furnished but not installed under this Section include steel doors and frames.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data: Manufacturer's specifications for fabrication and installation, including data substantiating that products comply with requirements. Manufacturer's certificate stating that each assembly required to be fire rated but exceeding sizes of tested assemblies has been constructed to conform to design, materials, and details of construction equivalent to requirements for labeled units.
- C. Shop Drawings: For fabrication and installation of custom steel doors and frames work. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Provide a schedule of doors and frames using same reference numbers for details and openings as those on the Contract Drawings.
- D. Samples representing at least the minimum construction of doors and frames required for Project.
 - 1. Doors showing vertical edge construction, top, and bottom construction; insulation, face stiffeners, hinge and other applied hardware reinforcement. Include louver section and glazing stops where applicable.
 - 2. Frames showing profile, welded corner joint, welded hinge reinforcement, dust cover boxes, floor and wall anchors, and silencers. Include panel and louver sections and glazing stops where applicable.

1.4 QUALITY ASSURANCE

- A. Provide custom steel doors and frames manufactured by a single firm specializing in the production of this type of work, unless otherwise acceptable to the Contracting Officer.
- B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies whose fire resistance characteristics have been determined per ASTM E 152, and that are labeled and listed by UL, Warnock Hersey, or other testing and inspecting organization acceptable to authorities having jurisdiction.
- C. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide manufacturer's certification that doors conform to all standard construction requirements of tested and labeled fire-rated door assemblies except for size.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palleted, wrapped, or crated to provide protection during transit and job storage.
- B. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the Architect; otherwise remove and replace damaged items as directed.
- C. Store doors and frames at the building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid the use of nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide 1/4-inch spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Custom Steel Doors and Frames:
 - a. Allied Steel Products, Inc.
 - b. American Steel Products Corp.
 - c. Curries Mfg., Inc.
 - d. Deronde Products.
 - e. Impco Door Corporation.
 - f. Karpen Steel Products, Inc.
 - g. Overly Manufacturing Co.
 - h. Pioneer Industries/Div. CORE Industries, Inc.
 - i. Precision Metals, Inc.
 - j. Security Metal Products, Inc.
 - k. Superior Fireproof Door, Inc.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheets: Commercial-quality, level, carbon steel, complying with ASTM A 366.
- B. Hot-Rolled Steel Sheets and Strips: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569, free of scale, pitting, or surface defects.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526 and ASTM A 525 with A60 or G60 coating designation, mill phosphatized.
- D. Stainless Steel Sheets: Commercial-quality stainless steel, AISI Type 302/304, complying with ASTM A 167, exposed finish No. 4 polish.
- E. Supports and Anchors: Fabricate of not less than 16-gage sheet metal. Galvanize after fabrication units to be built into exterior walls, complying with ASTM A 153, Class B.
- F. Inserts, Bolts, and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.
- G. Shop-Applied Paint: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as base for specified finish paints on steel surfaces.

2.3 DOORS

- A. General: Provide flush design doors, 1-3/4 inches thick, seamless hollow construction, unless otherwise indicated.
 - 1. For single-acting swing doors, bevel both vertical edges 1/8 inch in 2 inches. For double-acting swing doors, round vertical edges with 2-1/8-inch radius.
 - 2. Unless otherwise required for acoustical or thermal doors, provide filler of fiberboard, mineral-wool board, or other insulating material solidly packed full door height to fill voids between inner core reinforcing members.
 - 3. Reinforce doors with rigid tubular frame where stiles and rails are less than 8 inches wide. Form tubular frame with 16-gage steel, welded to outer sheets.
- B. Painted Exterior Doors: Fabricate exterior doors of 2 outer, galvanized, stretcher-leveled steel sheets not less than 16 gage. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges, except

around glazed or louvered panel inserts. Provide weep-hole openings in the bottom of doors to permit escape of entrapped moisture.

1. Reinforce inside of doors with vertical galvanized sheet steel sections not less than 22 gage. Space vertical reinforcing 6 inches o.c. and extend full door height. Spot weld at not more than 5 inches o.c. to both face sheets. Continuous truss-form inner core of 28-gage galvanized sheet steel reinforcing may be provided as inner reinforcement, in lieu of above. Spot weld truss-form reinforcement 3 inches o.c. vertically and horizontally over entire surface of both sides.
 2. Reinforce tops and bottoms of doors with 16-gage horizontal steel channels welded continuously to outer sheets. Close top and bottom edges to provide flush, waterproof weather seal, as integral part of door construction or by addition of inverted steel channels.
- C. Painted Interior Doors: Fabricate interior doors of 2 outer, cold-rolled, stretcher-leveled steel sheets not less than 18 gage. Construct doors with smooth, flush surfaces, without visible joints or seams on exposed faces or stile edges, except around glazed or louvered panel inserts.
1. Reinforce inside of doors with vertical, hot-rolled, not less than 22-gage steel sections. Space vertical reinforcing 6 inches o.c. and extend full door height. Spot weld at not more than 5 inches o.c. to both face sheets. Continuous truss-form inner core of 28-gage sheet metal reinforcing may be provided as inner reinforcement in lieu of above. Spot weld truss-form reinforcement 3 inches o.c. vertically and horizontally over entire surface of both sides.
 2. Reinforce tops and bottoms of doors with 18-gage, horizontal steel channels, welded continuously to outer sheets.
- D. Finish Hardware Reinforcement: Minimum gages of steel reinforcing plates for the following hardware:
1. Hinges and Pivots: 7 gage thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 2. Lock Face, Flush Bolts, Closers, and Concealed Holders: 12 gage.
 3. All Other Surface-Mounted Hardware: 16 gage.

2.4 HOLLOW METAL PANELS

Provide hollow metal panels of same materials, construction, and finish as specified for

doors.

2.5 FRAMES

- A. Fabricate frames of full-welded unit construction, with corners mitered, reinforced, continuously welded full depth and width of frame. Knock-down type frames are not acceptable.
1. Form frames of minimum 14-gage galvanized steel sheets for exterior, and either cold or hot-rolled sheet steel of the following minimum gages for interior:
 - a. Openings up to and including 4'-0" wide: 16 gage.
 - b. Openings over 4'-0" wide: 14 gage.
 2. Form countertop of stainless steel sheets with #4 polish for openings indicated to receive stainless steel countertops. (Roll up Service Windows)
- B. Finish Hardware Reinforcement: Minimum gages of steel reinforcing plates for the following hardware:
1. Hinges and Pivots: 7 gage thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 2. Strikes, Flush Bolts, and Closers: 12 gage.
 3. Surface-Mounted Hold-Open Arms and Panic Devices: 12 gage.
- C. Mullions and Transom Bars: Provide closed or tubular mullions and transom bars where indicated. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame. Provide false head member to receive lower ceiling where frames extend to finish ceilings of different heights.
- D. Head Reinforcing: Where installed in masonry, leave vertical mullions in frames open at top for grouting.
- E. Jamb Anchors: Furnish jamb anchors as required to secure frames to adjacent construction, formed of not less than 18-gage galvanized steel.
1. Masonry Construction: Adjustable, flat, corrugated, or perforated, t-shaped to suit frame size, with leg not less than 2 inches wide by 10 inches long. Furnish at least 3 anchors per jamb up to 7'-6" height; 4 anchors up to 8'-0" jamb height; one additional anchor for each 24 inches or fraction thereof over 8'-0" height.

2. Metal Stud Partitions: Insert type with notched clip to engage metal stud, welded to back of frames. Provide at least 4 anchors for each jamb for frames up to 7'-6" in height; 5 anchors up to 8'-0" jamb height; one additional anchor each 24 inches or fraction thereof over 8'-0" height.
- F. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed of not less than 14-gage galvanized steel sheet, as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with 2 holes to receive fasteners, welded to bottom of jambs and mullions.
 2. Separate Topping Concrete Slabs: Adjustable type with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.
- G. Head Anchors: Provide 2 anchors at head of frames exceeding 42 inches wide for frames mounted in steel stud walls.
- H. Head Strut Supports: Provide 3/8-inch by 2-inch vertical steel struts extending from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members in compliance with UL 63.
- I. Structural Reinforcing Members: Provide as part of frame assembly, where indicated at mullions, transoms, or other locations that are to be built into frame.
- J. Head Reinforcing: For frames over 4'-0" wide in masonry wall openings, provide continuous steel channel or angle stiffener, not less than 12 gage for full width of opening, welded to back of frame at head.
- K. Spreader Bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.
- L. Rubber Door Silencers: Except on weatherstripped doors, drill stop in strike jamb to receive 3 silencers on single-door frames and drill head jamb stop to receive 4 silencers on double-door frames. Install plastic plugs to keep holes clear during construction.
- M. Plaster Guards: Provide 26-gage steel plaster guards or dust cover boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

2.6 LOUVERS

- A. Door Louvers: Fabricate louvers and mount flush into doors without overlapping moldings on surface of door facing sheets.
- B. Provide internal support as recommended by louver manufacturer. Prime paint after fabrication, except stainless steel. Interior Louvers: Sightproof, stationary type, constructed of inverted Y-shaped blades formed of 20-gage cold-rolled steel, except 20-gage stainless steel for stainless steel doors.
- C. Louvered Panels: Provide for installation in frames where indicated.
 - 1. Exterior Louvers: Not less than 16-gage galvanized steel sheet. Fabricate units with stationary, weatherproof Z-shaped blades and U-shaped frames, not less than 1-3/8 inches thick. Space louver blades not more than 1-1/2 inches o.c. Assemble units by welding. Provide removable insect screens on interior side of frame, consisting of 14 by 18 bronze wire mesh in rigid, formed metal frame.
 - 2. Interior Louvers: Not less than 18-gage cold-rolled steel sheet. Fabricate units with stationary, sightproof inverted V-shaped blades and U-shaped frames, not less than 1-3/8 inches thick. Space louver blades not more than 3 inches o.c. Assemble units by welding.

2.7 STOPS AND MOLDINGS

- A. Provide stops and moldings around solid, glazed, and louvered panels where indicated.
- B. Form fixed stops and moldings integral with frame, unless otherwise indicated.
- C. Provide removable stops and moldings where indicated or required, formed of not less than 20-gage steel sheets matching steel of frames. Secure with countersunk flat or oval head machine screws spaced uniformly not more than 12 inches o.c. Form corners with butted hairline joints.
- D. Coordinate width of rabbet between fixed and removable stops with type of glass or panel and type of installation indicated.

2.8 FABRICATION, GENERAL

- A. Fabricate hollow metal units to be rigid, neat in appearance, and free from defects, warp, or buckle. Accurately form metal to required sizes and profiles. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure

proper assembly at the project site. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

1. Interior Doors: Minimum 18-gage face sheets.
 2. Exterior Doors: Minimum 16-gage face sheets.
- B. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- C. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors and frames that have been fabricated as thermal insulating assemblies and tested in accordance with ASTM C 236 or C 976. Unless otherwise indicated, provide assemblies U-value rating of 0.68 to .19 Btu/(hr by sq ft by deg F).
- D. Sound-Rated (Acoustical) Assemblies: Wherever shown or scheduled, provide door and frame assemblies that have been fabricated as sound-reducing type, tested in accordance with ASTM E 90, and classified in accordance with ASTM E 413. Unless otherwise indicated, provide acoustical assemblies with sound ratings of STC 33 or better.
- E. Finish Hardware Preparation: As follows:
1. Prepare doors and frames to receive finish hardware, including cutouts, reinforcing, mortising, drilling, and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A 115 series specifications for door and frame preparation for hardware.
 2. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
 3. Locate finish hardware as shown on final shop drawings, or if not shown, in accordance with "Recommended Locations for Builder's Hardware for Custom Steel Doors and Frames," published by Door and Hardware Institute.
- F. Shop Painting: Clean, treat, and paint exposed surfaces of steel doors and frames, including galvanized surfaces, but excluding stainless steel surfaces.
1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
 2. Apply pretreatment to cleaned metal surfaces, using cold phosphate solution (SSPC-PT2), hot phosphate solution (SSPC-PT4), or basic zinc

chromate-vinyl butyryl solution (SSPC-PT3).

3. Apply shop coat of prime paint within time limits recommended by pretreatment manufacturer. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Frames: Provide custom steel frames for doors, transoms, side lights, borrowed lights, and other openings, of size and profile as indicated.
 1. Install frames and accessories in accordance with shop drawings, manufacturer's data, and as herein specified.
 2. Setting Masonry Anchorage Devices: Provide masonry anchorage devices where required for securing frames to in-place concrete or masonry construction. Set anchorage devices opposite each anchor location, in accordance with details on final shop drawings and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed, and free from dust and debris.
 3. Floor anchors may be set with powder-actuated fasteners instead of masonry anchorage devices and machine screws, if so indicated on final shop drawings.
 4. Placing Frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - a. At in-place concrete or masonry construction, set frames and secure in place with machine screws and masonry anchorage devices.
 - b. Place frames at fire-rated openings in accordance with NFPA Standard No. 80.
 - c. Make field splices in frames as detailed on final shop drawings, welded and finished to match factory work.
 - d. Remove spreader bars only after frames or bucks have been properly set and secured.
- B. Door: Fit non-fire-rated doors accurately in their respective frames, with the following clearances:

1. Jams and Head: 3/32 inch.
 2. Meeting Edges, Pairs of Doors: 1/8 inch.
 3. Bottom: 3/8 inch, where no threshold or carpet.
 4. Bottom: 1/8 inch, at threshold or carpet.
- C. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

3.2 ADJUST AND CLEAN

- A. Final Adjustments: Check and readjust operating hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- C. Stainless Steel Touch-Up: Immediately after erection, smooth any abraded areas of stainless steel and polish to match undamaged finish.

END OF SECTION 08114

SECTION 08211

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY:

- A. Extent and location of each type of flush wood door is indicated on drawings and in schedules.
- B. Types of doors required include the following: Solid core flush wood doors with wood veneer faces.
- C. Shop-priming of flush wood doors is included in this section.
- D. Factory-prefitting to frames and factory-premachining for hardware for wood doors is included in this section.
- G. Metal door frames for flush wood doors are specified in another Division-8, Section 08111.

1.3 SUBMITTALS:

- A. Product Data: Door manufacturer's technical data for each type of door, including details of core and edge construction, and factory-finishing specifications.
- B. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.
- C. Samples: Submit samples, 1-0" square or as indicated, for the following: Doors for Transparent Finish: Door faces with solid wood edging representing typical range of color and grain for each species of veneer and solid lumber required.

1.4 QUALITY ASSURANCE:

- A. Quality Standards: Comply with the following standards:
 - 1. NWWDA Quality Standard: I.S.1 "Industry Standard for Wood Flush Doors", of National Wood Window and Door Association (NWWDA).
 - 2. AWI Quality Standard: "Architectural Woodwork Quality Standards"; including Section 1300 "Architectural Flush Doors", of Architectural Woodwork Institute (AWI) for grade of door, core construction, finish and other requirements exceeding those of NWWDA quality standard.
- B. NWWMA Quality Marking: Mark each wood door with NWWDA Wood Flush Door Certification Hallmark certifying compliance with applicable requirements of NWWDA I.S. 1 Series. For manufacturers not participating in NWWDA Hallmark Program, a certification of compliance may be substituted for marking of individual doors.
- C. Fire-Rated Wood Doors: Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152 and which are labeled and listed for ratings indicated by UL, Warnock Hersey or other testing and inspection agency acceptable to authorities having jurisdiction.
- D. Sound Retardant Doors: Provide wood doors which are in sizes and thickness shown on drawings and schedules and which meet or exceed AWI Quality Standards for Type SR. The doors shall have an STC rating of 42 or better by tests conducted according to ASTM Standard E90-617. They shall also pass the standard ASTM E152-73 20-minute fire and hose stream test and bear a 20-minute fire-rated label.
- E. Manufacturer: Obtain doors from a single manufacturer.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and recommendations of NWWDA pamphlet "How to Store, Handle, Finish, Install, and Maintain Wood Doors", as well as with manufacturer's instructions.
- B. Identify each door with individual opening numbers which correlate with designation system used on shop drawings for door, frames, and hardware, using temporary, removable or concealed markings.

1.6 PROJECT CONDITIONS:

- A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with the following requirements applicable to project's geographical location:
- B. Referenced AWI quality standard including Section 100-S-3 "Moisture Content".
- C. Referenced WIC quality standard including "Section 1 - General Information - Technical Bulletin".

1.7 WARRANTY:

- A. General: Warranties shall be in addition to, and not a limitation of, other rights the Government may have under the Contract Documents.
- B. Door Manufacturer's Warranty: Submit written agreement in door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup or twist) or that show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of referenced quality standards.
 - 1. Warranty shall also include reinstallation which may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.
 - 2. Warranty shall be in effect during following period of time after date of Substantial Completion.
 - 3. Solid Core Interior Doors: 5 - Year, minimum.
- C. Contractor's Responsibilities: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering doors which may be incorporated in the work include, but are not limited to, the following:
- B. Manufacturer: Subject to compliance with requirements, provide products for Solid Core Doors with Wood Veneer Faces:

1. Algoma Hardwoods, Inc.
2. Buell Door Company.
3. Cal-Wood Door Div., Timberland Industries, Inc.
4. Chappell Door Company.
5. Doors, Incorporated.
6. Eggers Industries, Architectural Door Division.
7. Gay Doors, Inc.
8. Glen-Mar Door Mfg. Co.
9. Graham Manufacturing Corp.
10. Ipik Door Co., Inc.
11. Mohawk Flush Doors, Inc.
12. Weyerhaeuser Company.

2.2 INTERIOR FLUSH WOOD DOORS:

- A. Solid Core Doors for Transparent Finish: Comply with the following requirements:
 1. Faces: Red Oak.
 2. AWI Grade: Premium.
 3. Construction: PC-5 (Particleboard core, 5-ply).
- B. Fire-Rated Solid Core Doors: Comply with the following requirements.
- C. Faces and AWI Grade: Provide faces and grade to match non-rated doors in same area of building, unless otherwise indicated.
 1. Construction: Manufacturer's standard core construction as required to provide fire-resistance and STC rating indicated.
 2. Edge Construction: Provide manufacturer's standard laminated edge construction for improved screw-holding capability and split resistance as

compared to edges composed of a single layer of treated lumber.

2.3 FABRICATION:

Fabricate flush wood doors to produce doors complying with following requirements: In sizes indicated for job-site fitting.

2.4 SHOP PRIMING:

Transparent Finish: Shop seal faces and edges of doors.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine installed door frames prior to hanging door:
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 - 2. Reject doors with defects.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Hardware: For installation see Division-8 "Finish Hardware" section of these specifications.
- B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and of referenced AWI standard and as indicated. Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No. 80.
- C. Field-Finished Doors: Refer to the following for finishing requirements: Division-9 section "Painting".

3.3 ADJUSTING AND PROTECTION:

- A. Operation: Rehang or replace doors which do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 08211

SECTION 08305

ACCESS DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

This Section includes access doors for installation in the following types of construction:

- A. Gypsum drywall.
- B. Masonry.
- C. Acoustical ceiling

1.3 SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

- A. Product data in form of manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions, and directions for installation of anchorage, devices. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.
- B. Shop drawings showing fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage and accessory items.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain access doors for entire project from one source from a single manufacturer.

- B. Size Variations: Obtain Contracting Officer's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.
- C. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.5 PROJECT CONDITIONS

Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering access doors that may be incorporated in the work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide access doors by one of the following:
 - 1. Bar-Co., Inc.
 - 2. Cesco Products
 - 3. J.L. Industries
 - 4. Karp Associates, Inc.
 - 5. Milcor, Inc.
 - 6. Nystrom, Inc.
 - 7. The Williams Brothers Corp.
- C. Subject to compliance with requirements, provide sidewalk door by one of the following:
 - 1. Babcock-Davis Hatchways, Inc., AM 242A

2. Bilco PMC-3

2.2 MATERIALS AND FABRICATION

Access Doors:

- A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts, and ready for installation.
- B. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.
- C. Frames: Fabricate from 16-gage steel.
 - 1. Fabricate frame with exposed flange nominal 1-inch wide around perimeter of frame for units installed in the following construction:
 - a. Ceramic tile finish.
 - b. Exposed concrete.
 - 2. For gypsum drywall, furnish perforated frames with drywall bead.
- D. Flush Panel Doors: Fabricate from not less than 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint.
- E. Locking Devices: Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed. Where shown or scheduled, provide one cylinder lock per access door. Furnish 2 keys per lock. Key all locks alike unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's instructions for installation of access doors and sidewalk doors.
- B. Coordinate installation with work of other trades.
- C. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

3.2 ADJUST AND CLEAN

- A. Adjust hardware and panels after installation for proper operation.
- B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08305

SECTION 08321

INSULATING SECURITY DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes insulating security doors for file rooms.
- B. This Section includes theft resistant, flat sill, fire-resistance rated, insulated steel door and frame assemblies, complete with hardware and factory finish.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 15 Section "Fire Protection" for sprinkler system.
 - 2. Division 16 Section "Fire Alarm System" for fire and smoke detectors.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data: Manufacturer's technical data, roughing-in drawings, and installation instructions. Indicate on drawings wall opening dimensions and any necessary adjustments to designed wall thicknesses, and other requirements for proper installation.
- C. Operating Instructions: Manufacturer's operating instructions, including keying and combination information.

1.4 QUALITY ASSURANCE

- A. Fire Resistance Classification: Provide insulating security doors bearing UL labels

for fire-resistance ratings indicated.

- B. Vault and file room doors shall be tested in accordance with ANSI/UL 155 and have a rating, in hours of fire resistance, comparable to the classification of the containing walls.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering insulating security doors that may be incorporated in the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide insulating security doors by one of the following:
 1. Diebold, Inc.
 2. Inter Innovation LeFebure.
 3. Mosler, Inc.
 4. Schwab Safe Co., Inc.

2.2 DOOR AND FRAME ASSEMBLY

- A. Construction: Manufacturer's standard all-welded construction with interlocking door and frame to provide fire-resistance rating and lock protection indicated and as herein specified.
- B. Door: Hollow steel construction with not less than 1/16-inch-thick face plate.
- C. Frame: Exterior facing, not less than 1/8-inch-thick. Sides and top jambs, not less than 18-gage steel. Sill, not less than 10-gage reinforced formed steel or 1/4-inch-thick flat plate.
- D. Sizes: Provide units of sizes as shown or scheduled; or if size not indicated, provide standard 32-inch by 78-inch unit.
- E. Fire-Resistive Insulation: Manufacturer's standard to comply with UL label requirements for fire-resistance rating indicated.

- F. Finish: Door manufacturer's standard baked-on gray finish, unless otherwise indicated.

2.3 HARDWARE AND ACCESSORIES

- A. General: Provide hardware units as required for specified UL labeling.
- B. Hinges: Not less than three offset roller or ball bearing hinges of design, size, and weight necessary for smooth operation of security door and to allow full, clear door opening.
- C. Bolts: Permanently lubricated, rust and corrosion resistive, 11/16-inch or 3/4-inch diameter bolts.
- D. Lock: Three tumbler, key-change combination lock equipped with UL relocking device designed to function automatically when mechanically or torch attacked. Provide drill-resistant hard plate for protection of lock case and locking mechanism.
- E. Relocking Device: Provide UL labeled relocking device or devices that function automatically when door is subjected to mechanical, explosive, or torch attack.
- F. Emergency Escape Device: Provide instant unlocking device for emergency escape from locked vault, activated only from vault side of door.
- G. Bolt-Throw Handle: Provide manufacturer's standard vault door bolt-throw handle.
- H. Trim: Stainless steel, chromium-plated, or other trim standard with door manufacturer.
- I. Day Gate: Provide manufacturer's standard grille gate on inside jamb opening with full-length piano-type or self-closing gravity hinges. Equip gate with key operated lock.

PART 3 - EXECUTION

3.1 PREPARATION

Prepare wall openings to receive door and frame assemblies in accordance with manufacturer's recommendations after "wet" construction has been completed and is dry.

3.2 INSTALLATION

- A. Install all items of equipment in accordance with manufacturer's instructions. Provide temporary shoring or bracing of floors, if required, while transporting heavy units to final location. Coordinate sequence of installation with other work to avoid delays.
- B. Adjust hardware and operating mechanism for proper operation, and conduct tests to demonstrate correct installation.

3.3 PROTECTION

Protect door assemblies against moisture and damage during handling and installation. After installation, protect from soiling and defacement until acceptance of work.

END OF SECTION 08321

SECTION 08331

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes overhead coiling metal doors.
- B. Types of overhead coiling doors include the following: Insulated overhead doors.
- C. Operation of overhead coiling doors include the following: Chain Operation
- D. Provide complete operating door assemblies including door curtains, guides, counterbalance mechanism, hardware, operators, and installation accessories.
- E. Field painting is specified in Division 9.

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.
- B. Product data, roughing-in diagrams, and installation instructions for each overhead coiling door. Provide operating instructions and maintenance information.
- C. Shop drawings for special components and installations that are not dimensioned or detailed in manufacturer's data sheets.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Furnish overhead coiling door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation components.

- B. Insert and Anchorages: Furnish inserts and anchoring devices that must be set in concrete or built into masonry to install units. Provide setting drawings, templates, instructions, and directions to install anchorage devices. Coordinate delivery with other work to avoid delay. See concrete and masonry Sections of these specifications regarding installation of inserts and anchorage devices.
- C. Wind Loading: Design and reinforce exterior overhead coiling doors to withstand a 20-psf (85-mph) wind-loading pressure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Apton Rolling Doors, A Gichner Systems Group, Inc.
 - 2. Atlas Roll-Lite Overhead Doors/Div. of MASCO. (Detailed)
 - 3. Ceco/Windsor Door--Div. of the Ceco Corp.
 - 4. The Cookson Co.
 - 5. Cornell Iron Works Inc.
 - 6. Dynamic Closures Corp.
 - 7. Mahon Door Corp.
 - 8. Overhead Door Corp.
 - 9. Pacific Rolling Door Co.
 - 10. Raynor Garage Door.
 - 11. Southwestern Steel Rolling Door Co.
 - 12. Wayne-Dalton Corp.
 - 13. J. G. Wilson Corp.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtain: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand required wind loading, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of material gage recommended by door manufacturer for size and type of door required, and as follows: Stainless Steel Door Curtain Slats: Furnish with #4 finish. Furnish manufacturer's standard "flat-face" slats.
- B. Endlocks: Malleable iron castings galvanized after fabrication, secured to curtain slats with galvanized rivets. Provide locks on alternate curtain slats for curtain alignment and resistance against lateral movement.
- C. Bottom Bar: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick, either galvanized or stainless steel or aluminum extrusions to suit type of curtain slats. Provide a replaceable gasket of flexible vinyl or neoprene between angles as a weather seal and cushion bumper for manually operated doors, unless shown as an overlapping joint.
- D. Curtain Jamb Guides: Fabricate curtain jamb guides of steel angles, or channels and angles with sufficient depth and strength to retain curtain loading. Build up units with minimum 3/16-inch-thick steel sections, galvanized after fabrication. Slot bolt holes for track adjustment.
- E. Secure continuous wall angle to wall framing with a minimum of 3/8-inch bolts at not more than 30 inches o.c., unless closer spacing recommended by door manufacturer. Extend wall angles above door opening head to support coil brackets, unless otherwise indicated. Place anchor bolts on exterior wall guides so they are concealed when door is in closed position. Provide removable stops on guides to prevent over-travel of curtain and a continuous bar for holding windlocks.
- F. Weather Seals: Provide vinyl or neoprene weatherstripping for exterior exposed doors, except where otherwise indicated. At door heads, use 1/8-inch-thick continuous sheet secured to inside of curtain coil hood. At door jambs, use 1/8-inch-thick continuous strip secured to exterior side of jamb guide.

2.3 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of adjustable steel helical torsion spring, mounted around a steel shaft and in a spring barrel, and connected to door curtain with required barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of hot-formed structural-quality carbon steel, welded or seamless pipe, of sufficient diameter and wall thickness to

support roll-up of curtain without distortion of slats and to limit barrel deflection to not more than 0.03 inch per foot of span under full load.

- C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast steel barrel plugs to secure ends of springs to barrel and shaft.
- D. Fabricate torsion rod for counterbalance shaft of cold-rolled steel in size required to hold fixed spring ends and carry torsional load.
- E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate with bell mouth guide groove for curtain.
- F. Hood: Form to entirely enclose coiled curtain and operating mechanism at opening head and act as weather seal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods and any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag. Fabricate aluminum hoods for aluminum doors of Alloy 3003 or 5052 aluminum sheet not less than 0.032-inch thick, mill finish.

2.4 MANUAL DOOR OPERATORS

Chain Hoist Operator: Provide manual chain hoist operator consisting of endless steel hand chain, chain pocket wheel and guard, and geared reduction unit with a maximum 35-lb pull for door operation. Furnish alloy steel hand chain with chain holder secured to operator guide.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to final shop drawings, manufacturer's instructions, and as specified.
- B. After completing installation, including work by other trades, lubricate, test, and adjust doors to operate easily, free from warp, twist, or distortion.
- C. Train Owner's maintenance personnel on procedures and schedules related to door operation, servicing, preventive maintenance.

END OF SECTION 08331

SECTION 08351

FOLDING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Accordion folding doors.
2. Panel wood and metal folding doors.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 10 Section "Folding Panel Partitions" for large-size operable partitions.
2. Division 10 Section "Acoustical Folding Partitions" for operable partitions for acoustic separation.
3. Division 10 Section "Demountable Partitions" for full-height removable partitions.
4. Division 10 Section "Fire Rated Partitions" for automatic fire separation partitions.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data for each type of door and installation accessory specified.
2. Shop drawings showing fabrication and installation including plans, elevations, details of components, attachments to other work, and accessory

items. Include location template drawings for items supported or anchored to permanent construction.

3. Samples for initial selection purposes in form of manufacturer's actual outer covering material showing full range of colors, textures, and patterns available for each type of outer covering material indicated.
4. Samples for verification purposes for each type of outer covering material indicated in sets for each color, texture, and pattern specified, showing full range of variations expected in these characteristics.
5. Schedule of door units using same room designations indicated on drawings.
6. Material certificates, in lieu of laboratory test reports when permitted by Architect, signed by manufacturer certifying that each material item complies with requirements.
7. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

1.4 QUALITY ASSURANCE

Fire Performance Characteristics: Provide units that are identical to those tested for the following fire performance characteristics, per ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify units with appropriate markings of applicable testing and inspecting organization. Surface Burning Characteristics per ASTM E 84.

- A. Flame Spread: 25 or less.
- B. Smoke Developed: 450 or less.

1.5 WARRANTY

Special Project Warranty: Submit a written warranty, executed by manufacturer, agreeing to repair or replace doors that fail in materials or workmanship within the specified warranty period. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents. Special Project Warranty Period is 3 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include but are not limited to the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Manufacturers of Accordion Folding Doors
 - a. Curtition.
 - b. Custom Fold Doors, Inc.
 - c. Foldoor/Holcomb and Hoke Mfg. Co., Inc.
 - d. Hufcor, Inc.
 - e. Modernfold, Inc.
 - f. Panelfold, Inc.
 - g. Rolscreen Co. (Pella)
 - h. Woodfold-Marco Mfg. Co.
 - 2. Manufacturers of Panel Bifolding Doors
 - a. Benchmark (General Products Co., Inc.)
 - b. Floataway Home Products, Inc.
 - c. Paniflex Corp.
 - d. Slimfold Mfg. Co., Inc.

2.2 ACCORDION FOLDING DOORS

- A. General Description: Top-supported, horizontal-sliding, manually operated, pantographic, single-panel hinged, or "X"-type accordion folding doors.
- B. Wood Panels: Sizes indicated, with core construction of dense wood particleboard, kiln-dried solid wood, or water-resistant laminated wood.
 - 1. Thickness: 1/4-inch minimum for 4-inch nominal panels.
 - 2. Thickness: 3/8-inch minimum for 5-inch nominal panels.
 - 3. Thickness: 7/16-inch minimum for 6-inch nominal panels.
 - 4. Wood facing: Genuine wood veneer laminated to core with moisture-resistant glue, of the following wood species:

- a. Philippine Mahogany.
 - b. Natural Birch.
 - c. Walnut.
 - d. Oak.
5. Finish wood faces as follows:
- a. Unfinished.
 - b. Sanded and sealed, for field-applied finish.
 - c. Sanded, sealed, and coated with clear lacquer.
6. Outer Covering: Attach covering to support frame in concealed manner at sufficient intervals to prevent sagging and separation and to permit on-site removal and repair. Locate vertical seams in valleys. Turn hems at top and bottom.
- a. Vinyl reinforced with woven backing weighing not less than 16 oz. per lineal yard. Attach covering to support frame in concealed manner at sufficient intervals to prevent sagging and separation and to permit on-site removal and repair. Locate vertical seams in valleys. Turn hems at top and bottom.
 - b. Fabric not weighing not less than 16 oz per lineal yard, treated to resist stains, as selected by Architect from manufacturer's standard selection.
 - c. Carpet nonwoven, needle-punched with fused fibers to prevent unraveling, as selected by Architect from manufacturer's standard selection.
 - d. High-pressure decorative laminate as selected by Architect from manufacturer's standard selection, complying with NEMA LD 3, adhesive applied under pressure to core.
- C. Metal Panels: Sizes indicated of vinyl-clad, cold-rolled steel supporting hinges attached to 0.0747-inch thick (14-gage) steel hinge support bracket with heavy-duty spacing chain to control panel spacing and extension. Vinyl cladding as selected by Architect from manufacturer's standards.
- D. Polyvinyl Chloride Panels: Sizes indicated, solid extrusions, and as follows:
- E. Polyvinyl Chloride Panels: Sizes indicated, double-walled extruded construction, and as follows:
1. Color: White.
 2. Color: Beige.
- F. Lead Posts and Jamb Posts: Not less than 0.0478 inch thick (18- gage) steel for

units up to 10 feet high, and not less than 0.0747- inch-thick (14-gage) steel for units over 10 feet high, formed for rigidity and light seal at supporting construction.

- G. Carriers: 4-wheel carriers at lead post and 2-wheel carriers at intermediate spacing as necessary for size and weight of partition, to assure secure, easy, and quiet operation.
1. Units 8 feet high or less: nylon wheels on steel shafts.
 2. Units over 8 feet high: ball-bearing wheels with nylon tread and steel shafts.
 3. 3- and 4-inch-wide panels 10 feet high or less: nylon wheels and axles.
 4. Panels over 4 inches wide and/or 10 feet high: ball-bearing wheels with nylon tread and steel shafts.
- H. Tracks: Manufacturer's standard extruded aluminum or steel track with factory-applied corrosion-resistant finish. Track deflection, independent of structural supporting system, of no more than 1/360th of opening width, sized to support operation without damage to track, folding unit, or adjacent surfaces.
1. Prefinished ceiling guard/channel.
 2. Surface-mounted channel.
 3. Center stop for biparting partitions.
 4. Galvanized sheet steel or aluminum subchannel for forming pocket for recessed suspension track.
 5. Metal ceiling contact guard to protect finished ceiling surface from damage by moving perimeter seals. Finish to match other exposed metal.
 6. Nonferrous jamb strip for single-operating partitions, to assure tight closure by engaging rubber bumper on lead post.
- I. Hinge Connectors: Manufacturer's standard system of extruded vinyl, concealed horizontal spring, or continuous metal pin type hinges combined with vinyl seals between panels. Color as selected by Architect from manufacturer's standards.
- J. Hardware: Manufacturer's standard heavy-duty manually operated metal pulls and latches as follows:
1. Finish: Clear anodized aluminum.

2. Finish: White bronze.
 3. Finish: Satin stainless steel.
 4. Finish: Dull chromium finish brass.
 5. Finish: Dull chromium finish steel.
 6. Latch operable from both sides of closed partition.
 7. Latch operable from one side, as indicated, with coin slot release on opposite side.
 8. Manufacturer's standard keyed cylinder lock, operable from both sides.
 9. Deadlock to receive cylinder, operable from both sides. Refer to Division 8 hardware section for lock cylinder requirements.
 10. Pendant pull near top of lead post in addition to standard pull handle/latch for units over 10 feet high and/or 20 feet high.
 11. Upper draw latch with grip handle in addition to standard latch for units over 11 feet high.
 12. Foot bolts on lead post where indicated. Secure to post to avoid interference with seals.
- K. Jamb Molding: Manufacturer's standard wood or metal molding at closing jamb as required for light-tight jamb closure.
1. Finish wood molding to match species and finish or panel facing.
 2. Metal molding with manufacturer's standard finish.
- L. Wood Track Molding: Manufacturer's standard wood molding on each side of surface-mounted track to match panel facings. Install with tight, hairline joints with all fasteners concealed.

2.3 PANEL BIFOLDING DOORS

- A. General Description: Folding panel doors hinged together and suspended from overhead track.
- B. Metal Panels: Sizes as indicated, 0.0239-inch thickness (24-gage) cold-rolled steel, prefinished with mitered snap-on casing and corner pieces, and as follows:

1. Surface Profile: fully louvered.
 2. Surface Profile: flush.
 3. Surface Profile: paneled.
 4. Surface Profile: louvered and paneled.
 5. Finish: Electrostatically applied and baked enamel factory finish in following color:
 - a. White.
 - b. Black.
 - c. Brown.
 - d. Custom color selected by Architect.
 6. Finish: Hot-dipped galvanized coating applied to panels, stiffeners, hinges, and decorative trim.
- C. Wood Panels: 3/4-inch-thick particle board not less than 42-lb. density.
- D. Wood Panels: 3/4-inch-thick fire-retardant particle board with factory-sanded and -eased vertical edges.
 1. Mirror Facing: Double-strength, smooth-edged mirrors fully covering door panel. Securely mount mirror with double-faced polyurethane tape and metal channels, top and bottom.
 2. Plastic Laminate Facing: High-pressure plastic laminate complying with NEMA LD 3, adhesive-applied under pressure to core, and as follows:

E. Hardware: Hinges, pivots, and rollers factory installed. Manufacturer's standard, as follows:
 1. Three self-aligning hinges for pair of panels up to 8 feet high.
 2. Four self-aligning hinges for pair of panels 8 feet high.
 3. Zinc-plated steel guide and spring-loaded pivot pins with nylon bushings and nylon tips.
 4. Wood pulls to match species and finish of panel facing.
 5. Brass pull and escutcheon plate.

F. Trim: Full-height plastic expansion channel for each panel edge adjacent to wall.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's printed installation instructions. Install track in lengths as long as practicable, with flush, hairline joints.
- B. Standard Clearances: Install units to meet the following:
 - 1. Floor: 1/4 inch to 3/4 inch max. (above floor finish).
 - 2. Vertical Joints: Flush, light-tight.

3.2 ADJUSTMENTS

Adjust units as necessary to assure smooth, quiet operation without warping or binding. Check and readjust operating hardware so that latches engage accurately and positively without forcing and binding.

END OF SECTION 08351

SECTION 08410

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following types of aluminum entrance and storefront work:
1. Exterior entrance doors.
 2. Vestibule doors matching entrance doors.
 3. Transoms.
 4. Sidelights.
 5. Frames for entrances.
 6. Storefront-type framing system.
- B. Related Sections: The following sections contain requirements that relate to this Section:
1. Glazing requirements for aluminum entrances and storefront, including entrances specified to be factory glazed, are included in Division 8 Section "Glass and Glazing."
 2. Lock cylinders are included in Division 8 Section "Door Hardware."
 3. Curtain wall is included in Division 8 Section "Glazed Aluminum Curtain Wall."

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum entrance and storefront assemblies that comply with performance characteristics specified, as demonstrated by testing the manufacturer's

corresponding stock assemblies according to test methods indicated.

- B. Thermal Movement: Design the aluminum entrance and storefront framing systems to provide for expansion and contraction of the component materials. Entrance doors shall function normally over the specified temperature range. The system shall be capable of withstanding a metal surface temperature range of 180 deg F (100 deg C) without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects.
- C. Design Requirements: Provide aluminum entrance and storefront systems that comply with structural performance, air infiltration, and water penetration requirements indicated. Wind Loads: Provide aluminum entrance and storefront assemblies capable of withstanding wind pressures of 20 psf inward and 20 psf outward acting normal to the plane of the wall.
- D. Structural Performance: Conduct tests for structural performance in accordance with ASTM E 330. At the conclusion of the tests there shall be no glass breakage or permanent damage to fasteners, anchors, hardware or actuating mechanism. Framing members shall have no permanent deformation in excess of 0.2 percent of their clear span.
 - 1. Deflection Normal to the Plane of the Wall: Test pressure required to measure deflection of framing members normal to the plane of the wall shall be equivalent to the wind load specified above. Deflection shall not exceed 1/175 of the clear span, when subjected to uniform load deflection test.
 - 2. Deflection Parallel to the Plane of the Wall: Test pressures required to measure deflection parallel to the plane of the wall shall be equal to 1.5 times the wind pressures specified above. Deflection of any member carrying its full dead load shall not exceed an amount that will reduce glass bite below 75 percent of the design dimension and shall not reduce the edge clearance between the member and the fixed panel, glass or other fixed member above to less than 1/8 inch. The clearance between the member and an operable door or window shall be at least 1/16 inch.
- E. Air Infiltration: Provide aluminum entrance and storefront framing system with an air infiltration rate of not more than 0.50 CFM per linear foot of perimeter crack for single doors and 1.0 CFM per linear foot of perimeter crack for pairs of doors when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.57 psf.
- F. Water Penetration: Provide framing systems with no uncontrolled water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 lbf per sq. ft.

- G. Condensation Resistance: Where framing systems are "thermal-break" construction, provide units tested for thermal performance in accordance with AAMA 1503 showing condensation resistance factor (CRF) of not less than 56.
- H. Thermal Transmittance: Provide framing systems that have an overall U-value of not more than 0.53 BTU/(hr. x sq. ft. x deg. F) at 15 mph exterior wind velocity when tested in accordance with AAMA 1503.

1.4 SUBMITTALS

General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

- A. Product data for each aluminum entrance and storefront system required, including:
 - 1. Manufacturer's standard details and fabrication methods.
 - 2. Data on finishing, hardware and accessories.
 - 3. Recommendations for maintenance and cleaning of exterior surfaces.
- B. Shop drawings for each aluminum entrance and storefront system required, including:
 - 1. Layout and installation details, including relationship to adjacent work.
 - 2. Elevations at 1/4-inch scale.
 - 3. Detail sections of typical composite members.
 - 4. Anchors and reinforcement.
 - 5. Hardware mounting heights.
 - 6. Provisions for expansion and contraction.
 - 7. Glazing details.
- C. Hardware Schedule: Submit complete hardware schedule organized into sets based on hardware specified. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Include item name, name of the manufacturer and complete designations of every item required for each door opening.

- D. Samples for Initial Color Selection: Submit pairs of samples of each specified color and finish on 12-inch-long sections of extrusions or formed shapes. Where normal color variations are anticipated, include 2 or more units in each set of samples indicating extreme limits of color variations.
- E. Samples for Verification Purposes: The Contracting Officer reserves the right to require additional samples, that show fabrication techniques and workmanship, and design of hardware and accessories.
- F. Test Reports: Provide certified test reports from a qualified independent testing laboratory showing that aluminum entrance and storefront systems have been tested in accordance with specified test procedures and comply with performance characteristics indicated.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed installations of aluminum storefront and entrances similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer's Qualifications: Provide aluminum entrances and storefront systems produced by a firm experienced in manufacturing systems that are similar to those indicated for this project and that have a record of successful in-service performance.
- C. Fabricator Qualifications: Provide aluminum entrances and storefront systems fabricated by a firm experienced in producing systems that are similar to those indicated for this Project, and that have a record of successful in-service performance. The fabricator shall have sufficient production capacity to produce components required without causing delay in progress of the Work.
- D. Single Source Responsibility: Obtain aluminum entrance and storefront systems from one source and from a single manufacturer.
- E. Design Criteria: The drawings indicate the size, profile, and dimensional requirements of aluminum entrance and storefront work required and are based on the specific types and models indicated. Aluminum entrance and storefront by other manufacturers may be considered, provided deviations in dimensions and profiles are minor and do not change the design concept as judged by the Contracting Officer. The burden of proof of equality is on the proposer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver aluminum entrance and storefront components in the manufacturer's original protective packaging.
- B. Store aluminum components in a clean dry location away from uncured masonry or concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.

1.7 PROJECT CONDITIONS

Field Measurements: Check openings by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

1.8 WARRANTY

- A. Warranty: Submit a written warranty, executed by the manufacturer, agreeing to repair or replace units that fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to:
 - 1. Structural failures including excessive deflection, excessive leakage or air infiltration.
 - 2. Faulty operation.
 - 3. Deterioration of metals, metal finishes and other materials beyond normal weathering.
- B. Warranty Period: 3 years after the date of Substantial Completion.
- C. The warranty shall not deprive the Government of other rights or remedies the Government may have under other provisions of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers

offering entrance and storefront systems that may be incorporated in the work include, but are not limited to, the following:

- B. Manufacturer: Subject to compliance with requirements, provide entrance and storefront systems manufactured by one of the following: Details based on Kawneer Co. isoglaze 450 T frame and 260 doors. Concealed rod panic device for pairs of doors.
1. Amarlite Architectural Products.
 2. Atlas Architectural Metals, Inc.
 3. CMI-Cronstroms Mfg. Inc.
 4. Dawson Metal Company, Inc.
 5. EFCO Corporation.
 6. Kawneer Company, Inc.
 7. Portal, Inc.
 8. PPG Industries.
 9. Rebco, Inc.
 10. Tubelite Division of Indal, Inc.
 11. United States Aluminum Corp.
 12. Vistawall Architectural Products.

2.2 MATERIALS

- A. Aluminum Members: Alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for aluminum extrusions, ASTM B 209 for aluminum sheet or plate, and ASTM B 211 for aluminum bars, rods and wire.
- B. Carbon steel reinforcement of aluminum framing members shall comply with ASTM A 36 for structural shapes, plates and bars, ASTM A 611 for cold rolled sheet and strip, or ASTM A 570 for hot rolled sheet and strip.
- C. Glass and Glazing Materials: Comply with requirements of "Glass and Glazing"

section of these specifications.

- D. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, zinc plated steel, or other material warranted by the manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors and other components.
 - 1. Reinforcement: Where fasteners screw-anchor into aluminum members less than 0.125 inches thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard noncorrosive pressed-in splined grommet nuts.
 - 2. Exposed Fasteners: Do not use exposed fasteners except for application of hardware. For application of hardware, use Phillips flat-head machine screws that match the finish of member or hardware being fastened.
- E. Concealed Flashing: 0.0179-inch (26 gage) minimum dead-soft stainless steel, or 0.026-inch-thick minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.
- F. Brackets and Reinforcements: Provide high-strength aluminum brackets and reinforcements; where use of aluminum is not feasible provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 123.
- G. Concrete and Masonry Inserts: Provide cast iron, malleable iron, or hot-dip galvanized steel inserts complying with ASTM A 123.
- H. Compression Weatherstripping: Manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.

2.3 HARDWARE

- A. General: Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those indicated to be provided by the aluminum entrance manufacturer.
- B. Provide heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish to match door.
 - 1. Offset Pivot Sets: Comply with ANSI A156.4, Grade 1. Provide exposed parts of cast aluminum alloy. Provide an intermediate pivot for doors over 7 feet 6 inches high.

2. Ball-Bearing Butts: 5-knuckle, 2-bearings, steel ball bearing butts sized to comply with ANSI A156.1, Grade 1. Provide 2 butts for doors 7 feet 6 inches or less; provide 3 butts for taller and heavier doors.
3. Surface-Mounted Overhead Closers: Modern type with cover, for parallel-arm-type mounting installation. Comply with ANSI A156.4, Grade 1. Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather and anticipated frequency of use. Include the following:
 - a. Hold-open arm.
 - b. Delayed-action closing.
4. Door Stop: Floor- or wall-mounted door stop, as appropriate, with integral rubber bumper; comply with ANSI A156.16, Grade 1.
5. Cylinders are supplied under another Division 8 Section for keying into the building system.
6. Panic Hardware: Rim-type, center latch bolt type panic exit device activated by a full-width crash bar. Comply with UL 305.
7. Panic Hardware: Concealed-rod type panic exit devices activated by full-width crash bar. Comply with UL 305.
8. Pull Handles: Aluminum pull handles of style indicated.
9. Push Bars: Manufacturer's standard full-door-width single-bar push bar.
10. Thresholds: Extruded aluminum threshold of size and design indicated in mill finish, complete with anchors and clips, coordinated with pivots and floor-concealed closers.

2.4 COMPONENTS

- A. Storefront Framing System: Provide storefront and entrance framing systems fabricated from extruded aluminum members of size and profile indicated. Include subframes and other reinforcing members of the type indicated. Provide for flush glazing storefront from the exterior on all sides without projecting stops. Shop-fabricate and preassemble frame components where possible. Provide storefront frame sections without exposed seams. Mullion Configurations: Provide pockets at the inside glazing face to receive resilient elastomeric glazing. Mullions and horizontals shall be one piece. Make provisions to drain moisture accumulation to the exterior.

- B. Entrance Door Frames: Provide tubular and channel frame entrance door frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards. Reinforce as necessary to support required loads.
- C. Stile-and-Rail Type Entrance Doors: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.
 - 1. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for nonremoval.
 - 2. Design: Provide 1-3/4-inch-thick doors of design indicated. Narrow stile (2-inch nominal width).

2.5 FABRICATION

- A. General: Fabricate aluminum entrance and storefront components to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes and profile requirements are indicated on the drawings. Variable dimensions are indicated, with maximum and minimum dimensions required, to achieve design requirements and coordination with other work. Fabricate storefront framing system with an integrally concealed, low-conductance thermal barrier, located between exterior materials and exposed interior members to eliminate direct metal-to-metal contact. Use manufacturer's standard construction that has been in use for similar projects for period of not less than 3 years.
- B. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible before shipment to the Project site. Disassemble components only as necessary for shipment and installation.
 - 1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.
 - 2. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
 - 3. Preglaze door and frame units to greatest extent possible.
- C. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish. Welding behind finished surfaces shall be performed in such a manner as to minimize distortion and discoloration on the finished surface.

- D. Reinforcing: Install reinforcing as required for hardware and as necessary for performance requirements, sag resistance and rigidity.
- E. Dissimilar Metals: Separate dissimilar metals with bituminous paint, or a suitable sealant, or a nonabsorptive plastic or elastomeric tape, or a gasket between the surfaces. Do not use coatings containing lead.
- F. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members. Uniformity of Metal Finish: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.
- G. Fasteners: Conceal fasteners wherever possible.
- H. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops. At other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.
 - 1. Provide EPDM or vinyl-blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
 - 2. At interior doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.
- I. Provide finger guards of collapsible neoprene or PVC gasketing securely anchored into frame at hinge-jamb of center-pivoted doors.

2.6 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. Finish aluminum entrance and storefront to match other adjacent glazed aluminum curtain wall components. Refer to "Glazed Aluminum Curtain Wall" Section for finish requirements.
- D. Class I Color Anodized Finish: AA-M12C22A42/A44 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, film thicker than 0.7 mil with integral color or electrolytically deposited color) complying with AAMA 606.1 or AAMA 608.1. Color: As selected by Contracting Officer from within standard industry colors and color density range.

PART 3 - EXECUTION

3.1 EXAMINATION

Examine substrates and supports, with the Installer present, for compliance with requirements indicated, installation tolerances, and other conditions that affect installation of aluminum entrances and storefronts. Correct unsatisfactory conditions before proceeding with the installation. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation.
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Install components in proper alignment and relation to established lines and grades indicated. Provide proper support and anchor securely in place.
- C. Construction Tolerances: Install aluminum entrance and storefront to comply with the following tolerances:
 - 1. Variation from Plane: Do not exceed 1/8 inch in 12 feet of length or 1/4 inch in any total length.
 - 2. Offset from Alignment: The maximum offset from true alignment between two identical members abutting end to end in line shall not exceed 1/16 inch.
 - 3. Diagonal Measurements: The maximum difference in diagonal measurements shall not exceed 1/8 inch.
 - 4. Offset at Corners: The maximum out-of-plane offset of framing at corners shall not exceed 1/32 inch.
- D. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
 - 1. Zinc or cadmium plate steel anchors and other unexposed fasteners after fabrication.
 - 2. Paint dissimilar metals where drainage from them passes over aluminum.
 - 3. Paint aluminum surfaces in contact with mortar, concrete or other masonry

- with alkali resistant coating.
4. Paint wood and similar absorptive material in contact with aluminum and exposed to the elements or otherwise subject to wetting, with two coats of aluminum house paint. Seal joints between the materials with sealant.
- E. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
 - F. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.
 - G. Refer to "Glass and Glazing" Section of Division 8 for installation of glass and other panels indicated to be glazed into doors and framing, and not preglazed by manufacturer.

3.3 ADJUSTING

Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight closure.

3.4 CLEANING

- A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.
- B. Clean glass surfaces after installation, complying with requirements contained in the "Glass and Glazing" Section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.5 PROTECTION

Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION 08410

SECTION 08520
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

Each window unit shall bear the AAMA Label warranting that the product complies with AAMA 101. Certified test reports attesting that the window units meet the requirements of AAMA 101 will be acceptable in lieu of product labeling.

1.3 SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

A. Manufacturer's Catalog Data for the following:

1. Windows
2. Hardware
3. Fasteners
4. Screens
5. Weatherstripping
6. Accessories

B. Manufacturer's Standard Color Charts

C. Drawings shall indicate elevations of windows, full-size sections, thicknesses and gages of metal, fastenings, proposed method of anchoring, size and spacing of anchors, details of construction, method of glazing, details of operating hardware, mullion details, method and materials for weatherstripping, method of attaching screens, material and method of attaching subframes, sills, trim, installation

details, and other related items.

- D. Schedules: Submit schedule with drawings indicating location of each window unit.
- E. Test Reports: Minimum condensation resistance factor: Submit test reports for each type of window attesting that identical windows have been tested and meet the requirements specified herein for conformance to AAMA 101, and minimum condensation resistance factor (CRF).
- G. Samples: Submit one full-size window of each type proposed for use, complete with AAMA Label, glazing, hardware, anchors, and other accessories. Where screens or weatherstripping is required, fit sample windows with such items that are to be used. After approval, install each sample in the work, clearly identified, and record its location.
- H. Operation and Maintenance Manuals: Submit Manufacturer's standard Operation and Maintenance Manuals.

1.4 DELIVERY AND STORAGE

Deliver windows to project site in an undamaged condition. Use care in handling and hoisting windows during transportation and at the jobsite. Store windows and components out of contact with the ground, under a weathertight covering, so as to prevent bending, warping, or otherwise damaging the windows. Damaged windows shall be repaired to an "as new" condition as approved by Contracting Officer. If windows can not be repaired, provide new units.

1.5 PROTECTION

Protect finished surfaces during shipping and handling using the manufacturer's standard method, except that no coatings or lacquers shall be applied to surfaces to which caulking and glazing compounds must adhere.

PART 2 - PRODUCTS

2.1 WINDOWS

- A. Windows shall conform to AAMA 101 and the requirements specified herein. Provide windows of types, grades, performance classes, combinations and sizes indicated or specified. Design windows to accommodate hardware, glass, weatherstripping, screens, and accessories to be furnished. Each window shall be

a complete factory assembled unit with or without glass installed. Dimensions shown are minimum. Provide windows with insulating glass and thermal break necessary to achieve a minimum Condensation Resistance Factor (CRF) of 48 when tested in accordance with AAMA 1503.1.

1. Projected Windows: Type P-HC 50. Provide projected windows with concealed four bar friction hinges only.
2. Fixed Windows: Type F-HC 50.
3. Glass and Glazing: Materials are specified in Section 08800, "Glazing."
4. Caulking and Sealing: Are specified in Section 07901, "Joint Sealants."
5. Weatherstripping: AAMA 101.
6. Insect Screening, Metallic: FS RR-W-365, Type VII (aluminum alloy) 18 by 18 mesh.

2.2 FABRICATION

Window units shall conform to AAMA 101.

- A Provisions for Glazing: Design windows and rabbets suitable for glass thickness shown or specified. Design sash for inside and outside double glazing and for securing glass with glazing channels.
- B. Weatherstripping: Provide for ventilating sections of all windows to ensure a weather-tight seal meeting the infiltration requirements specified in AAMA 101. Provide easily replaceable factory-applied weatherstripping. Use molded vinyl, molded or molded-expanded neoprene or molded or expanded Ethylene Propylene Diene Terpolymer (EPDM) weatherstripping for compression contact surfaces. Use treated woven pile or wool, or polypropylene or nylon pile bonded to nylon fabric and metal or plastic backing strip weatherstripping for sliding surfaces. Do not use neoprene or polyvinylchloride weatherstripping where they will be exposed to direct sunlight.
- C. Fasteners: Use fasteners as standard with the window manufacturer for windows, trim, and accessories. Self-tapping sheet-metal screws are not acceptable for material more than 1/16-inch thick.
- D. Drips and Weep Holes: Provide continuous drips over heads of top ventilators. Where fixed windows adjoin ventilators, drips shall be continuous across tops of fixed windows. Provide drips and weep holes as required to return water to the outside.

- E. Combination Windows: Windows used in combination shall be the same grade and performance class and shall be factory assembled. Where factory assembly of individual windows into larger units is limited by transportation considerations, prefabricate, match mark, transport, and field assemble.
- F. Accessories: Provide windows complete with necessary hardware, fastenings, clips, fins, anchors, glazing beads, and other appurtenances necessary for complete installation and proper operation.
 - 1. Hardware: AAMA 101. The item, type, and functional characteristics shall be the manufacturer's standard for the particular window type. Provide hardware of suitable design and of sufficient strength to perform the function for which it is used. Equip all operating ventilators with a lock or latching device which can be secured from the inside.
 - 2. Fasteners: Provide concealed anchors of the type recommended by the window manufacturer for the specific type of construction. Anchors and fasteners shall be compatible with the window and the adjoining construction. Provide a minimum of three anchors for each jamb located approximately 6 inches from each end and at midpoint.
 - 3. Finishes: Exposed aluminum surfaces shall be factory finished with an anodic coating. Color shall be as selected. All windows shall have the same finish.
 - 4. Anodic Coating: Clean exposed aluminum surfaces and provide an anodized finish conforming to AA 45. Finish shall be architectural Class II (0.4 mil to 0.7 mil), designation AA-M10-C22-A32, integral color anodized.
 - 5. Screens: AAMA 101. Provide one insect screen for each operable exterior sash or ventilator. Design screens to be rewirable, easily removable and to permit easy access to operating hardware.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Method of Installation: Install in accordance with the window manufacturer's printed instructions and details. Build in windows as the work progresses or install without forcing into prepared window openings. Set windows at proper elevation, location, and reveal; plumb, square, level, and in alignment; and brace, strut, and stay properly to prevent distortion and misalignment. Protect ventilators and operating parts against accumulation of dirt and building materials

by keeping ventilators tightly closed and locked to frame. Bed screws or bolts in sill members, joints at mullions, contacts of windows with sills, built-in fins, and subframes in mastic sealant of a type recommended by the window manufacturer. Install windows in a manner that will prevent entrance of water and wind. Fasten insect screens securely in place.

- B. Dissimilar Materials: Where aluminum surfaces are in contact with, or fastened to masonry, concrete, wood, or dissimilar metals, except stainless steel or zinc, the aluminum surface shall be protected from dissimilar materials as recommended in the Appendix to AAMA 101. Surfaces in contact with sealants after installation shall not be coated with any type of protective material.
- C. Anchors and Fastenings: Make provision for securing units to masonry and to other adjoining construction. Windows installed in masonry walls shall have head and jamb members designed to recess into masonry wall as indicated.
- D. Adjustments After Installation: After installation of windows and completion of glazing and field painting, adjust all ventilators and hardware to operate smoothly and to provide weathertight sealing when ventilators are closed and locked. Lubricate hardware and operating parts as necessary.

3.2 CLEANING

Clean interior and exterior surfaces of window units of mortar, paint spattering spots, and other foreign matter to present a neat appearance, to prevent fouling of weathering surfaces and weather-stripping, and to prevent interference with the operation of hardware. Replace all stained, discolored, or abraded windows that cannot be restored to their original condition with new windows.

END OF SECTION 08520

SECTION 08710

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following:
 - 1. Hinges.
 - 2. Pivots.
 - 3. Lock cylinders and keys.
 - 4. Lock and latch sets.
 - 5. Bolts.
 - 6. Exit devices.
 - 7. Push/pull units.
 - 8. Closers.
 - 9. Overhead holders.
 - 10. Miscellaneous door control devices.
 - 11. Door trim units.
 - 12. Protection plates.
 - 13. Weatherstripping for exterior doors.
 - 14. Sound stripping for interior doors.

15. Automatic drop seals (door bottoms).
 16. Astragals or meeting seals on pairs of doors.
 17. Thresholds.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 6 Section "Interior Architectural Woodwork" for cabinet hardware.
 2. Division 8 Section "Steel Doors and Frames" for silencers integral with hollow metal frames.
 3. Division 8 Section "Flush Wood Doors" for factory prefabricating and factory pre-machining of doors for door hardware.
 4. Division 8 Section "Aluminum Entrances and Storefronts" for aluminum entrance door hardware, except cylinders.
- D. Products furnished but not installed under this Section include:
1. Cylinders for locks on entrance doors.
 2. Final replacement cores and keys to be installed by government, furnished by contractor.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.
- B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - a. Type, style, function, size, and finish of each hardware item.
 - b. Name and manufacturer of each item.

- c. Fastenings and other pertinent information.
 - d. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - h. Keying information.
2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Government's final instructions on keying of locks has been fulfilled.
- D. Samples of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.
- E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Government Contracting Officer, and Contractor, at reasonable times during the course of the Work, for consultation. Require supplier to meet with Contracting Officer to finalize keying requirements and to obtain final instructions in writing.

- C. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

1.5 PRODUCT HANDLING

- A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.
- C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).
- E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.6 MAINTENANCE

Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Government's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Butts and Hinges: Stanley Hardware, Div. Stanley Works.
 2. Pivots:
 - a. Glynn-Johnson Corp.
 - b. Rixson-Firemark, Div. Yale Security Inc.
 - c. Stanley Hardware, Div. Stanley Works.
 - d. Dorma Door Controls, Inc.
 - e. Dor-O-Matic
 3. Key Control System:
 - a. Key Control Systems, Inc.
 - b. Telkee Inc.
 4. Cylinders and Locks:
 - a. Best Lock Corp.
 - b. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
 - c. Sargent Manufacturing Company.
 - d. Schlage Lock, Div. Ingersoll-Rand Door Hardware Group.
 - e. Yale Security Inc.
 5. Bolts:
 - a. Builders Brass Works Corp.
 - b. Glynn-Johnson Corp.
 - c. Hager Hinge Co.
 - d. H. B. Ives, A Harrow Company.
 - e. Quality Hardware Mfg. Co., Inc.; Div. Newman Tonks, Inc.
 - f. Stanley Hardware, Div. Stanley Works.
 6. Exit/Panic Devices:
 - a. Adams Rite Manufacturing Co.
 - b. Arrow Lock Manufacturing Co.
 - c. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
 - d. Dor-O-Matic.
 - e. Reed Exit Hardware, Div. Yale Security Inc.
 - f. Sargent Manufacturing Company.
 - g. Von Duprin, Div. Ingersoll-Rand Door Hardware Group.

- h. Yale Security Inc.
7. Overhead Closers:
- a. Arrow Lock Manufacturing Co.
 - b. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
 - c. Dorma Door Controls International.
 - d. LCN, Div. Ingersoll-Rand Door Hardware Group.
 - e. Norton Door Controls, Div. Yale Security Inc.
 - f. Rixson-Firemark, Div. Yale Security Inc.
 - g. Sargent Manufacturing Company.
 - h. Yale Security Inc.
8. Door Control Devices:
- a. Baldwin Hardware Corp.
 - b. Brookline Industries, Div. Yale Security Inc.
 - c. Builders Brass Works Corp.
 - d. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
 - e. Glynn-Johnson Corp.
 - f. Hager Hinge Co.
 - g. H. B. Ives, A Harrow Company.
 - h. Quality Hardware Mfg. Co., Inc.; Div. Newman Tonks, Inc.
 - i. Triangle Brass Manufacturing Company (Trimco).
9. Door Trim Units:
- a. Baldwin Hardware Corp.
 - b. Brookline Industries, Div. Yale Security Inc.
 - c. Builders Brass Works Corp.
 - d. Hager Hinge Co.
 - e. H. B. Ives, A Harrow Company.
 - f. Triangle Brass Manufacturing Company (Trimco).
10. Kick, Mop, and Armor Plates:
- a. Baldwin Hardware Corp.
 - b. Brookline Industries, Div. Yale Security Inc.
 - c. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
 - d. Hager Hinge Co.
 - e. Hiawatha, Inc.
 - f. H. B. Ives, A Harrow Company.
 - g. Triangle Brass Manufacturing Company (Trimco).

11. Door Stripping and Seals:
 - a. Hager Hinge Co.
 - b. National Guard Products, Inc.
 - c. Pemko Manufacturing Co., Inc.
 - d. Reese Enterprises, Inc.
 - e. Sealeze Corp.
 - f. Ultra Industries.
 - g. Zero International, Inc.

12. Thresholds:
 - a. Hager Hinge Co.
 - b. National Guard Products, Inc.
 - c. Pemko Manufacturing Co., Inc.
 - d. Reese Enterprises, Inc.
 - e. Sealeze Corp.
 - f. Zero International, Inc.

13. Automatic Drop Seals:
 - a. Hager Hinge Co.
 - b. National Guard Products, Inc.
 - c. Pemko Manufacturing Co., Inc.
 - d. Reese Enterprises, Inc.
 - e. Zero International, Inc.

14. Sound Stripping:
 - a. National Guard Products, Inc.
 - b. Pemko Manufacturing Co., Inc.
 - c. Reese Enterprises, Inc.
 - d. Zero International, Inc.

15. Astragals:
 - a. Hager Hinge Co.
 - b. National Guard Products, Inc.
 - c. Pemko Manufacturing Co., Inc.
 - d. Reese Enterprises, Inc.
 - e. Zero International, Inc.

2.2 SCHEDULED HARDWARE

Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the "Hardware Schedule" in the drawings or project specifications. Products are identified by using hardware designation numbers of the following: Manufacturer's Product Designations: The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements. Provide either the product designated or, where more than one manufacturer is specified under the Article "Manufacturers" in Part 2 for each hardware type, the comparable product of one of the other manufacturers that complies with requirements.

2.3 MATERIALS AND FABRICATION

- A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to government. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
- C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- D. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
- E. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

2.4 HINGES, BUTTS, AND PIVOTS

- A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- B. Screws: Provide Phillips flat-head screws complying with the following requirements:
 - 1. For metal doors and frames install machine screws into drilled and tapped holes.
 - 2. For wood doors and frames install wood screws.
 - 3. For fire-rated wood doors install #12 x 1-1/4-inch, threaded-to-the-head steel wood screws.
 - 4. Finish screw heads to match surface of hinges or pivots.
- C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - 1. Out-Swing Exterior Doors: Nonremovable pins.
 - 2. Out-Swing Corridor Doors with Locks: Nonremovable pins.
 - 3. Interior Doors: Nonrising pins.
 - 4. Tips: Flat button and matching plug, finished to match leaves, except where hospital tip (HT) indicated.
- D. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height. Fire-Rated Doors: Not less than 3 hinges per door leaf for doors 86 inches or less in height with same rule for additional hinges.

2.5 LOCK CYLINDERS AND KEYING

- A. Existing System: Grandmasterkey the locks to the Government's existing system, with a new masterkey for the Project.
- B. Equip locks with cylinders for interchangeable-core pin tumbler inserts. Furnish only temporary inserts for the construction period, and remove these when directed. Furnish final cores and keys for installation by Government.
- C. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel

silver.

- D. Comply with Government's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."
- E. Key Material: Provide keys of nickel silver only.
- F. Key Quantity: Furnish 3 change keys for each lock, 5 master keys for each master system, and 5 grandmaster keys for each grandmaster system.
 - 1. Furnish one extra blank for each lock.
 - 2. Deliver keys to Contracting Officer.

2.6 LOCKS, LATCHES, AND BOLTS

- A. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
 - 1. Provide flat lip strikes for locks with 3-piece, antifriction latchbolts as recommended by manufacturer.
 - 2. Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.
 - 3. Provide dust-proof strikes for foot bolts, except where special threshold construction provides nonrecessed strike for bolt.
- B. Lock Throw: Provide 5/8-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings. Provide 1/2-inch minimum throw of latch for other bored and preassembled types of locks and 3/4-inch minimum throw of latch for mortise locks. Provide 1-inch minimum throw for all dead bolts.
- C. Flush Bolt Heads: Minimum of 1/2-inch-diameter rods of brass, bronze, or stainless steel with minimum 12-inch-long rod for doors up to 7'-0" in height. Provide longer rods as necessary for doors exceeding 7'-0" in height.
- D. Exit Device Dogging: Except on fire-rated doors where closers are provided on doors equipped with exit devices, equip the units with keyed dogging device to keep the latch bolt retracted, when engaged.

2.7 CLOSERS AND DOOR CONTROL DEVICES

- A. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.
 - 1. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.
 - 2. Provide parallel arms for all overhead closers, except as otherwise indicated.
- B. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.
- C. Provide grey resilient parts for exposed bumpers.

2.8 DOOR TRIM UNITS

- A. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
- B. Fabricate edge trim of stainless steel to fit door thickness in standard lengths or to match height of protection plates.
- C. Fabricate protection plates not more than 1-1/2 inches less than door width on hinge side and not more than 1/2 inch less than door width on pull side by height indicated. Metal Plates: Stainless steel, 0.050 inch (U.S. 18 gage).

2.9 WEATHERSTRIPPING AND SEALS

- A. General: Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
- B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
- C. Weatherstripping at Jambs and Heads: Provide bumper-type resilient insert and metal retainer strips, surface applied unless shown as mortised or semimortised, and of following metal, finish, and resilient bumper material:

1. Extruded aluminum with natural anodized finish, 0.062-inch minimum thickness of main walls and flanges.
 2. Sponge neoprene conforming to MIL R 6130, Class II (Closed Cell). Grade A (30 deg F to 150 deg F, oil-resistant and self-extinguishing).
 3. Solid neoprene conforming to MIL R 6855, Class II, Grade 40. Flexible, hollow bulb or loop insert.
 4. Brush pile insert of polypropylene or nylon woven pile and aluminum strip backing complying with AAMA 701.2.
- D. Weatherstripping at Door Bottoms: Provide threshold as indicated with Door Bottom contact-type resilient insert and metal housing of design and size shown and of following metal, finish, and resilient seal strip: Cast Aluminum threshold with extruded aluminum with natural anodized finish, 0.062-inch minimum thickness of main walls and flanges.

2.10 THRESHOLDS

- A. General: Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile as shown or scheduled.
- B. Exterior Hinged or Pivoted Doors: Provide units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, fabricated to accommodate door hardware and to fit door frames, and as follows: For out-swinging doors provide units as indicated.

2.11 HARDWARE FINISHES

- A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
- B. Provide finishes that match those established by BHMA or, if none established, match the Contracting Officer's selection.
- C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used

with standard finish designations to indicate "no lacquer."

- E. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
- F. The designations used in schedules and elsewhere to indicate hardware finishes are the industry-recognized standard commercial finishes, except as otherwise noted. Rust-Resistant Finish: For iron and steel base metal required for exterior work and in areas shown as "High Humidity" areas (and also when designed with the suffix -RR), provide 0.2-mil-thick copper coating on base metal before applying brass, bronze, nickel, or chromium plated finishes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
 - 1. "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute.
 - 2. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers."

- F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Instruct Government personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
- D. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the Installer, accompanied by representatives of the manufacturers of latchsets and locksets and of door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:
 - 1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
 - 2. Consult with and instruct Government personnel in recommended additions to the maintenance procedures.
 - 3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
 - 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.3 HARDWARE SCHEDULE

General: Provide hardware for each door to comply with requirements of Section "Door Hardware," hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.

- A. Hardware sets indicate quantity, item, manufacturer and product designation, size, and finish or color, as applicable.

- B. Hardware sets indicate quantity, item, ANSI designation, size, and finish or color, as applicable.

END OF SECTION 08710

SECTION 08800

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

This Section includes glazing for the following products, including those specified in other Sections where glazing requirements are specified by reference to this Section:

- A. Side lites.
- B. Entrances and other doors.
- C. Storefront construction (including fixed aluminum & glass windows).

1.3 DEFINITIONS

- A. Manufacturer is used in this Section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced glazing standard.
- B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's directions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- C. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use due to causes other than glass breakage and improper practices for maintaining, and cleaning insulating glass. Evidence of failure is the obstruction of vision by dust, moisture, or film on the interior surfaces of glass. Improper practices for maintaining and cleaning glass do not comply with the manufacturer's directions.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where

applicable), without failure including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.

- B. Glass Design: Glass thicknesses indicated on Drawings are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for the various size openings in the thicknesses and strengths (annealed or heat-treated) to meet or exceed the following criteria:
1. Minimum glass thickness, nominally, of lites in exterior walls is 6.0 mm (0.23 inch).
 2. Tinted and heat-absorbing glass thicknesses for each tint indicated are the same throughout Project.
 3. Minimum glass thicknesses of lites, whether composed of annealed or heat-treated glass, are selected so the worst-case probability of failure does not exceed the following: 8 lites per 1000 for lites set vertically or not over 15 degrees off vertical and under wind action. Determine minimum thickness of monolithic annealed glass according to ASTM E 1300. For other than monolithic annealed glass, determine thickness per glass manufacturer's standard method of analysis including applying adjustment factors to ASTM E 1300 based on type of glass.
- C. Normal thermal movement results from the following maximum change (range) in ambient and surface temperatures acting on glass-framing members and glazing components. Base engineering calculation on materials' actual surface temperatures due to both solar heat gain and nighttime sky heat loss. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.5 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each glass product and glazing material indicated.
- C. Samples for verification purposes of 12-inch-square samples of each type of glass indicated except for clear monolithic glass products, and 12-inch-long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative in color of the adjoining framing system.
- D. Product certificates signed by glazing materials manufacturers certifying that their

products comply with specified requirements. Separate certifications are not required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.

- E. Compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.
- F. Compatibility test report from manufacturer of insulating glass edge sealant indicating that glass edge sealants were tested for compatibility with other glazing materials including sealants, glazing tape, gaskets, setting blocks, and edge blocks.
- G. Product test reports for each type of glazing sealant and gasket indicated, evidencing compliance with requirements specified.
- H. Maintenance data for glass and other glazing materials to include in Operating and Maintenance Manual specified in Division 1.

1.6 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. FGMA Publications: "FGMA Glazing Manual."
 - 2. LSGA Publications: "LSGA Design Guide."
 - 3. SIGMA Publications: TM-3000 "Vertical Glazing Guidelines".
- B. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:
 - 1. Insulating Glass Certification Council (IGCC).
 - 2. Associated Laboratories, Inc. (ALI).
 - 3. National Certified Testing Laboratories (NCTL).

- C. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful in-service performance.
- D. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:
 - 1. Primary glass of each (ASTM C 1036) type and class indicated.
 - 2. Heat-treated glass of each (ASTM C 1048) condition indicated.
 - 3. Insulating glass of each construction indicated.
- E. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- F. Preconstruction Compatibility and Adhesion Testing: Submit to sealant manufacturers, samples of each glass, gasket, glazing accessory, and glass-framing member that will contact or affect glazing sealants for compatibility and adhesion testing as indicated below:
 - 1. Use test methods standard with sealant manufacturer to determine if priming and other specific preparation techniques are required for rapid, optimum glazing sealants adhesion to glass and glazing channel substrates. Perform tests under normal environmental conditions during installation.
 - 2. Submit not less than nine pieces of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, laminated, insulating units) for adhesion testing, as well as one sample of each glazing accessory (gaskets, setting blocks and spacers) for compatibility testing.
 - 3. Schedule sufficient time to test and analyze results to prevent delay in the Work.
 - 4. Investigate materials failing compatibility or adhesion tests and get sealant manufacturer's written recommendations for corrective measures, including using special primers.
 - 5. Testing is not required when glazing sealant manufacturer can submit required preparation data that is acceptable to Contracting Officer and is based on previous testing of current sealant products for adhesion to and compatibility with submitted glazing materials.

1.7 DELIVERY, STORAGE, AND HANDLING

Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes. Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator's recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes. Install liquid sealants at ambient and substrate temperatures above 40 deg F (4.4 deg C).

1.9 WARRANTY

- A. General: Warranties specified in this Article shall not deprive the Government of other rights the Government may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
- B. Manufacturer's Warranty on Coated Glass Products: Submit written warranty signed by coated glass manufacturer agreeing to furnish replacements for those coated glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer's published instructions. Warranty Period: Manufacturer's standard but not less than 5 years after date of Substantial Completion.
- C. Manufacturer's Warranty on Insulating Glass: Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions. Warranty Period: Manufacturer's standard but not less than 10 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the products specified.

2.2 PRIMARY FLOAT GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class as indicated below, and Quality q3 (glazing select).
 - 1. Class 1 (clear) unless otherwise indicated.
 - 2. Class 2 (tinted, heat-absorbing, and light-reducing) where indicated.
- B. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted glass, coated or uncoated, relative to visible light transmittance and shading coefficient.

2.3 HEAT-TREATED FLOAT GLASS PRODUCTS, GENERAL

Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.

2.4 HEAT-TREATED FLOAT GLASS

- A. Uncoated, Tinted, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 2 bronze (tinted heat-absorbing and light-reducing), Quality q3 (glazing select), with tint color and performance characteristics for 6.0-mm-thick (0.23-inch-thick) glass matching those indicated for annealed primary tinted float glass; visible light transmittance: not more than 47%; Shading coefficient: not less than 57%; kind as indicated below: Kind FT (fully tempered) where indicated.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering heat-treated glass products that may be incorporated in the Work include, but are not limited to, the following companies.
 - 1. AFG Industries, Inc.
 - 2. Artistic Glass Products Co.
 - 3. Cardinal IG.

4. Saint-Gobain.
5. Falconer Glass Industries.
6. Glasstemp, Inc.
7. Guardian Industries Corp.
8. HGP Industries.
9. PPG Industries, Inc.
10. Spectrum Glass Products, Inc.
11. Tempglass.
12. Viracon, Inc.

2.5 INSULATING GLASS PRODUCTS

- A. Sealed Insulating Glass Units: Preassembled units consisting of organically sealed lites of glass separated by dehydrated air spaces complying with ASTM E 774 and with other requirements indicated.
 1. For properties of individual glass lites making up units, refer to requirements specified elsewhere in this Section applicable to types, classes, kinds, and conditions of glass products comprising lites of insulating glass units.
 2. Provide heat-treated, coated float glass of kind indicated or, if not otherwise indicated, Kind HS (heat strengthened) where recommended by manufacturer to comply with system performance requirements specified and Kind FT (fully tempered) where safety glass is designated or required.
 3. Performance characteristics designated for coated insulating glass are nominal values based on manufacturer's published test data for units with lites 6.0 mm (0.23 inch) thick and nominal 1/2-inch dehydrated space between lites, unless otherwise indicated. Visible light transmittance: not more than 47%; Shading coefficient: not less than 57%;
- B. Provide 1/2-inch airspace. The inner light shall be ASTM C 1036, Type I, Class 1, Quality q3, 1/4-inch thick. The outer light shall be ASTM C 1036, Type I, Class 2, (tinted heat absorbing), Quality q3, 1/4-inch thick, bronze in color.

2.6 SETTING AND SEALING MATERIALS

- A. Provide as specified in the FGMA GM, SIGMA A3000 and manufacturer's recommendations, unless specified otherwise herein. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers, or impregnated preformed gaskets. Materials exposed to view and unpainted shall be gray or neutral color.
- B. Elastomeric Sealant: ASTM C 920, Type S or M, Grade NS, Class 12.5, Use G. Use for channel or stop glazing metal sash. Sealant shall be chemically compatible with setting blocks, edge blocks, and sealing tapes, with sealants used in manufacture of insulating glass units. Color of sealant shall be bronze.
- C. Preformed Channels: Neoprene, vinyl, or rubber, as recommended by the glass manufacturer for the particular condition.
- D. Sealing Tapes: Preformed, semisolid, polymeric-based material of proper size and compressibility for the particular condition. Use only where glazing rabbet is designed for tape and tape is recommended by the glass or sealant manufacturer. Provide spacer shims for use with compressible tapes. Tapes shall be chemically compatible with the product being set.
- E. Setting Blocks and Edge Blocks: Lead or neoprene of 70 to 90 Shore "A" durometer hardness, chemically compatible with sealants used, and of sizes recommended by the glass manufacturer.
- F. Accessories: Provide as required for a complete installation, including glazing points, clips, shims, angles, beads, and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass and sealant manufacturers.

2.7 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.
- B. Clean cut or flat grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

PART 3 - EXECUTION

3.1 PREPARATION

Preparation, unless otherwise specified or approved, shall conform to applicable recommendations in the FGMA GM, FGMA SM, SIGMA A3000, and manufacturer's recommendations. Determine the sizes to provide the required edge clearances by measuring the actual opening to receive the glass. Grind smooth in the shop glass edges that will be exposed in finish work. Leave labels in place until the installation is approved, except remove applied labels on heat-absorbing glass and on insulating glass units as soon as glass is installed. Securely fix movable items or keep in a closed and locked position until glazing compound has thoroughly set.

3.2 GLASS SETTING

- A. Shop glaze or field glaze items to be glazed using glass of the quality and thickness specified or indicated. Glazing, unless otherwise specified or approved, shall conform to applicable recommendations in the FGMA GM, FGMA SM, SIGMA A3000, and manufacturer's recommendations. Aluminum windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except that face puttying with no bedding will not be permitted. Handle and install glazing materials in accordance with manufacturer's instructions. Use beads or stops which are furnished with items to be glazed to secure the glass in place.
- B. Insulating Glass Units: Do not grind, nip, or cut edges or corners of units after the units have left the factory. Springing, forcing, or twisting of units during setting will not be permitted. Handle units so as not to strike frames or other objects. Installation shall conform to applicable recommendations of SIGMA A3000.

3.3 PROTECTION AND CLEANING

- A. Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in

any way, including natural causes, accidents and vandalism, during construction period.

- E. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 08800