SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. 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, sliding, and folding 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 "Standard Steel Doors and Frames" for silencers integral with hollow metal frames.
3. Division 8 Section "Flush Wood Doors" for factory prefitting and factory premachining of doors for door hardware.
4. Division 8 Section "Aluminum Entrances and Storefronts" for aluminum entrance door hardware, except cylinders.
5. Division 8 Section "Automatic Entrance Doors" for automatic door operators.

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 Owner.

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 Owner'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.

1. 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 Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Require supplier to meet with Owner 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.

D. Accessibility Compliance: All hardware must comply with all requirements of the Uniform FederalAccessibility Standards (UFAS).

E. 3 year written warranty: Provide a manufacturer's 3 year written warranty.

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

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Butts and Hinges:

*a. Hager Hinge Co.
b. H. Soss & Company.
c. Stanley Hardware, Div. Stanley Works.

2. Cylinders and Locks:

*a. Best Lock Corp.
b. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.
c. Yale.

3. Bolts:

*a. Glynn-Johnson Corp.
b. Hager Hinge Co.
c. H. B. Ives, A Harrow Company.

4. Exit/Panic Devices:

*a. Von Duprin, Div. Ingersoll-Rand Door Hardware Group.
b. Sargent Manufacturing Co.
c. Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.

5. Push/Pull Units:

*a. Hager Hinge Co.
b. Hiawatha, Inc.
c. Lindstrom

6. Overhead Closers:

   *a. LCN, Div. Ingersoll-Rand Door Hardware Group.
   b. Sargent Manufacturing Co.
   c. Norton Door Controls, Div. Yale Security Inc.

7. Door Trim Units:

   *a. Baldwin Hardware Corp.
   b. Hager Hinge Co.
   c. H. B. Ives, A Harrow Company.

8. Kick, Mop, and Armor Plates:

   *a. Hager Hinge Co.
   b. Hiawatha, Inc.
   c. Lindstrom

9. Door Stripping and Seals:

   *a. National Guard Products, Inc.
   b. Pemko Manufacturing Co., Inc.
   c. Reese Enterprises, Inc.

10. Thresholds:

    *a. National Guard Products, Inc.
    b. Pemko Manufacturing Co., Inc.
    c. Reese Enterprises, Inc.

11. Automatic Drop Seals:

    *a. National Guard Products, Inc.
    b. Pemko Manufacturing Co., Inc.
    c. Reese Enterprises, Inc.

12. Astragals:

    *a. National Guard Products, Inc.
    b. Pemko Manufacturing Co., Inc.
    c. Reese Enterprises, Inc.

2.2 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the "Hardware Schedule" at the end of this Section. Products are identified by using hardware designation numbers of the following:

1. 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 Architect.

1. 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 fire-rated wood doors install #12 x 1-1/4-inch, threaded-to-the-head steel wood screws.
3. 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.

1. 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 Owner's existing system, with a new masterkey for the Project.

B. Lock cylinders shall be 7-pin removable core.

C. Equip locks with cylinders for interchangeable-core pin tumbler inserts. Furnish only temporary inserts for the construction period, and remove these when directed.

1. Permanent keying to be performed by Best Lock Systems of Maryland.

D. Equip locks with high-security cylinders that comply with performance requirements for Grade 1 cylinders as listed in ANSI/BHMA A156.5 and that have been tested for pick and drill resistance requirements of UL 437 and are UL listed.

E. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.

F. Comply with Owner'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.

1. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."

G. Key Material: Provide keys of nickel silver only.

H. Provide proper interlocking of cylinders with auto door opener.

2.6 KEY CONTROL SYSTEM

A. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.

1. Provide complete cross index system set up by key control manufacturer, and place keys on markers and hooks in the cabinet as determined by the final key schedule.
2. Provide hinged-panel type cabinet for wall mounting.

2.7 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.

1. 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.

E. Rabbeted Doors: Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts.

2.8 PUSH/PULL UNITS

A. Exposed Fasteners: Provide manufacturer's standard exposed fasteners for installation, thru-bolted for matched pairs but not for single units.

2.9 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 UFAS provisions for door opening force and delayed action closing.

C. Combination Door Closers and Holders: Provide units designed to hold door in open position under normal usage and to release and close door automatically under fire conditions. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts.

2.10 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.

1. Metal Plates: Stainless steel, 0.050 inch (U.S. 18 gage).

2.11 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 color anodized finish as selected from manufacturer's standard color range, 0.062-inch minimum thickness of main walls and flanges.
2. Solid neoprene conforming to MIL R 6855, Class II, Grade 40.

    a. Flexible, hollow bulb or loop insert.

D. Weatherstripping at Door Bottoms: Provide threshold consisting of contact-type resilient insert and metal housing of design and size shown and of following metal, finish, and resilient seal strip:

1. Extruded aluminum with color anodized finish as selected from manufacturer's standard color range, 0.062-inch minimum thickness of main walls and flanges.
2. Solid neoprene wiper or sweep seal complying with MIL R 6855, Class II, Grade 40.

2.12 THRESHOLDS

A. General: Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile as shown or scheduled.

1. Provide raised stop that meeds ADA.

2.13 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 Architect's sample.

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 the industry-recognized standard commercial finishes, except as otherwise noted.

1. 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 at chlorine atmosphere areas provide stainless steel hardware..

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 Standard 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.

1. 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 Owner's 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 Owner's 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

A. 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.

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

HW 1

Doors 101A, 101B

8	Pivots	By alum. door manufacturer
1	Exit Device(s)	(Cylinder-outside by lever except when locked by key inside or outside)
1	Exit Device(s)	(No cylinder- lever rigid)
2	Door Bottom(s)	By alum. door manufacturer
2	Closer(s)	By alum. door manufacturer
1	Threshold	By alum. door manufacturer
2	Weatherstripping Set(s)	By alum. door manufacturer
1	Auto. Door Opener	@ Door 142C Only

HW 2

Doors 101C, 101D

8	Pivots	By alum. door manufacturer
2	Push Plate(s)	By alum. door manufacturer
2	Pull(s)	By alum. door manufacturer
2	Closer(s)	By alum. door manufacturer
1	Threshold	By alum. door manufacturer
1	Weatherstripping Set	By alum. door manufacturer

HW 3

Doors 127A, 127B, 127C, 127D, 127E, 129B, 129C, 129D

8	Pivots	By alum. door manufacturer
1	Exit Device	(Cylinder-Key lock and unlock from inside, lever @ outside rigid)
1	Exit Device	(No cylinder- lever rigid)
2	Closers	By alum. door manufacturer
1	Threshold	By alum. door manufacturer
1	Weatherstripping Set	By alum. door manufacturer
2	Door Bottoms	By alum. door manufacturer

HW 4

Doors 102A, 102B & 117

4	Pivots	By alum. door manufacturer
1	Exit Device	(Cylinder-Key lock and unlock from inside, lever @ outside)
2	Closers	By alum. door manufacturer
1	Threshold	By alum. door manufacturer
1	Weatherstripping Set	By alum. door manufacturer
1	Door Bottom	By alum. door manufacturer
1	Auto Door Opener	@ Door 102B only

HW 5

Doors 105, 105A & 129A

8	Pivots	By alum. door manufacturer
1	Exit Device	(Cylinder-Outside by key lever always rigid)
1	Exit Device	(No cylinder - Lever rigid
2	Closers	By alum. door manufacturer
1	Threshold	By alum. door manufacturer

HW 6

Doors 131 & 131A

4	Pivots	By alum. door manufacturer
1	Dead Bolt	Key outside, inside thumbturn can retract but not latch bolt.
1	Push Plate(s)	By alum. door manufacturer
1	Pull(s)	By alum. door manufacturer
1	Closer(s)	By alum. door manufacturer
1	Threshold	By alum. door manufacturer

HW 7

Doors 144A

4	Pivots	By Aluminum Door Manufacturer
1	Cylinder	By Aluminum Door Manufacturer
1	Pull	By Aluminum Door Manufacturer
1	Closer	By Aluminum Door Manufacturer
1	Threshold	426
2	Door Bottoms	312
2	Sets of Weatherstripping	5050C

HW 8

Door 118C

4	Pr. Butts	4 1/2 X 4 1/2; BB 1199 - 26D
2	Exit Device	(Cylinder- outside by lever except when locked by key outside)
1.	Automatic Flushbolt	842
6	Silencers	20R
1	Threshold	411
2	Closers	2000 Series
2	Kickplates	8 X 34 1/2 X 0.50 - 32D

HW 9

Doors 144, 146, 149, 130B

2	Pr. Butts	4 1/2 X 4 1/2; BB 1199 - 32D
1	Lockset	9551 - 779L - 26D
1	Closer	2000 Series
3	Silencers	20R
1	Wall Stop	406 - 1/2 S - 32D
1	Threshold	657

HW 10

Doors 141A, 142 & 143A

4	Pr. Butts	4 1/2 X 4 1/2; BB 1199 - 32D
1	Lockset	9757 - 779L - 26D
2	Closers with hold-open	100 Series
1	Set Automatic Flush Bolts	458-D 12" 26D
1	Threshold	657
1	Door Bottom	312
1	Door Sweep	101AV
1	Weatherstripping Set	5050C

HW 11

Doors 123, 124, 132, 203 & 204

1 1/2	Pr. Butts	4 1/2 X 4 1/2, BB 1199 - 32D
1	Lockset	9520 - 779L - 26D
1	Closer	2000 Series
1	Wall Stop	406 - 1 1/2 S - 32D
3	Silencers	20R

HW 12

Doors 118D, 118E, 119, 119A, 140 & 141

4	Pr. Butts	4 1/2 X 4 1/2; BB 1199 - 32D
1	Lockset	9557 - 779L - 26D
1	Closer	100 Series with hold-open
1	Set of Flushbolts	458 Series
6	Silencers	20R
2	Wall Stop or Floor Stop	406 - 1/2 S/441 - 26D
1	Threshold	426
1	Weatherstripping Set	5050C (@ Door 141)

HW 13

Doors 106, 109, 112, 115, 116, 116A, 122, 130, 130A, 150, 150A, 152, 201, 205, 206, 210

2	Pr. Butts	4 1/2 X 4 1/2; BB 1199 - 32D
1	Lockset	9555 - 779L - 26D
1	Closer	2000 Series
3	Silencers	20R
1	Wall Stop	406 - 1/2 S - 32D
1	Threshold	657

HW 14

Doors 107, 111, 113, 114, 117A, 126, 136, 140A, 143B, 151A, 211

2	Pr. Butts	4 1/2 X 4 1/2; BB 1199 - 32D
1	Lockset	9557 - 779L - 26D
1	Closer	2000 Series with hold-open (No hold open at Rated Doors)
3	Silencers	20R
1	Wall Stop or Floor Stop	406 - 1/2 S/441 - 26D
1	Threshold	426

HW15

Doors 120, 121, 133, 134, 137 & 139

2	Pr. Butts	4 1/2 X 4 1/2; BB 1199 - 32D
1	Dead Bolt	Key lock and unlock outside, inside thumbturn can retract but not latch bolt.
1	Pushplate	0100 (4 X 16) - 32D
1	Pullplate	0100 X G10 (3 1/2 X 15) X 126 - 32D
1	Kickplate	8 X 34 1/2 X 0.50 - 32D
1	Closer	2000 Series
1	Wall Stop or Floor Stop	406 - 1/2 S - 32D/438 - 26D
3	Silencers	20R

HW16

Doors 118A & 118B

2	Pr. Butts	4 1/2 X 4 1/2; BB 1199 - 32D
1	Exit Device	(Cylinder – outside by lever except when locked by key outside)
1	Threshold	411
1	Closer	2000 Series
1	Kickplate	8 X 34-1/2 X 0.50 – 32D

HW17

Doors 211A

2	Pr. Butts	4 1/2 X 4 1/2; BB 1199 - 32D
1	Lockset	9757 – 779L – 26D
1	Closer with hold-open	100 Series
1	Threshold	657
1	Door Bottom	312
1	Door Sweep	101AV
1	Weatherstripping Set	5050C

END OF SECTION 08710

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1. Vision lites.
2. Entrances and other doors.
3. Storefront construction.
4. Curtainwall construction.

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

1. Division 8 Section "Mirrored Glass" for mirrored glass and glazing requirements.
2. Division 8 Section "Aluminum Entrances and Storefront".
3. Division 8 Section " Glazed Aluminum Curtainwalls".

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 Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's directions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated glass standard.

D. 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.

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: 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:

   a. 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.
   b. 1 lite per 1000 for lites set over 15 degrees off vertical and under action of wind or snow.

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.

1. 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.

1. 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. AAMA Publications: AAMA TIR-A7 "Sloped Glazing Guidelines" and "Glass Design for Sloped Glazing."
3. LSGA Publications: "LSGA Design Guide."
4. SIGMA Publications: TM-3000 "Vertical Glazing Guidelines" and TB-3001 "Sloped Glazing Guidelines."

B. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

C. 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).

D. 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.

E. 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. Laminated glass of each (ASTM C 1172) kind indicated.
4. Insulating glass of each construction indicated.

F. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

G. Field-Constructed Mockups: Prior to glazing, erect mockups for each glass product indicated below to verify selections made under sample submittals and to demonstrate aesthetic effects and quality of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work:

1. Glass Products: Erect mockups with the following kinds of glass to match glazing systems required for Project, including typical lite size, framing systems, and glazing methods:

   a. Coated insulating glass.

2. Place mockups on site in location and of size indicated or, if not indicated, as directed by Architect.
3. Notify Architect one week in advance of the dates and times when mockups will be erected.
4. Obtain Architect's acceptance of mockups before start of final unit of Work.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Retain and maintain mockups during construction in undisturbed condition as a standard for judging completed unit of Work.

H. 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.
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 Architect 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

A. 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.

1.8 PROJECT CONDITIONS

A. 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.

1. 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 Owner of other rights the Owner 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.

1. Warranty Period: Manufacturer's standard but not less than 5 years after date of Substantial Completion.

C. Manufacturer's Warranty on Laminated Glass: Submit written warranty signed by insulating glass manufacturer agreeing to furnish replacements for those laminated glass units that deteriorate as defined in the "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.

1. Warranty Period: Manufacturer's standard but not less than 5 years after date of Substantial Completion.

D. 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.

1. Warranty Period: Manufacturer's standard but not less than 10 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 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.

a. Color - Evergreen Tint, LOF

B. Refer to coated glass product requirements for tint color and performance characteristics of coated tinted glass for monolithic glazing relative to visible light transmittance, U-values, shading coefficient, and visible reflectance.

C. 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, U-values, shading coefficient, and visible reflectance.

2.2 HEAT-TREATED FLOAT GLASS PRODUCTS, GENERAL

A. 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.

2.3 HEAT-TREATED FLOAT GLASS

A. Uncoated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), kind as indicated below.

1. Kind FT (fully tempered) where indicated.

B. Coated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition C (other coated glass), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), with coating type and performance characteristics complying with requirements specified under coated glass products; kind as indicated below:

1. Kind FT (fully tempered) where indicated.

C. Manufacturers: Subject to compliance with requirements, provide heat-treated glass by one of 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.
13. LOF

2.4 COATED MONOLITHIC GLASS PRODUCTS

A. General: Performance characteristics designated for coated monolithic glass products are nominal values based on manufacturer's published test data for glass products 6.0 mm thick (0.23 inch thick), unless otherwise indicated. Comply with requirements specified including those for primary and heat-treated float glass products as they relate to properties of glass to which coatings are applied.

1. U-values are expressed as Btu/hour x sq. ft. x deg F.
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 coated safety glass is designated or required.

3. Provide Kind HS (heat-strengthened) coated float glass except provide Kind FT (fully tempered) products where coated safety glass is designated or required.

B. Pyrolytically Coated Glass Products: Float glass with solar-reflective metallic oxide coating applied pyrolytically either during initial manufacture or during heat treatment.

C. Sputter-Coated Glass Products: Float glass with metallic oxide or metallic nitride coating deposited by magnetic sputtering process after manufacture and heat treatment (if any).

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.
4. U-values are expressed as Btu/hour x sq. ft. x deg F.

B. Low Emissivity-Coated Insulating Glass Units: Manufacturer's standard units with one pane of glass coated with a durable, neutral-colored, low-emissivity metallic coating, of type and on surface indicated, and complying with the following requirements:

1. Exterior Pane: Float glass, coated on second surface.

   a. Tint: Ever-Green High Performance Tint by LOF
   b. Kind FT (fully tempered) where indicated.

2. Interior Pane: Clear float glass, uncoated.

   a. Kind FT (fully tempered) where indicated.

3. Coating Type: Vacuum deposited.

4. Performance Characteristics: Visible light transmittance of 33 percent, summer daytime U-value of 0.34, winter nighttime U-value of 0.31, shading coefficient of 0.44 and outdoor reflectance of 8 percent.

2.6 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
2. Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.
3. Colors: Provide color of exposed joint sealants to comply with the following:

   a. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

B. Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920 requirements indicated on each Elastomeric Glazing Sealant Product Data Sheet at the end of this Section, including those referencing ASTM classifications for Type, Grade, Class and Uses.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, nonstaining and nonmigrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with AAMA 800 for products indicated below:

1. AAMA 804.1.
2. AAMA 806.1.
3. AAMA 807.1.

B. Expanded Cellular Glazing Tape: Closed-cell, polyvinyl chloride foam tape, factory coated with adhesive on both surfaces, packaged on rolls with release liner protecting adhesive, and complying with AAMA 800 for product 810.5.

C. Available Products: Subject to compliance with requirements, glazing tape that may be incorporated in the Work include, but is not limited to, the following:

1. Back-Bedding Mastic Glazing Tape Without Spacer Rod:

a. PTI 303 Glazing Tape (shimless), Protective Treatments, Inc.
b. S-M 5700 Poly-Glaze Tape Sealant, Schnee-Morehead, Inc.
c. Tremco 440 Tape, Tremco Inc.
d. Extru-Seal, Pecora Corp.
e. PTI 606 Architectural Sealant Tape, Protective Treatments, Inc.
f. Dyna-Seal, Pecora Corp.
g. PTI 626 Architectural Sealant Tape, Protective Treatments, Inc.
h. S-M 5710 H.P Poly-Glaze Tape Sealant, Schnee-Morehead, Inc.
i. SST-800 Tape, Tremco, Inc.

2. Back-Bedding Mastic Glazing Tape With Spacer Rod:

a. PTI 303 Glazing Tape (with shim), Protective Treatments, Inc.
b. Pre-shimmed Tremco 440 Tape, Tremco, Inc.
c. PTI 606 Architectural Sealant Tape, Protective Treatments, Inc.

3. Expanded Cellular Glazing Tape:

a. Norseal V-980 Closed-Cell Glazing Tape, Norton Company.

2.8 GLAZING GASKETS

A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.

B. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

C. Soft Compression Gaskets: Extruded or molded closed-cell, integral-skinned gaskets of material indicated below, complying with ASTM C 509, Type II, black, and of profile and hardness required to maintain watertight seal:

1. Neoprene.
2. EPDM.
3. Silicone.
4. Thermoplastic polyolefin rubber.
5. Any material indicated above.

D. 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 companies.

1. Lock-Strip Gaskets:

   a. Stanlock Div., Griffith Rubber Mills.

2. Preformed Gaskets:

   a. Advanced Elastomer Systems, L.P.
   b. Schnee-Morehead, Inc.
   c. Tremco, Inc.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85 plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side-walking).

F. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistive rating.

2.10 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass from edge damage during handling and installation as follows:

1. Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.
2. Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:

1. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each lite is installed.

3.5 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

C. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.7 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's printed recommendations. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 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

SECTION 08830 - MIRROR GLASS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Extent of mirror glass work is indicated on the drawings.

B. Types of work in this section include glass and glazing for:

1. Mirror glass (at full length and above countertop mirrors).

1.3 SYSTEM DESCRIPTION

A. Provide mirror glass that has been produced, fabricated and installed to withstand normal thermal movement and impact loading (where applicable), without failure including loss or breakage of glass, deterioration of glass and glazing materials, and other defects in the work.

B. Deterioration of coated glass is defined as the development of manufacturing defects including peeling, cracking or other indications of deterioration in metallic coating due to normal conditions of use.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each glazing material and fabrication glass product required, including installation and maintenance instructions.

B. Samples: Submit, for verification purposes, 12" square samples of each type of mirror glass indicated.

C. Certificate: Submit certificates from respective manufacturers attesting that glass and glazing materials furnished for project comply with requirements.

1.5 QUALITY ASSURANCE

A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FMGA) "Glazing Manual" except where more stringent requirements are

indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.

B. Safety Glazing Standard: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.

C. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer of fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source of each type and class required.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glass materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass materials from effects of moisture including condensation, or temperature changes, or direct exposure to sun, and from other causes.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

1.8 WARRANTY

A. Warranty: Submit a written warranty executed by mirror manufacturer, agreeing to replace any mirrors that develop visible silver spoilage defects within warranty period.

1. Warranty Period: 15 years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Manufacturers of Mirror Glass:
   a. AFG Industries, Inc.
   b. Ford Glass Division.
   c. Guardian Industries Corp.
   d. LOF Glass, Inc.

e. PPG Industries, Inc.
f. Saint-Gobain/Euroglass.

2.2 GLASS PRODUCTS, GENERAL

A. Primary Glass Standard: Provide primary glass which complies with ASTM C 1036 requirements, including those indicated by reference to type, class, quality, and if applicable, form, finish , mesh and pattern.

B. Mirror Glass: (at full length mirrors) shall be installed in a continuous chrome frame on all 4 sides per drawing. Provide vinyl adhesive backing behind mirror to eliminate mirror shake.

1. Mirror glass shall be, Type 1, Class 1, Quality q2, 1/4" thick, with silver coating, copper protective coating, and non-metallic paint coating.

2.3 HEAT-TREATED GLASS PRODUCTS

A. Manufacturing Process: Manufacture heat-treated glass as follows:

1. 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".

B. Uncoated Clear Heat-Treated Float Glass: Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), kind as indicated below.

1. Kind FT (fully tempered) where indicated.

2.4 MISCELLANEOUS GLAZING MATERIALS

A. Compatibility: Provide materials with proven record of compatibility with surfaces contacted in installation.

PART 3 - EXECUTION

3.1 PREPARATION AND CLEANING

A. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

B. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

C. Wash glass face not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each are of project. Wash glass by method recommended by glass manufacturer.

END OF SECTION 08830

SECTION 08920 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. 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 a stick-framed glazed aluminum curtain wall system with interior and exterior metal framing.

B. Primary components of the glazed curtain wall system include:

1. Aluminum curtain wall framing system.
2. Internal steel reinforcement.
3. Glazing gaskets.
4. Sills, copings, trim, and similar border and filler items.
5. Interior curtain wall that matches the exterior curtain wall.
6. Anchors, shims, fasteners, inserts, accessories, and support brackets.
7. Insulation within the curtain wall system.
8. Joint sealing within the curtain wall system; refer to Division 7 Section "Joint Sealers" for requirements.
9. Glass and glazing included as part of the curtain wall system; refer to Division 8 Section "Glass and Glazing" for requirements.

C. Aluminum entrance and storefront work is included in Division 8 Section "Aluminum Entrances and Storefronts."

1.3 SYSTEM DESCRIPTION

A. Aluminum stick-type system: The glazed aluminum curtain wall system shall consist of individual members erected separately. Major components consist of aluminum vertical exterior mullions, horizontal rails, and matching glazed insulated spandrel panels and vision glass.

B. Architectural Requirements:

1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage or moisture disposal.
2. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.

3. Glazing shall be replaceable from exterior.
4. Glass and glazing shall have uniform color and appearance.
5. Design windows using pressure plate system.
6. Provide concealed fastening wherever possible.
7. Exposed aluminum shall have uniform color and profile appearance.
8. Provide thermal isolation between exterior and interior components.

C. System Types:

1. Glazing System 1.0: 10" nominal depth with internal steel reinforcement, thermally broken with 1" insulated glazing.
2. Glazing System 2.0: 7" nominal depth, thermally broken with 1" insulated glazing.
3. Glazing System 2.1: 7" nominal depth with 1/4" glazing.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. General: Provide the manufacturer's stock curtain wall system, adapted to the application indicated, that complies with performance requirements specified as demonstrated by testing the manufacturers corresponding stock systems according to test methods indicated.

B. Air and Water Infiltration: Design and install the glazed curtain wall system for permanent resistance to air and water leakage through the system in accordance with the following:

1. Air Infiltration: Air leakage through the curtain wall system shall not exceed 0.06 cfm per sq. ft. of wall area when tested in accordance with ASTM E 283 at a minimum static air pressure differential of 6.24 lbf per sq. ft.
2. Water Penetration: There shall be no uncontrolled water leakage through the curtain wall system, as defined in AAMA 501.1, when tested in accordance with ASTM E 331 at a minimum differential pressure of 20 percent of inward design wind load but not less than 10 lbf per sq. ft. or more than 12 lbf per sq. ft. Water leakage is defined as follows: According to AAMA 501.1.
3. Water leakage is defined as follows: Uncontrolled water infiltrating system or appearing on system's normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

C. Structural Performance: Manufacturer shall be responsible for design of glazed curtainwall and window engineering including necessary modifications to meet specified requirements and maintaining visual design concepts.

1. Design, engineer, fabricate, and install the glazed aluminum curtain wall system to withstand the effects of a wind load of 25 psf acting inward and 20 psf acting outward, normal to the plane of the wall, when tested in accordance with ASTM E 330, with no material failures or permanent deformation of structural members

2. Structural test pressure shall be equal to 150 percent of the inward and outward acting design wind pressures.
3. Deflections: The curtain wall system shall be capable of withstanding building movements including wind loading and of performing within the following limitations:

    a. Deflection of framing members normal to the plane of the wall shall not exceed 1/175 of its clear span or 3/4 inch, whichever is less.
    b. Deflection of metal panels normal to the plane of the wall shall not exceed 1/175 of the span or 3/4 inch, whichever is less. Measure deflection relative to horizontal and vertical support members; use the lesser dimension to determine allowable deflection.
    c. Deflection of members parallel to the plane of the wall, when carrying its full dead load, shall not exceed an amount that will reduce glass bite by less than 75 percent of the design dimension and shall not reduce edge clearance between itself and the panel, glass, or other fixed member immediately below to less than 1/8 inch.

4. Design anchors, fasteners and braces with 2:1 minimum safety factor in accordance with AISI standards. . Attachment considerations shall take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
5. Provide internal structural steel reinforcement where required.

D. Thermal Movements: The glazed aluminum curtain wall system shall be capable of withstanding thermal movements resulting from an ambient temperature differential of 120 deg F (67 deg C), which may result in a metal surface temperature range of 180 deg F (100 deg C) within the curtain wall framing without causing buckling, stresses on glass, failure of joint sealants, damaging loads on fasteners, or other detrimental effects.

    1. Shop Drawings should clearly show provisions that allow thermal movement to occur within the framing system. The design of thermal movement capabilities must be in strict conformance with system manufacturer's recommendations. Provision for thermal movement must be approved by the manufacturer as part of their certification of Shop Drawings.

E. Condensation Requirements: The glazed aluminum curtain wall system shall be of thermal-break construction that has been tested in accordance with AAMA 1503.1 and certified by the manufacturer to provide a condensation resistance factor (CRF) of at least 55.

F. Average Thermal Conductance: Provide glazed aluminum curtain wall system with an average U-value of not more than 0.66 Btu/sq. ft. x h x deg F (3.75 W/sq. m x K) when tested according to AAMA 1503.1.

G. Sound Transmission: The average sound transmission loss through the glazed aluminum curtain wall system shall be a minimum of 34 db for the standard frequency range of 125 to 4000 Hz when tested in accordance with ASTM E 90 with the glass type indicated.

1.5 SUBMITTALS

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

B. Product data: Include manufacturer's specifications for materials and fabrication, installation instructions, and recommendations for maintenance. Include test reports showing compliance with project requirements where test method is indicated.

C. Shop Drawings: Show adaptation of manufacturer's standard glazed aluminum curtain wall system to the project; include typical unit elevations at 1/2-inch scale and details at 3-inch scale. Show dimensions, profiles of members, anchorage system, interface with building construction, and glazing.

1. Include setting drawings, templates, and directions for the installation of anchor bolts and other anchorages installed as a unit of work under other sections.
2. Indicate where and how the system deviates from contract drawings and specifications. Show section moduli of wind-load-bearing members and calculations of stresses and deflections. Provide material properties and other information needed for structural analysis including computations, prepared, signed, or, and sealed by a professional engineer licensed to practice in the jurisdiction where the project is located.

D. Manufacturer's Approval of Shop Drawings and Installation:

1. Prior to submitting Shop Drawings to the Architect, all details must be reviewed and approved by the curtain wall system manufacturer. A written certification must be submitted signed by the manufacturer, certifying that all details used have been reviewed and approved by the manufacturer.
2. During the curtain wall installation, the manufacturer's representative shall visit the site and field verify the installation in progress and field conditions. A written report must be submitted to the Architect documenting that the field installation is in accordance with approved Shop Drawings.
3. After completion of the installation, the manufacturer shall field verify the installation. As directed by the curtain wall manufacturer, the curtain wall installer must dismantle sections of curtain wall so that the manufacturer may observe the installed conditions and workmanship. Any unacceptable conditions must be corrected by the installer and reinspected by the manufacturer. A written certification must be submitted, signed by the manufacturer certifying that the curtain wall is installed according to approved Shop Drawings and details.
4. Curtainwall drawings to be stamped by licensed Engineer in the State of Pennsylvania.

E. Samples: Provide pairs of samples of each aluminum finish type and color on 12-inch-long sections of extrusions or formed shapes and on 6-inch-squares of aluminum sheet or plate. Include 2 or more units in each sample set showing the extreme limits of variations expected in color and texture of finish.

1. The Architect reserves the right to require fabrication samples showing the following:

   a. Prime members.
   b. Joinery.
   c. Anchorage.
   d. Expansion provisions.
   e. Glazing and similar details.
   f. Profiles.
   g. Intersections.

F. Installer certificates signed by the manufacturer certifying that the Installers of the glazed aluminum curtain wall system comply with requirements indicated.

G. Test Reports: Provide test reports from a qualified independent testing laboratory that show compliance of the manufacturer's stock glazed aluminum curtain wall system with performance requirements indicated based on comprehensive testing of the system by the laboratory within the last 3 years current production of the system by the manufacturer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has successfully completed installation of glazed curtain wall systems similar in material, design, and extent to that indicated for the Project for a minimum of five years and who is acceptable to the curtain wall manufacturer.

B. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or referenced standards.

C. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or on one component pane of units with the appropriate certification label of inspecting and testing organization indicated below.

   1. Insulating Glass Certification Council (IGCC).
   2. Associated Laboratories Inc. (ALI).

D. Single-Source Responsibility: Provide glazed aluminum curtain wall system for the project from one source from a single manufacturer.

E. Field-Constructed Mock-Up: Before installing the curtain wall system, erect a full-size sample curtain wall panel mock-up, including mullions, panels, vision glass, and other elements of the system, to verify selections made under sample submittals and to represent the completed system for aesthetic effects and qualities of materials and installation. Build the mock-up to comply with the following requirements, using materials indicated for the final installation.

1. Construct the mock-up on site in the location and sizes indicated or, if not indicated, as directed by the Architect.
2. Demonstrate the proposed range of aesthetic effects and workmanship.
3. Obtain the Architect's acceptance of the mock-up before starting final erection of the glazed aluminum curtain wall system.
4. Maintain the mock-up in undisturbed condition during construction as a standard for judging completed curtain wall installation.

    a. When directed, demolish and remove mock-ups from the site.
    b. If acceptable to the Architect, accepted mock-ups on the building in undisturbed condition at time of Substantial Completion may be incorporated into the Work.

F. Design Criteria: The drawings indicate size, profiles, and dimensional requirements of the curtain wall system and are based on the specific type and model indicated. Curtain wall systems by other manufacturers having equal performance characteristics may be considered provided deviations in dimensions and profiles are minor and do not change the design concept or intended performance as judged by the Architect.

1. The burden of proof for equality of the curtain wall systems is on the proposer.

G. Preinstallation Conference: Before beginning curtain wall installation, conduct a preinstallation conference at the Project site with the curtain wall system manufacturer, installer, and other interested parties to review procedures, schedules, and coordination of the curtain wall installation with other elements of the Work.

1. Comply with requirements of Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

A. Field Measurements: Take field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

1.8 SEQUENCING AND SCHEDULING

A. Schedule installation of the glazed aluminum curtain wall system in sequence with related elements of the Work specified in other Sections to ensure that wall assemblies, including flashing, trim, and joint sealers, are protected against damage from effects of weather, age, corrosion, and other causes.

1.9 WARRANTY

A. General: Submit a written warranty signed by authorized representatives of the Contractor and installer warranting that portions of the Work involving glazed aluminum curtain wall are of good quality, free from defects, and in conformance with the requirements of the Contract Documents and further promising to repair or

replace defective Work during a 5-year period following completion of that portion of the Work.

1. Defective is defined to include the following:

   a. Glass breakage.
   b. Failure of operational parts to function normally.
   c. Deterioration or discoloration of finishes.
   d. Failure of the system to meet performance requirements.

B. The Warranty submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner 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. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

1. US Aluminum Corporation - Series CW 4500
2. Kawneer Company, Inc. - 1600 Wall System
3. EFCO Corporation - 5600 Wall System
4. Tubelite Architectural Systems - 400 Series

2.2 MATERIALS

A. Aluminum: Provide alloy, temper, and thickness recommended by the manufacturer for the type of use and finish indicated and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required.

1. Extruded Bar and Shapes: Comply with requirements of ASTM B 221.
2. Plate and Sheet: Comply with requirements of ASTM B 209.

B. Steel Reinforcement: ASTM A 36 (ASTM A 36M) for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 (ASTM A 570M) for hot-rolled sheet and strip.

C. Glass: Provide glass of types and thicknesses indicated. Fabricate glass to sizes required for openings indicated with edge clearances and tolerances complying with manufacturer's recommendations. Refer to Division 8 Section "Glass and Glazing" for requirements.

1. Float Glass: Comply with requirements of the "Glass and Glazing" Section, including those specified by reference to ASTM C 1036.

2. Coated, Heat-Treated, Fully Tempered Glass: Comply with requirements of the "Glass and Glazing" Section, including those specified by reference to ASTM C 1048.

3. Sealed Insulating Glass: Insulating glass units shall be the manufacturer's standard preassembled dual-seal insulating glass units consisting of organically sealed panes of 1/4-inch-thick glass enclosing a hermetically sealed dehydrated 1/2-inch air space. Provide units with a silicone secondary seal with an IGCC-certified CBA level compatible with structural silicone sealant.

   a. Comply with requirements of the "Glass and Glazing" Section, including those specified by reference to ASTM E 774 for performance Class A. Requirements for glass characteristics, air space, sealing system, sealant, spacer material, corner design, and desiccant are specified in the "Glass and Glazing" Section.
   b. Units shall be certified compatible by the sealant manufacturer. Insulating glass seals shall be certified to withstand project structural loading requirements.

C. Glazing Gaskets: Manufacturer's standard sealed-corner pressure- glazing or wedge-lock dry glazing system of black, resilient elastomeric glazing gaskets, setting blocks and shims or spacers as required, hardness as selected by manufacturer.

1. Gasket Material: Extruded or molded EPDM synthetic rubber gaskets, compound as recommended by the manufacturer.

D. Glazing sealants and fillers: Comply with requirements in the "Glass and Glazing" section.

E. Framing System Gaskets and Joint Fillers: Manufacturer's standard permanent framing system gaskets and joint fillers, depending on joint movement and sealing requirements, such as sliding joints, compression joint translation, or nonmoving joints.

F. Sealants and joint fillers, both for joints within the curtain wall construction and for joints at the interface of curtain wall construction and other work, shall comply with requirements specified in the "Joint Sealers" Section.

G. Concealed Flashing: Dead-soft 26-gage stainless steel concealed flashing of type selected for compatibility by the manufacturer.

H. Firestopping Materials: Provide mineral fiber insulation or other noncombustible materials suitable for permanent placement and that comply with governing regulations.

I. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.3 COMPONENTS

A. Aluminum Composite Panels: Manufacturer's standard laminated aluminum faced panels, flat with no deviations in plane exceeding 1/16" in 24" or 1/8" over entire panel.

1. Face and back sheet: .020" nominal thickness finished to match system framing.
2. Core: Polyethylene core.
3. Edge Configuration: Mill edge.
4. Thickness: 6 mm.
5. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Alucobond - Alusuisse Composites Inc.
b. Alpolic - Mitsubishi Chemical America
c. Unaclad Series 45.

B. Sill Flashing: Aluminum sill flashing finished to match the curtain wall must be provided at all exterior curtain walls, whether required by the manufacturer or not. Any penetrations through or joints in the sill flashing must be sealed to create a continuous barrier. Turn up back and ends of sill flashing to direct any water to the exterior.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum units or manufacturer's standard nonmagnetic stainless steel properly insulated from the aluminum.

1. Provide nonstaining, nonferrous shims for installation and alignment of curtain wall work.

D. Fasteners and Accessories: Provide manufacturer's standard non- corrosive fasteners and accessories compatible with materials used in the framing system and with exposed portions that match finish of the curtain wall system. Where movement is expected, provide slip-joint linings of sheets, pads, shims, or washers of fluorocarbon resin or a similar material recommended by the manufacturer.

1. Where fasteners anchor into aluminum less than 0.125-inch thick, provide noncorrosive pressed-in splined grommet nuts or other type reinforcement to receive fastener threads.

D. Concrete or Masonry Inserts: Hot-dip galvanized steel inserts complying with ASTM A 386.

2.4 FABRICATION

A. General: Fabricate glazed aluminum curtain wall system according to Shop Drawings. Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. Match exposed work to produce continuity of line. Fit joints accurately

and secure rigidly. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Prepare components to receive concealed fasteners and anchor and connection devices.

D. Fabricate components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

E. Glazing Pockets: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."

F. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

2.6 STEEL PRIMING

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.

B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.

C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of glazed aluminum curtain wall system. Do not proceed with installation until unsatisfactory conditions have been corrected or accommodations acceptable to Architect have been made.

3.2 PREPARATION

A. Furnish inserts at proper times for setting in concrete foamwork, masonry, and similar work indicated to support curtain wall work.

3.3 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing glazed aluminum curtain wall system. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight, unless otherwise indicated. Provide means to drain water to the exterior to produce a permanently weatherproof system.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

D. Install framing members plumb and true in alignment with established lines and grades.

E. Anchorage: After system components are positioned, fix connections to building structure as indicated on Shop Drawings. Shim and allow for movement resulting from changes in thermal conditions.

1. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Install glazing according to Shop Drawings. Comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.

G. Install sealant according to Shop Drawings. Comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.

1. Sealant and Backing: Shop Drawings and installations must allow for a minimum of 3/8" at exterior curtain walls for the installation of backer rod and sealant between the storefront and adjacent finishes. Joints that do not allow a backer rod and sealant to be installed in accordance with sealant manufacturer's recommendations will be rejected. Surface applied sealant where adequate sealant joints were not provided will not be acceptable.

H. Install insulation materials in locations indicated. Comply with requirements of Division 7 Section "Building Insulation," unless otherwise indicated.

I. Install firesafing in locations indicated. Comply with requirements of Division 7 Section "Building Insulation," unless otherwise indicated.

J. Erection Tolerances: Install glazed aluminum curtain wall system to comply with the following maximum tolerances indicated below. Tolerances are maximum and are not cumulative.

1. Plumb: 1/8 inch in 10 feet (3 mm in 3 m); 1/4 inch in 40 feet (6 mm in 12 m).
2. Level: 1/8 inch in 20 feet (3 mm in 6 m); 1/4 inch in 40 feet (6 mm in 12 m).
3. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm); where a reveal or protruding element separates aligned surfaces by less than 2 inches (50.8 mm), limit offset to 1/8 inch (12.7 mm).
4. Location: Limit variation from plane or location shown on Shop Drawings to 1/8 inch in 12 feet (3 mm in 3.7 m); 3/8 inch (12.7 mm) over total length.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure glazed aluminum curtain wall system is without damage or deterioration at the time of Substantial Completion.

3.5 CLEANING

A. Clean the completed system, inside and out, promptly after erection and installation of glass and sealants, allowing for nominal curing of liquid sealants. The installer shall advise the Contractor of proper and adequate procedures for protection and cleaning during the remainder of the construction period so that the system will be without damage and deterioration at the time of acceptance.

B. At the time of Substantial Completion, clean curtain wall system thoroughly and polish glass. Demonstrate proper cleaning methods and materials to the Owner's maintenance personnel.

END OF SECTION 08920