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DURATHERM PRODUCT BINDER 2017 EDITION

Welcome

Over 40 years ago, encouraged by master architect Louis I. Kahn, founder Philip Cole began custom-crafting monumental wood window systems and doors. Since then, our reputation for superior quality and design innovation has made Duratherm the first choice of leading architects. We appreciate your interest and look forward to our creative collaboration with you.

What you'll find here—and what you won't.

In this binder and on the enclosed CD you'll find answers to most of your questions about Duratherm products and services. You'll also see examples of projects we've worked on with some of our long-time customers.

You won't find as many design and construction specifics here as you might expect, however. We know from experience how much architects rely on us to design and build to unique requirements. So we've tried to give you just enough specifics to lay the groundwork without giving you so many that they constrain your creativity. After all, some of architects' best ideas—like a rolling door with fixed-frame sidelights, multi-panel pocket doors set at 90° to each other, or the WinDoor™—have joined our repertoire of innovative designs.

If you don't find the answer to your questions in these pages or on the CD, chances are it's because the answer is, "It depends." Please call us to talk about your requirements with a qualified professional. Or email your questions to info@durathermwindow.com.

Want to know more? Visit our website.

durathermwindow.com

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2017

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• Mullion covers • Restoration sash • True muntins	• True divided lights • Curved in plan units • Integrated blinds	Contact factory: 800.996.5558
• Minimum/Maximum unit sizes		Details/Data Sheets
• Installation		Specifications, Section 085200, 3.2 Product Manual, Installation
Doors		See This Section
• In-Swing • Out-Swing • Lift/Roll	• Lift/Roll Pocket • Slide/Fold • WinDoor™	Details/Data Sheets
• Auxiliary trims • Spandrel panels • Steel reinforcing • Interior rolling partitions	• Panels and frames only, or fully hung and machined • Three- or five-point locking system	Contact factory: 800.996.5558
• Minimum/Maximum unit sizes		Details/Data Sheets
• Installation		Specifications, Section 081400, 3.2 Product Manual, Installation
Woods		See This Section
Interior • Mahogany (African, Honduran, Sapele) • Cherry • Maple • Oak (white, red) • Cypress	• Spanish cedar • Redwood • Douglas fir • Teak	Specifications, Section 085200, 2.2 Specifications, Section 081400, 2.2
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• Two woods on one frame.		Contact factory: 800.996.5558
Finishes		See This Section
 • Paint • Conversion varnish • Stain	• Polyurethane • Sikkens	Specifications, Section 085200, 2.4 Specifications, Section 081400, 2.4

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Glazing		See This Section
• Custom according to aesthetic or performance requirements • Dry • Wet		Glass and Glazing Guide Specifications, Section 085200, 2.4 Specifications, Section 081400, 2.4
• Butt glazing • Triple glazing	• High STC • Art glass	Contact factory: 800.996.5558
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Windows • Commercial-duty brass, bronze, stainless steel • Remote operators • Security hardware		Specifications, Section 085200, 2.3
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Care and Service		See This Section
• Maintenance • Prevention • Troubleshooting • Warranty on materials and workmanship: 3 years • Warranty on insulated glass seal failure: 10 years		Product Manual, Maintenance Product Manual, Owner Precautions Product Manual, Troubleshooting Contact factory for copies of our warranties.
Contact Information		
Website: durathermwindow.com Address: 720 Main Street • Vassalboro, ME 04989 Telephone: 207.872.5558 or 800.996.5558 Facsimile: 207.872.6731 Email - general: info@durathermwindow.com Email - specific: <firstname>_<lastname>@durathermwindow.com		



GLASS AND GLAZING GUIDE

Insulated Glass Unit Sizing

General

The following guidelines apply to most commercial insulated glass manufacturers. Specific glass companies have variations to the following, so it is advisable to contact them directly.

1. Keep overall insulated glass unit sizes to 50 sq. ft. or less to obtain a 10-year seal failure warranty.
2. Tints, coatings, and/or films within the insulated unit may result in more restrictive maximum unit sizing.
3. Keep at least one dimension (either width or height) of the unit under 96".
4. Maximum size of insulated glass readily obtainable is 70 sq. ft., but glass of this size may not carry a seal failure warranty.
5. We recommend a length-to-width ratio of 4 to 1 or less to avoid excessive stress in the unit.

Tempered IG Units

Most manufacturers require that tempered glass have one dimension at least 16". This requirement is based on production/fabrication restrictions determined by the typical support roller spacing within the tempering ovens. However, this may vary among manufacturers; contact specific fabricators for their limitations.

Low E Coatings

We use either pyrolytic (hard coat) or sputtered (vacuum deposition or soft coat) products.

In pyrolytic glass, the coating is chemically bonded to the glass at the molecular level while it is still in the semi-molten stage. This results in an extremely durable and stable coating that is impregnated right into the surface of the glass.

Pyrolytic coats have an unlimited shelf life, and can be tempered, laminated, or bent after coating. Because of these properties, many fabricators keep pyrolytic coated glass in inventory.

Soft coat Low E, or sputter coating, is applied in multiple layers of optically transparent silver sandwiched between layers of metal oxide in a vacuum chamber. This process provides the highest level of performance with a nearly invisible coating, high visible light transmission and very low emissivity giving optimum winter U-values.

Glazing Methods

Dry Glazing

High performance, commercial grade system for long life and easy maintenance and reglazing. Consists of compressible extruded silicone exterior gasket and dense wedge rubber interior. This glazing system is recommended by all major commercial insulated glass manufacturers.

Wet Glazing

Norseal V994 glazing tape with black silicone heel bead at exterior, clear silicone bedding bead at interior. Typically used for traditional window configurations, true divided light applications, and painted sashes.

Breather Tubes

All insulated glass units delivered to elevations 4,000 feet above sea level or higher include breather tubes to equalize pressure within the insulated unit. These tubes are to be sealed within two days of arrival at the jobsite.

Glass Manufacturers

Specific glass companies, and specific products from each company, can have more restrictive sizing requirements, variable lead times, etc. We strongly advise that you contact them directly for product-specific specifications and limitations. Insulated glass manufacturers we have worked with include:

AFG	afg.com	800.251.0441	Pilkington	pilkington.com	800.523.0133
Cardinal	cardinalcorp.com	952.935.1722	SolarSeal	solarseal.com	508.238.0112
Heat Mirror	southwall.com	800.365.8794	Viracon	viracon.com	800.533.2080



ENVIRONMENTAL STEWARDSHIP

Duratherm Window Corporation realizes that environmental stewardship is not simply good policy—it is good business. We aim to fulfill our role as good corporate and global citizens by vigorously pursuing goals in recycling, waste management, energy usage reduction, and respect for our natural environment. We provide long-lasting, renewable and recyclable wood products that minimize our clients' carbon footprint.

Our primary raw material—solid stock lumber from both tropical and native sources—makes us, perhaps more

than other manufacturers, acutely conscious of the need to use this resource wisely. Wood remains one of the few truly renewable resources in the building industry. But we as a company still need to be cognizant of the species we use, how we source them, and how we use them. Duratherm's comprehensive approach to sustainable design allows us to be good stewards of the environment as well as proud manufacturers of the highest quality products

Lumber Sourcing / FSC® Certification



We are increasingly able to source lumber from responsibly managed forests with the highly sought-after Forest Stewardship Council® (FSC®) Certification. Virtually all domestic woods and many tropical species—including African Mahogany—are now harvested and marketed according to the high standards of the FSC®.

NFRC and Energy Star Product Ratings



Our windows are tested according to the exacting standards of the National Fenestration Rating Council (NFRC) and come with the Energy Star label. This signifies that our products meet strict energy efficiency guidelines as set forth by the EPA and the US Department of Energy.

LEED Certification Credits



The Leadership in Energy and Environmental Design (LEED) system was developed by the United States Green Building Council to recognize projects that excel in their energy performance and sustainable design initiatives. Duratherm's window and door components, critical parts of the building envelope, have helped our clients obtain LEED credits in categories such as Optimized Energy Performance, Certified Wood, Local and Regional Materials, and Ventilation Effectiveness. A list of our LEED-certified projects is available on request.

Company-wide Recycle Procedures and Green Initiatives

Duratherm makes a concerted effort to prevent as much of our by-product as possible from entering the waste stream. Virtually all our sawdust is recycled or used as fuel to heat our plant. Wood scraps are likewise used for fuel, or donated to the local citizenry for use in hobbies or crafts. In addition to these recycling and reuse procedures, we are continually researching new and innovative ways to maintain a leadership position in environmental stewardship. Recent initiatives include:

- Procedures to use low-VOC finish products and minimize the volume of solvents required in finish operations.
- State of the art ventilation in our finish room to insure a safe work environment and to filter exhaust air.
- Upgraded factory lighting utilizing high-efficiency T-8 fixtures throughout the facility.
- A high-efficiency, variable-speed compressor that senses demand for air, reducing our electricity usage for our compressed air needs by more than 50%.
- A clean-burn wood furnace (carbon neutral) that uses clean waste wood to heat our facility, reducing our need for #2 fuel oil by at least 10,000 gallons per year.
- A wood briquette machine that compresses generated sawdust into clean-burning wood briquettes that are both utilized on site and marketed as fuel in the local area.



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SPECIFICATIONS – DOORS

SECTION 081400 – EXTERIOR STILE AND RAIL WOOD DOORS

PART 1 — GENERAL

1.1 SUMMARY

A. Section includes:

Edit the following listing as required for applicability to the specific project, particularly door types required and specific trim inclusions.

1. Doors: Fixed and operable wood stile and rail door systems including single swing, paired swing, lift/roll, slide/fold and WinDoor™, all with factory glazed components and reinforcing as required.
2. Trims (if applicable).
3. Flat steel mullion stiffeners (if applicable).
4. All labor equipment, materials to furnish and perform work as specified and shown on contract documents.

B. Related Work Specified Elsewhere

Edit the following listings as required for applicability to the specific project.

1. Section 051000 – Structural Metal Framing
2. Section 061053 – Miscellaneous Rough Carpentry: Wood framing or blocking
3. Section 062000 – Finish Carpentry
4. Section 064000 – Architectural Woodwork
5. Section 076000 – Flashing and Sheet Metal
6. Section 079200 – Joint Sealants: Perimeter sealants and backup materials
7. Section 085200 – Wood Windows
8. Section 087100 – Door Hardware
9. Section 088000 – Glazing
10. Section 099300 – Staining and Transparent Finishes

1.2 SYSTEM REQUIREMENTS

A. General Qualifications: Wood stile and rail doors shall withstand the effects of the performance requirements indicated without failure due to defective manufacture, fabrication or installation.

1. Fabricator: Single fabricator regularly engaged for at least ten years fabricating products of the kind and quality required for the project.
2. Installer: Experienced carpenter contractor who has completed comparable work.

B. Design Criteria

1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Wall openings: Accommodate allowable building wall construction tolerances and moisture-caused brick masonry swell without stressing or deforming door units or overstressing anchorage.
3. Moisture changes: Accommodate wood shrinking and swelling caused by ambient conditions at the project, without stressing window units, overstressing anchorage, causing sash to bind, or exceeding air/water entry limits.



SPECIFICATIONS – DOORS

4. Comply with applicable provisions in AAMA/WDMA I.S. 2, “Standard Specification for Windows, Doors and Skylights” for operating force, air infiltration, water penetration, structural performance, and forced-entry resistance for wood stile and rail doors.
5. Glazing provisions: As recommended by the glass manufacturer.

C. Reference Standards

List reference standards that are included within the text of the specification. Edit the listings below as required for applicability to the specific project.

1. ASTM E 283 Test method for determining air leakage.
2. ASTM E 330 Test method for determining structural performance.
3. ASTM E 331 Test method for determining water penetration using static air pressure differential.
4. ASTM E 547 Test method for determining water penetration using cyclic air pressure differential.
5. ASTM F 588 Test method for forced entry resistance.
6. ASTM E 783-02 Standard test method for field measurement of air leakage through installed exterior windows and doors.
7. AAMA 501.3 Field check of water and air leakage through installed exterior windows, curtain walls and doors by uniform air pressure difference.
8. AWI: *Architectural Woodwork Quality Standards*, 7th edition, version 1.0, 1997, of the Architectural Woodwork Institute.
9. AAMA/WDMA/CSA 101/I.S.2/A440-05 *Standard/Specification for Windows, Doors and Unit Skylights*.

1.3 PERFORMANCE REQUIREMENTS

Section 1.3.A refers to units that include manufacturer’s standard operating hardware. Delete Section A in its entirety if doors are used for a commercial/institutional project or if manufacturer’s standard operating hardware is not used.

A. Performance Requirements, manufacturer’s standard operating hardware utilized:

1. Air Infiltration: Air leakage shall not exceed 0.15 CFM per square foot of surface area for fixed units and 0.30 CFM per foot of sash crack when tested in accordance with ASTM E283 at differential static pressure of 6.24 psf.
2. Water Infiltration: No uncontrolled leakage when tested in accordance with ASTM E547 at test pressure of 6.24 psf, or 20 percent of full positive design wind load, whichever is greater.
3. Forced-Entry Resistance: Comply with Performance Level 10 requirements when tested according to ASTM F588.
4. Thermal Transmittance: Provide window units with the following U-value as determined according to NFRC 100 or calculated according to LBNL Window 5.2 computer analysis.

Indicate required U-value below.

a. U-value =

Section 1.3.B refers to units for commercial/institutional work or if manufacturer’s standard hardware is not utilized. Delete Section B in its entirety if manufacturer’s standard operating hardware is used.

B. Performance Requirements, hardware provided and installed under Section 087100:

1. Air Infiltration: Doors not warranted against air infiltration.
2. Water Infiltration: Doors not warranted against water infiltration.
3. Forced-Entry Resistance: Doors not warranted against forced entry.



SPECIFICATIONS – DOORS

4. Thermal Transmittance: Provide window units with the following U-value as determined according to NFRC 100 or calculated according to LBNL Window 5.2 computer analysis.

Indicate required U-value below.

- a. U-value =

- C. Structural Requirements: When tested in accordance with ASTM E330 at 150 percent of design pressure, no failure or permanent deflection in excess of 0.003 of any member's span after removing the imposed load, for a positive (inward) and negative (outward) design pressure of 60 psf.

1.4 SUBMITTALS

- A. Wood Samples: Duplicate pairs of samples for each species of unfinished and transparent finished wood proposed for production work.
 1. Samples shall be large enough to accurately show typical appearance characteristics.
 2. Each pair of samples shall show extremes of appearance characteristic of range proposed for the work. Wood used for production shall be within this range.

If FSC® (Forest Stewardship Council®) certified lumber is mandated for the project, include the following reference. Otherwise, delete 1.4.A.3.

3. Provide chain-of-ownership documentation for all FSC certified lumber.
- B. Sample doors/mock-ups (where specified): Door assemblies for typical wall openings shall be provided, complete and ready to install.
- C. Shop Drawings
 1. Schedule: Door types, sizes, locations, and quantities, keyed to scale elevations. Identify materials, finish and species of woods, glazing types, hardware, and anchoring provisions.
 2. Details: Full or large scale, keyed to scale elevations. Show frame and panel construction, glazing, weep/vent provisions, hardware, weather-stripping and anchorage.
 3. Installation: Clearly show relation to adjoining construction. Give blocking requirements, clearances, weather proofing & flashing recommendations and all other instructions necessary for proper installation.

If maintenance stock is to be required, clearly list quantities and types of stock required. Otherwise, delete section 1.4.D.

- D. Maintenance Stock: Per project requirements (glass, hardware, etc.)

1.5 QUALITY ASSURANCE

- A. Single Source Responsibility:
 1. Provide window and door systems that are products of a single manufacturer.
 2. Glass, glazing, and glazing sealants for window and door systems are required as work of this section for single source responsibility.
- B. Certifications
 1. Fabricator qualifications: Not less than 10 years prior successful production of units similar to those required. List projects having doors of the kind required for the project. Installations shall have been done to meet job conditions and performance requirements of the kind shown and specified for this project. Give installation dates, locations, contact names, addresses, and phone numbers for each project.
 2. Test report: Certified independent testing agency reports to show compliance with specified door performance requirements. Tests shall have been made within 5 years of submission. Reports shall include test descriptions and results, as well as sufficient product descriptions to show that tested products are representative of those proposed for the project.



SPECIFICATIONS – DOORS

3. Installer Qualifications: Certified in writing by manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.
- C. Maintenance Instructions: Two copies of door manufacturer's product manual with recommendations for routine owner maintenance of door units, hardware and wood finishes; and instructions for removing and replacing panel and glass.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver factory-assembled, preglazed doors in enclosed vans. Bundle and label loose materials as necessary to prevent loss and damage.
- B. Store products in a clean, protected, dry, well-ventilated building, on platforms or blocking at least 4 inches above floor. Stack products so they do not warp, bend or twist. Store doors upright, not flat or leaning, with at least ¼" air space between units. General contractor is responsible for storage on site.
- C. Protect glazing and frame components from adverse job conditions before, during, and after installation including but not limited to:
 1. Condensation, temperature changes, direct exposure to sun or other causes that could otherwise damage the assemblies
 2. The work of other trades before, during, and after installation (e.g., weld slag, run down staining, masonry dust and similar)
 3. Adhere to glass manufacturer's recommendations for venting and sealing insulated units to avoid hermetic seal ruptures or glass breakage at high altitude locations.
- D. Handle doors with clean hands or canvas gloves.

1.7 PROJECT CONDITIONS

- A. Connecting Work: Constructed to specified tolerances. Field dimensions agreed upon prior to fabrication.
- B. Reference Points: Benchmarks and other required reference points shall be established.
- C. Environmental Conditions: Air temperature during installations shall be at least 40° F and rising, and the wind light or still. Work areas and materials shall be dry and free of ice and snow. Ensure ambient and surface temperatures and joint conditions are suitable for installation of materials.

1.8 WARRANTY

- A. Provide written warranty signed by manufacturer stating that work is free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail under normal operation.
 1. Material and workmanship warranty term: 3 years from date of Substantial Completion.
- B. Provide written warranty agreeing to replace defective insulating glass units and stating that insulating glass units will be free from condensation, fogging and obstruction of vision due to film on internal surfaces for 10 years from date of installation. Replacement includes labor and materials.
 1. Glass seal failure warranty term: 10 years from date of Substantial Completion.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Duratherm Corporation, 720 Main Street, Vassalboro, ME 04989
Telephone: (800) 996-5558 / Email: info@durathermwindow.com.
- B. Other Acceptable Manufacturers: Subject to compliance with requirements listed herein, provide either the named product or a comparable product that meets visual, physical and performance criteria as judged solely by the architect.



SPECIFICATIONS – DOORS

2.2 FRAME MATERIALS

- A. Lumber: All pieces shall be dried to an average moisture content of 12% (9-14% for individual pieces) before assembly and treatment.
- B. Wood Species: Different species at interior and exterior
 - 1. Exterior: Extension sill nosing, exterior frame and panel facing.

Edit the following list of exterior wood species according to material used on project. If more than one exterior wood type is used, give indication as to where the different woods occur on project. Indicate that lumber is to be FSC® certified if appropriate.

- a. Teak (*Tectona grandis*)
- b. Sapele mahogany (*Entandrophragma cylindricum*)
- c. African Mahogany (*Khaya ivorensis*)
- d. Honduran Mahogany (*Swietenia macrophylla*)
- e. Cypress (*Taxodium distichum*)
- f. Douglas Fir (*Pseudotsuga menziesii*)
- g. Spanish Cedar (*Cedrela odorata*)
- h. Redwood (*Sequoia sempervirens*)
- i. Jarrah (*Eucalyptus marginata*)

- 2. Interior: All inside frame and sash components.

Edit the following list of interior wood species according to material used on project. If more than one interior wood type is used, give indication as to where the different woods occur on project. Indicate that lumber is to be FSC® certified if appropriate.

- a. African Mahogany (*Khaya ivorensis*)
- b. Sapele mahogany (*Entandrophragma cylindricum*)
- c. Honduran Mahogany (*Swietenia macrophylla*)
- d. Cherry (*Prunus serotina*)
- e. Maple (*Acer saccharum*)
- f. White Oak (*Quercus alba*)
- g. Red Oak (*Quercus vubra*)
- h. Spanish Cedar (*Cedrela odorata*)
- i. Redwood (*Sequoia sempervirens*)
- j. Douglas Fir (*Pseudotsuga menziesii*)
- k. Teak (*Tectona grandis*)

2.3 HARDWARE

- A. Anchor Bolts and Screws: Hex head through-bolts and flat head wood screws shall be of corrosion resistant type (zinc chromate, galvanized or stainless steel).
- B. Waterproof Adhesive: Resorcinol, melamine, or polyvinyl acetate emulsion type.
- C. Anchor Clips: Teco, Simpson Strong-Tie Connectors®, or equal.



SPECIFICATIONS – DOORS

D. Operating Hardware

Edit the following hardware types to conform to requirements of project. Note that manufacturer's standard swing door operating hardware is for residential applications only. Edit finish/style/material within each listing as required.

1. All swing door hardware furnished under Section 087100, Door Hardware, for installation in field by others.
2. Manufacturer's standard hardware – swing door (panel height 74" to 120")
 - a. Lockset: Half-turn latchset with shoot bolts to provide multi-point latching at top frame, threshold, and adjacent door/frame.
 - b. Lever handle: Solid brass lever sets with matching escutcheon in manufacturer's standard finishes.
 - c. Hinges: Solid brass 4½" five knuckle flush ball bearing butt hinges, minimum 1½ pair per leaf for doors up to 96", 2 pair per leaf for doors over 96", in manufacturer's standard finishes.
3. Manufacturer's standard hardware – lift/roll door
 - a. Threshold: Solid wood.
 - b. Guide tracks: Clear anodized or bronze anodized aluminum rail guides at head and sill.
 - c. Lift and rollers: Lifting gear lever handle connects to built-in tie rod assembly. Manually rotating lock handle lifts door onto carriage, consisting of two sets of twin rollers assembled in bottom of operable panel.
 - d. Operating handle: Available in manufacturer's standard finishes. Standard configuration includes interior operating handle with turn knob lock and exterior flush pull. Exterior lever handle with keyed cylinder available.
4. Manufacturer's standard hardware – slide/fold door
 - a. Threshold: Aluminum / wood combination.
 - b. Guide tracks: Bronze or satin anodized head tracks and floor guides. Floor guides have black polypropylene liner.
 - c. Carriers, guides, pivots and hinges: Brushed stainless steel, oil rubbed bronze powder coat, or PVD brass finish over stainless steel.
 - d. Handle, drop bolts: Brushed stainless steel, oil rubbed bronze powder coat, or PVD brass finish over stainless steel. Drop bolts available in a range of lengths and in keyed or non-keyed configurations.
5. Manufacturer's standard hardware – WinDoor™ (panel height 74" to 120")
 - a. Lockset: Half-turn latchset with shoot bolts to provide multi-point latching at top frame, threshold and adjacent door/frame.
 - b. Lever handle: Solid brass lever sets with matching escutcheon in manufacturer's standard finishes.
 - c. Door panel hinges: Solid brass 4½" five knuckle flush ball bearing butt hinges, minimum 1½ pair per leaf for doors up to 96", 2 pair per leaf for doors over 96", in manufacturer's standard finishes.
 - d. Casement sash hardware: White bronze push-arm operator, white bronze jamb latch.
 - e. Casement sash hinges: Stainless steel piano hinge.
- E. Weather-Stripping: Extruded ethylene propylene, neoprene or other plastic that remains flexible and non-sticky at project ambient temperature extremes.

Edit or remove the following listing for screen doors as required for applicability to the specific project.

- F. Screen doors (swing and lift/roll only): Solid wood doors fitted with 1" x ⅝" tubular aluminum extruded screen frame with 18 x 16 screen mesh available in manufacturer's standard materials and finishes.



SPECIFICATIONS – DOORS

2.4 FABRICATION

A. General

1. Door panels, swing: AWI Premium grade, produced from standard components. Stiles and rails shall be glued block construction with 1/8" minimum veneers. Joinery shall be dowelled construction, sized for drive fit and set in adhesive. Glazed doors to incorporate interior removable glass stops for reglazing.
2. Door panels, lift/roll and slide/fold: AWI Premium grade, produced from standard components. Stiles and rails shall be glued block construction with 1/8" minimum veneers. Joinery shall be dowelled construction, sized for drive fit and set in adhesive. All operating hardware shall be factory-installed. Glazed doors to incorporate interior removable glass stops for reglazing.
3. Door frames, swing: AWI Custom Grade, wood components to be solid stock.
4. Door frames, lift/roll and slide/fold: AWI Custom Grade, wood components to be solid stock.
5. Door screen, swing and lift/roll: AWI premium grade, glued block construction with 1/8" minimum veneers.
6. Machining for swing door hardware, if performed in factory, shall be predicated on the issuance of physical samples in addition to templates.

B. Permanent Joints and Facings: Bonded with water-resistant adhesive.

C. Wood Finish: Door leaves shipped unfinished must be sealed within one week of arrival at jobsite. Prefinished doors that are machined or fitted on site must have all milled surfaces resealed immediately.

1. Exterior: Note that all corners and edges of units receiving film-forming finishes (Sikkens, paint, etc.) are to be eased/radiused to promote finish adhesion and maintain proper film thickness.

Edit the following list of exterior wood finish options according to finish used on project. If more than one exterior finish type is used, give indication as to where the different finishes are used.

- a. One (1) coat ICA #IM116 water-based impregnating agent, tinted per project requirements, one (1) coat #FA34 water-based bicomponent polyurethane sealer, two (2) coats #LA409 water-based monocomponent acrylic finish, 30 sheen.
- b. One (1) coat factory-stained or -primed, with additional coats applied by others in field after installation.
- c. Four (4) coat Sikkens finish: Two (2) coats Sikkens Cetol® 1 and two (2) coats Sikkens Cetol® 23.
- d. Three (3) coat Sikkens Cetol® Door and Window finish.
- e. Unfinished for jobsite finish by others in field after installation.

2. Interior

Edit the following list of interior wood finish options according to finish used on project. If more than one interior finish type is used, give indication as to where the different finishes are used.

- a. One (1) coat Sher-Wood® vinyl sealer T67F3 and two (2) coats Sher-Wood® Hi-Bild Catalyzed Lacquer T77F58.
- b. Factory-finished with one (1) sealer coat of sanding sealer for jobsite sanding and recoat by others in the field after installation.
- c. Factory-oiled with one (1) coat exterior grade wood oil for jobsite re-coat by others in field after installation.
- d. Factory-primed for sanding and finish by others in field after installation.
- e. Unfinished for jobsite finish by others in field after installation.



SPECIFICATIONS – DOORS

D. Glazing

1. Products and installation: Satisfy requirements specified in Section 088000 Glazing.
2. Glazing System

Edit the following Glazing System options according to that which is to be used on project.

- a. Wet Glazing: Provide two-part wet glazing system recommended by manufacturer for each type window and door specified
 - b. Dry Glazing: Provide compression type design utilizing extruded neoprene or silicone glazing gasket system recommended by manufacturer.
3. All units to be factory-pre-glazed.
 4. Interior removable glazing stops to be screwed in-place for ease of removal and maintenance.
 5. Insulated units for high elevation projects to include breather tubes. Tubes to be sealed within two days of arrival at jobsite following manufacturer's written instructions.

E. Measurements:

1. Take accurate field measurements to verify required dimensions prior to fabrication.
2. Where field dimensions can not be made without delaying the work, establish opening dimensions and proceed with fabricating doors without field dimensions. Coordinate wall construction to ensure that the actual opening dimensions correspond to established dimensions

F. Fabricate components in accordance with manufacturer's tested assemblies. Shop fabricate, glaze, and finish to greatest extent practical to minimize field assembly. Disassemble only to extent necessary for shipping and handling limitations.

G. Fabricate components true to detail and free from defects impairing appearance, strength or durability.

PART 3 — EXECUTION

3.1 EXAMINATION

- A. Examine conditions with installer present for compliance with all requirements. Inspect wall flashings, vapor retarders, water and weather barriers, and other built in components to ensure a weather tight installation.
- B. Verify dimensions, tolerances, and method of attachment with other work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install doors per approved shop drawings, in proper relation to adjoining construction. Do not twist frames or force fit them into poorly prepared openings. Anchor doors as required to satisfy design requirements. See manufacturer's installation instructions and shop drawings.
- B. Center door units in wall openings leaving a uniform interface caulking recess on all four sides. The manufacturer strongly suggests that sealant be selected for its adhesion compatibility with the specified exterior wood and adjacent wall materials. Consult the manufacturer for recommended sealant.
- C. Level Units: Install shims at bearing locations, anchors, and latchpoint, so they are not dislodged by subsequent operations. Test operation and panel alignment before permanently anchoring door units. It is imperative that lift/roll door units be installed perfectly level for proper operation and weather tightness.
- D. Anchorage: Install anchors through frame centerline beside shims. Anchor door units to wood blocking with wood screws and to metal framing with Tek screws; countersink anchor heads. All anchors shall be concealed by closed doors and/or with wood plugs.



SPECIFICATIONS – DOORS

- E. Installation to conform to door manufacturer's requirements as indicated in the manufacturer's product manual.
- F. Field installation of finish hardware for swing doors to conform to provisions of Section 087100 Door Hardware and Section 062000 Finish Carpentry.

If field testing is to be performed, include section 3.3. Otherwise remove section 3.3 in its entirety.

3.3 FIELD QUALITY CONTROL

- A. Field Tests: Independent testing laboratory will perform air infiltration tests in accordance with ASTM E783, and water infiltration tests in accordance with AAMA 501.3.
 - 1. Cost of initial testing to be born by owner.
 - 2. Costs for any remedial work and subsequent re-testing to be born by responsible party depending on nature of remedial work required.

3.4 CLEANING

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
- B. Clean exposed surfaces exercising care to avoid damage.
 - 1. Remove adhered matter and excess sealant materials.
 - 2. Replace glass which is broken, cracked, chipped, scratched, abraded or damaged in other ways.
- C. Wash glass on interior and exterior to remove paint, soil, prints and foreign matter. It is strongly advised that procedures and methods outlined in the following documents be strictly adhered to when cleaning Architectural glass:
 - 1. Glass Association of North America (GANA) Technical Bulletin 01-0300: *Glass Cleaning Procedure*
 - 2. GANA Technical Bulletin TD-02-0402: *Heat-treated Glass Surfaces Are Different*
 - 3. PPG Glass Technical Document TD-142: *Glass Cleaning Recommendations*

3.5 PROTECTION

Institute protective measures required throughout the construction period to ensure that both interior and exterior of wood doors will be without damage or deterioration, other than normal weathering.



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SPECIFICATIONS – WINDOWS

SECTION 085200 – WOOD WINDOWS

PART 1 — GENERAL

1.1 SUMMARY

A. Section includes:

Edit the following listing as required for applicability to the specific project, particularly window types required and specific trim inclusions.

1. Windows: Fixed frame, fixed sash, storefront, casement, hopper, awning, tilt/turn, and/or single-hung type operating sash, all with factory glazed components and reinforcing as required.
2. Trims (if applicable).
3. Flat steel mullion stiffeners (if applicable).
4. All labor equipment, materials to furnish and perform work as specified and shown on contract documents.

B. Related Work Specified Elsewhere

Edit the following listings as required for applicability to the specific project.

1. Section 051000 – Structural Metal Framing
2. Section 061053 – Miscellaneous Rough Carpentry: Wood framing or blocking
3. Section 062000 – Finish Carpentry
4. Section 064000 – Architectural Woodwork
5. Section 076000 – Flashing and Sheet Metal
6. Section 079200 – Joint Sealants: Perimeter sealants and backup materials
7. Section 081400 – Exterior Stile and Rail Wood Doors
8. Section 088000 – Glazing
9. Section 099300 – Staining and Transparent Finishes

1.2 SYSTEM REQUIREMENTS

A. General Qualifications: Wood framed windows shall withstand the effects of the performance requirements indicated without failure due to defective manufacture, fabrication or installation.

1. Fabricator: Single fabricator regularly engaged for at least ten years fabricating products of the kind and quality required for the project.
2. Installer: Experienced carpenter contractor who has completed comparable work.

B. Design Criteria

1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Wall openings: Accommodate allowable building wall construction tolerances and moisture-caused brick masonry swell without stressing or deforming window units or overstressing anchorage.
3. Moisture changes: Accommodate wood shrinking and swelling caused by ambient conditions at the project, without stressing window units, overstressing anchorage, causing sash to bind, or exceeding air/water entry limits.
4. Comply with applicable provisions in AAMA/WDMA I.S. 2, "Standard Specification for Windows, Doors and Skylights" for operating force, air infiltration, water penetration, structural performance, and forced-entry resistance for wood windows.



SPECIFICATIONS – WINDOWS

5. Glazing provisions: As recommended by the glass manufacturer.

C. Reference Standards

List reference standards that are included within the text of the specification. Edit the listings below as required for applicability to the specific project.

1. ASTM E 283 Test method for determining air leakage.
2. ASTM E 330 Test method for determining structural performance.
3. ASTM E 331 Test method for determining water penetration using static air pressure differential.
4. ASTM E 547 Test method for determining water penetration using cyclic air pressure differential.
5. ASTM F 588 Test method for forced entry resistance.
6. ASTM E 783-02 Standard test method for field measurement of air leakage through installed exterior windows and doors.
7. AAMA 501.3 Field check of water and air leakage through installed exterior windows, curtain walls and doors by uniform air pressure difference.
8. AWI: *Architectural Woodwork Quality Standards*, 7th edition, version 1.0, 1997, of the Architectural Woodwork Institute.
9. AAMA/WDMA/CSA 101/1.S.2/A440-05 *Standard/Specification for Windows, Doors and Unit Skylights*.

1.3 PERFORMANCE REQUIREMENTS

A. Performance Requirements:

1. Air Infiltration: Air leakage shall not exceed 0.15 CFM per square foot of surface area for fixed units and 0.30 CFM per foot of sash crack when tested in accordance with ASTM E283 at differential static pressure of 6.24 psf.
2. Water Infiltration: No uncontrolled leakage when tested in accordance with ASTM E547 at test pressure of 6.24 psf, or 20 percent of full positive design wind load, whichever is greater.
3. Thermal Transmittance: Provide window units with the following U-value as determined according to NFRC 100 or calculated according to LBNL Window 5.2 computer analysis.

Indicate required U-value below.

- a. U-value =
4. Forced-Entry Resistance: Comply with Performance Level 10 requirements when tested according to ASTM F588.

Under following section, Structural Requirements, provide project design pressure.

- B. Structural Requirements: When tested in accordance with ASTM E330 at 150 percent of design pressure, no failure or permanent deflection in excess of 0.003 of any member's span after removing the imposed load, for a positive (inward) and negative (outward) design pressure of 60 psf.

1.4 SUBMITTALS

- A. Wood Samples: Duplicate pairs of samples for each species of unfinished and transparent finished wood proposed for production work.
 1. Samples shall be large enough to accurately show typical appearance characteristics.
 2. Each pair of samples shall show extremes of appearance characteristic of range proposed for the work. Wood used for production shall be within this range.

If FSC® (Forest Stewardship Council®) certified lumber is mandated for the project, include the following reference. Otherwise, delete 1.4.A.3.

3. Provide chain-of-ownership documentation for all FSC certified lumber.



SPECIFICATIONS – WINDOWS

- B. Sample windows/mock-ups (where specified): Window assemblies for typical wall openings shall be provided, complete and ready to install.
- C. Shop Drawings
 - 1. Schedule: Window types, sizes, locations, and quantities, keyed to scale elevations. Identify materials, finish and species of woods, glazing types, hardware, and anchoring provisions.
 - 2. Details: Full or large scale, keyed to scale elevations. Show frame and sash construction, glazing, weep/vent provisions, hardware, weather-stripping and anchorage.
 - 3. Installation: Clearly show relation to adjoining construction. Give blocking requirements, clearances, weather proofing & flashing recommendations and all other instructions necessary for proper installation.

If maintenance stock is to be required, clearly list quantities and types of stock required. Otherwise, delete section 1.4.D.

- D. Maintenance Stock: Per project requirements (glass, hardware, etc.)

1.5 QUALITY ASSURANCE

- A. Single Source Responsibility:
 - 1. Provide window and door systems that are products of a single manufacturer.
 - 2. Glass, glazing, and glazing sealants for window and door systems are required as work of this section for single source responsibility.
- B. Certifications
 - 1. Fabricator qualifications: Not less than 10 years prior successful production of units similar to those required. List projects having windows of the kind required for the project. Installations shall have been done to meet job conditions and performance requirements of the kind shown and specified for this project. Give installation dates, locations, contact names, addresses, and phone numbers for each project.
 - 2. Test report: Certified independent testing agency reports to show compliance with specified window performance requirements. Tests shall have been made within 5 years of submission. Reports shall include test descriptions and results, as well as sufficient product descriptions to show that tested products are representative of those proposed for the project.
 - 3. Installer Qualifications: Certified in writing by manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.
- C. Maintenance Instructions: Two copies of window manufacturer's product manual with recommendations for routine owner maintenance of window units, hardware and wood finishes; and instructions for removing and replacing sash and glass.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver factory-assembled, preglazed windows in enclosed vans. Bundle and label loose materials as necessary to prevent loss and damage.
- B. Store products in a clean, protected, dry, well-ventilated building, on platforms or blocking at least 4 inches above floor. Stack products so they do not warp, bend or twist. Store windows upright, not flat or leaning, with at least ¼" air space between units. General contractor is responsible for storage on site.
- C. Protect glazing and frame components from adverse job conditions before, during, and after installation including but not limited to:
 - 1. Condensation, temperature changes, direct exposure to sun or other causes that could otherwise damage the assemblies
 - 2. The work of other trades before, during, and after installation (e.g., weld slag, run down staining, masonry dust and similar)



SPECIFICATIONS – WINDOWS

3. Adhere to glass manufacturer's recommendations for venting and sealing insulated units to avoid hermetic seal ruptures or glass breakage at high altitude locations.
- D. Handle windows with clean hands or canvas gloves.

1.7 PROJECT CONDITIONS

- A. Connecting Work: Constructed to specified tolerances. Field dimensions agreed upon prior to fabrication.
- B. Reference Points: Benchmarks and other required reference points shall be established.
- C. Environmental Conditions: Air temperature during installations shall be at least 40° F and rising, and the wind light or still. Work areas and materials shall be dry and free of ice and snow. Ensure ambient and surface temperatures and joint conditions are suitable for installation of materials.

1.8 WARRANTY

- A. Provide written warranty signed by manufacturer stating that work is free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail under normal operation.
 1. Material and workmanship warranty term: 3 years from date of Substantial Completion.
- B. Provide written warranty agreeing to replace defective insulating glass units and stating that insulating glass units will be free from condensation, fogging and obstruction of vision due to film on internal surfaces for 10 years from date of installation. Replacement includes labor and materials.
 1. Glass seal failure warranty term: 10 years from date of Substantial Completion.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Duratherm Corporation, 720 Main Street, Vassalboro, ME 04989
Telephone: (800) 996-5558 / Email: info@durathermwindow.com.
- B. Other Acceptable Manufacturers: Subject to compliance with requirements listed herein, provide either the named product or a comparable product that meets visual, physical and performance criteria as judged solely by the architect.

2.2 FRAME MATERIALS

- A. Lumber: All pieces shall be dried to an average moisture content of 12% (9-14% for individual pieces) before assembly and treatment.
- B. Wood Species: Different species at interior and exterior
 1. Exterior: Extension sill nosing, exterior frame and sash facing.

Edit the following list of exterior wood species according to material used on project. If more than one exterior wood type is used, give indication as to where the different woods occur on project. Indicate that lumber is to be FSC® certified if appropriate.

- a. Teak (*Tectona grandis*)
- b. Sapele mahogany (*Entandrophragma cylindricum*)
- c. African Mahogany (*Khaya ivorensis*)
- d. Honduran Mahogany (*Swietenia macrophylla*)
- e. Cypress (*Taxodium distichum*)
- f. Douglas Fir (*Pseudotsuga menziesii*)
- g. Spanish Cedar (*Cedrela odorata*)
- h. Redwood (*Sequoia sempervirens*)
- i. Jarrah (*Eucalyptus marginata*)



SPECIFICATIONS – WINDOWS

2. Interior: All inside frame and sash components.

Edit the following list of interior wood species according to material used on project. If more than one interior wood type is used, give indication as to where the different woods occur on project. Indicate that lumber is to be FSC® certified if appropriate.

- a. African Mahogany (Khaya ivorensis)
- b. Sapele mahogany (Entandrophragma cylindricum)
- c. Honduran Mahogany (Swietenia macrophylla)
- d. Cherry (Prunus serotina)
- e. Maple (Acer saccharum)
- f. White Oak (Quercus alba)
- g. Red Oak (Quercus vubra)
- h. Spanish Cedar (Cedrela odorata)
- i. Redwood (Sequoia sempervirens)
- j. Douglas Fir (Pseudotsuga menziesii)
- k. Teak (Tectona grandis)

2.3 HARDWARE

- A. Anchor Bolts and Screws: Hex head through-bolts and flat head wood screws shall be of corrosion resistant type (zinc chromate, galvanized or stainless steel).
- B. Waterproof Adhesive: Resorcinol, melamine, or polyvinyl acetate emulsion type.
- C. Anchor Clips: Teco, Simpson Strong-Tie Connectors®, or equal.
- D. Operating Hardware

*Edit the following hardware types to conform to requirements of project.
Edit finish/style/material within each listing as required.
If there are no operable window units on project, delete sections 2.3.D and 2.3.E.*

- 1. Sash locks (awning, out-swing casement, hopper, single-hung): Oxidized bronze alloy latch designed to be manually operated. Finishes: Lacquered Red Bronze (US 20A), Oil Rubbed Bronze (US 10) and White Bronze (US 26D).
- 2. Pushbar operator (out-swing casement and awning): Comprised of oxidized bronze alloy components and a solid brass bar, copper plated and oxidized to match bronze. The pushbar operator shall be designed to be manually operated for entire length and to hold sash at intermediate points. Finishes: Lacquered Red bronze (US 20A), Oil Rubbed Bronze (US 10) and White Bronze (US 26D).
- 3. Roto-crank operator (out-swing casement, awning): Truth Maxim® stainless steel roto-crank. Finishes: Satin Nickel (US15), Oil Rubbed Bronze (US 10).
- 4. Multi-latchpoint operating hardware (tilt/turn, in-swing casement): G-U Jet Contura with single lever handle and concealed hinging. Finishes: Lever handle style and finish per project requirements.
- 5. Hinges (awning, out-swing casement, hopper): Heavy duty stainless steel extension type. Heavy duty zinc chromate coated steel or solid brass available for oversized units.
- 6. Sash balances (single-hung): Concealed Ultralift 88L series 670 heavy duty tube / spring balances by Caldwell mounted within sash stile with no exposed cables or chains.
- 7. Insect screens (all unit types): Frames – 1" x 5/16" tubular aluminum extrusions in manufacturer's standard colors. Mesh – 18 x 16 screen mesh in manufacturer's standard materials and finishes: charcoal aluminum, mill finish aluminum, stainless steel, bright brass, or bright copper. Optional wood framed insect screens available.



SPECIFICATIONS – WINDOWS

8. Specialty hardware (per project requirements): Egress, sash restrictors, security locks, remote operators.
- E. Weather-Stripping: Extruded ethylene propylene, neoprene or other plastic that remains flexible and non-sticky at project ambient temperature extremes.

2.4 FABRICATION

A. General

1. Windows: Produced from standard components. Wood components shall be solid lumber. Like parts shall be interchangeable. Fitting, machining for hardware and glazing shall be done in the factory.
2. Frames: AWI Custom Grade Exterior Frames.
3. Sash: AWI Custom Grade Finished Exterior Sash. Fixed and operable sash incorporate removable interior glass stops for ease of reglazing.

B. Permanent Joints and Facings: Bonded with water-resistant adhesive.

C. Wood Finish:

1. Exterior: Note that all corners and edges of units receiving film-forming finishes (Sikkens, paint, etc.) are to be eased/radiused to promote finish adhesion and maintain proper film thickness.

Edit the following list of exterior wood finish options according to finish used on project. If more than one exterior finish type is used, give indication as to where the different finishes are used.

- a. One (1) coat ICA #IM116 water based impregnating agent, tinted per project requirements, one (1) coat #FA34 water based bicomponent polyurethane sealer, two (2) coats #LA409 water based monocomponent acrylic finish, 30 sheen.
- b. One (1) coat factory-stained or -primed, with additional coats applied by others in field after installation.
- c. Four (4) coat Sikkens finish: Two (2) coats Sikkens Cetol® 1 and two (2) coats Sikkens Cetol® 23.
- d. Three (3) coat Sikkens Cetol® Door and Window finish.
- e. Unfinished for jobsite finish by others in field after installation.

2. Interior

Edit the following list of interior wood finish options according to finish used on project. If more than one interior finish type is used, give indication as to where the different finishes are used.

- a. One (1) coat Sher-Wood® vinyl sealer T67F3 and two (2) coats Sher-Wood® Hi-Bild Catalyzed Lacquer T77F58.
- b. Factory-finished with one (1) sealer coat of sanding sealer for jobsite sanding and recoat by others in the field after installation.
- c. Factory-oiled with one (1) coat exterior grade wood oil for jobsite re-coat by others in field after installation.
- d. Factory-primed for sanding and finish by others in field after installation.
- e. Unfinished for jobsite finish by others in field after installation.

D. Glazing

1. Products and installation: Satisfy requirements specified in Section 088000 Glazing.
2. Glazing System



SPECIFICATIONS – WINDOWS

Edit the following Glazing System options according to that which is to be used on project.

- a. Wet Glazing: Provide two-part wet glazing system recommended by manufacturer for each type window and door specified
- b. Dry Glazing: Provide compression type design utilizing extruded neoprene or silicone glazing gasket system recommended by manufacturer.
3. All units to be factory-pre-glazed.
4. Interior removable glazing stops to be screwed in-place for ease of removal and maintenance.
5. Glazing channel shall be weeped/pressure relief vented per window manufacturer's requirements.
6. Where required, glass at heat absorbent unit to be suitably tempered.
7. Where required, glass at windows with blinds to be suitably tempered.
8. Insulated units for high elevation projects to include breather tubes. Tubes to be sealed within two days of arrival at jobsite following manufacturer's written instructions.
- E. Measurements:
 1. Take accurate field measurements to verify required dimensions prior to fabrication.
 2. Where field dimensions can not be made without delaying the work, establish opening dimensions and proceed with fabricating windows without field dimensions. Coordinate wall construction to ensure that the actual opening dimensions correspond to established dimensions
- F. Fabricate components in accordance with manufacturer's tested assemblies. Shop fabricate, glaze, and finish to greatest extent practical to minimize field assembly. Disassemble only to extent necessary for shipping and handling limitations.
- G. Fabricate components true to detail and free from defects impairing appearance, strength or durability.

PART 3 — EXECUTION

3.1 EXAMINATION

- A. Examine conditions with installer present for compliance with all requirements. Inspect wall flashings, vapor retarders, water and weather barriers, and other built in components to ensure a weather tight installation.
- B. Verify dimensions, tolerances, and method of attachment with other work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install windows per approved shop drawings, in proper relation to adjoining construction. Do not twist frames or force fit them into poorly prepared openings. Anchor windows as required to satisfy design requirements. See manufacturer's installation instructions and shop drawings.
- B. Center window units in wall openings leaving a uniform interface caulking recess on all four sides. The manufacturer strongly suggests that sealant be selected for its adhesion compatibility with the specified exterior wood and adjacent wall materials. Consult the manufacturer for recommended sealant.
- C. Level Units: Install shims at bearing locations, anchors, and latchpoint, so they are not dislodged by subsequent operations. Test sash operation and sash alignment before permanently anchoring units.
- D. Anchorage: Install anchors through frame centerline beside shims. Anchor window units to wood blocking with wood screws and to metal framing with Tek screws; countersink anchor heads. All anchors shall be concealed by closed sash or with wood plugs.



SPECIFICATIONS – WINDOWS

- E. Installation to conform to window manufacturer's requirements as indicated in the manufacturer's product manual.

If field testing is to be performed, include section 3.3. Otherwise remove section 3.3 in its entirety.

3.3 FIELD QUALITY CONTROL

- A. Field Tests: Independent testing laboratory will perform air infiltration tests in accordance with ASTM E783, and water infiltration tests in accordance with AAMA 501.3.
1. Cost of initial testing to be born by owner.
 2. Costs for any remedial work and subsequent re-testing to be born by responsible party depending on nature of remedial work required.

3.4 CLEANING

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
- B. Clean exposed surfaces exercising care to avoid damage.
1. Remove adhered matter and excess sealant materials.
 2. Replace glass which is broken, cracked, chipped, scratched, abraded or damaged in other ways.
- C. Wash glass on interior and exterior to remove paint, soil, prints and foreign matter. It is strongly advised that procedures and methods outlined in the following documents be strictly adhered to when cleaning Architectural glass:
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 2. GANA Technical Bulletin TD-02-0402: *Heat-treated Glass Surfaces Are Different*
 3. PPG Glass Technical Document TD-142: *Glass Cleaning Recommendations*

3.5 PROTECTION

Institute protective measures required throughout the construction period to ensure that both interior and exterior of wood doors will be without damage or deterioration, other than normal weathering.



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INSTALLATION INSTRUCTIONS

1. General Installation Instructions

A. Storage and Handling

1. Store windows in a clean, protected, dry, well-ventilated area on pallets or blocking at least 4" above the floor. Stack windows so they do not warp, bend, or twist. STORE WINDOWS UPRIGHT, not flat or leaning, with at least ¼" air space between units. General contractor is responsible for window storage on site.
2. Handle with clean hands or canvas gloves.
3. It is not uncommon for windows to be knocked out of square during shipping and handling, particularly large units. This is easily corrected once the windows are set in the opening and properly shimmed.

B. Installation Instructions — All Window and Door Units

1. Carefully review factory-prepared shop drawings and all other documentation pertaining to the windows and window installation.
2. Examine the framed opening, comparing rough opening and unit dimensions with those shown on shop drawings.
3. Report any irregularities affecting the installation to the general contractor for correction prior to beginning installation.
 - A. Do not force fit frames into improperly prepared openings.
 - B. Commencement of work may be construed as acceptance of work performed by others.
4. Set units spaced equally in the opening.
 - A. Shim sill level and jambs plumb and straight. Shims are required regardless of whether fastening consists of through-bolts or installation clips. Insert tapered shims from both directions in pairs to insure that the frame remains flat.
 - B. Check for square, measuring diagonally. Adjust shims as required.
 - C. Shim and fasten jambs at predrilled locations or as directed on the shop drawings. Typically, anchor locations are at jambs, 6" down from head, 6" up from sill, at ± 24" on center, adjacent to all latches, and adjacent to butt hinge locations for swing doors and casements. Refer to shop drawings for head or sill anchoring requirements.
5. Before final fastening, check clearances and adjust shims if necessary. Shims should be located adjacent to but not covering fastener locations to facilitate adjustment.
6. Secure units using manufacturer's recommended fasteners for the appropriate locations as per the shop drawings or as follows:
 - A. Wood screws: #14 galvanized or stainless steel flat head screws of suitable length at wood blocking.
 - B. Self-drilling/self-tapping screws (Tek™ Screw or equal): ¼" diameter of suitable length at metal studs or structural steel.
 - C. Self-tapping masonry anchors (Tapcon® or equal): ¼" diameter of suitable length at concrete block or poured concrete.
 - D. Clip Anchors (Teco, Simpson Strong-Tie Connectors® or equal): 18 gauge formed nailing clips.
7. Check installation for proper alignment and clearances.
8. Install matching wood plugs at through-bolt connections.



PRODUCT MANUAL – INSTALLATION

9. Fill all voids between frame and rough opening with foamed-in-place or batt insulation. Apply foamed-in-place insulation carefully to avoid bowing window frames.
10. Apply exterior sealants compatible with the specified wood and the adjacent wall materials. Contact sealant manufacturer or Duratherm for recommendations on sealant.
11. Install exterior trim and/or casing with stainless steel fasteners.
12. Protect completed unit with polyethylene during remainder of construction, especially during gypsum drywall or plastering work.
IMPORTANT: Protect exterior of windows from chemicals used in cleaning masonry.
13. Upon completion of interior wall finishes, install interior trim and frame extensions.
14. Apply interior decorative finish to exposed sash, frame, and trim members, keeping finish off glazing rubber, weather-strip, and hardware.
15. At project completion, re-check installation of window/door unit for proper operation. Lubricate all pivots and hinges with Dri-Slide® or similar dry lubricant.



2. Installation for Specific Unit Types

A. Fixed, Storefront

1. Shim sill level and space equally in opening at bottom.
2. Check unit for in/out location and shim jambs at bottom corners.
3. Check head of unit for plumb and shim jambs at top corners.
4. Check for square, measuring diagonally and adjusting shims accordingly.
It is not uncommon for units to be knocked out of square during shipping and handling, particularly large units. This is easily corrected once the windows are set in the opening and properly shimmed.
5. Install fasteners at the four corners.
6. Shim adjacent to each intermediate anchor point and install fasteners. Do not over-shim so as to cause the frame to bow. Check frame for plumb as shims are installed.
7. Re-check for square; tighten all fasteners.
8. Install matching wood plugs over anchor bolts.
9. Install backer rod and sealant at exterior interface joint. Make sure that sealant used is compatible with wood window and adjacent building surface.
10. Attach exterior trim with galvanized or stainless steel fasteners. Perimeter blocking should abut exterior trim.

B. Awning, Casement, Hopper, Tilt/Turn

1. **CAUTIONS**
 - A. Do not open the sash until unit is firmly fixed in the rough opening with shims. When sash is open, the thrust on the frame is considerable.
 - B. All operable units must have a uniform clearance between sash and frame for proper operation and sealing.
 - C. Protect windows from chemicals used in cleaning of masonry.
2. Level sill by shimming at the bottom corners. Do not bow jambs by shimming too tightly. Install intermediate shims along sill as required for wide units.
3. Check unit for in/out location and shim jambs at bottom corners.
4. Check head of unit for plumb and shim jambs at top corners. For butt-hinged casement units, install shims adjacent to hinges.
5. Check for square, measuring diagonally and adjusting shims accordingly.
6. Remove spacer blocks between sash and frame and carefully open sash enough to install upper and lower fasteners. Removal of sash stops within hinge track may be required to obtain sufficient clearance.
7. Shim adjacent to each intermediate anchor point and install fasteners. Do not over-shim so as to cause the frame to bow. Check frame for plumb with a straight edge as shims are installed.
8. Close sash and check for ease of operation and equal clearance (approximately $\frac{3}{16}$ ") between sash and frame. Adjust shims and fasteners as required.
9. Tilt/Turn sash can be adjusted for square within frame by using an Allen wrench at top and bottom hinge adjustments. The bullet catches can also be adjusted for closing force. Contact factory for assistance.
10. Follow steps 8 through 14 in section 1.B, General Installation Instructions.



C. Single-Hung

1. CAUTIONS

- A. All operable units must have a uniform clearance between sash and frame for proper operation and sealing.
 - B. Protect windows from chemicals used in cleaning of masonry.
2. Level sill by shimming at the bottom corners. Do not bow jambs by shimming too tightly. Install intermediate shims along sill as required for wide units.
 3. Check unit for in/out location and shim jambs at bottom corners.
 4. Check head of unit for plumb and shim jambs at top corners.
 5. Check for square, measuring diagonally and adjusting shims accordingly.
 6. Shim adjacent to each intermediate anchor point and install fasteners. Do not over-shim so as to cause the frame to bow. Check frame for plumb with a straight edge as shims are installed.
 7. Raise and lower sash to assure that equal clearance between sash and frame on each side has been maintained. Adjust shims and fasteners as required.
 8. Follow steps 8 through 14 in section 1.B, General Installation Instructions.

D. Lift/Roll, Pocket Roll Doors

1. Stand door frame in opening, making sure unit is positioned properly within the wall, especially at the sill.
2. Shim sill at each end of frame to level, then work across length of sill, shimming and leveling adjacent to all fastening points and at approximate 12" centers. NOTE: Sill must be perfectly level and true for door to operate properly and seal tightly. For large doors, it is recommended that a transit or tripod-mounted level be used. Door hardware does NOT allow for adjustment of wheels to compensate for improper installation.
3. Check unit for in/out location and shim jambs at bottom corners.
4. Check head of unit for plumb and shim jambs at top corners. Stretch tight diagonal lines from corner to corner at either interior or exterior face of door (contact points need to be in same plane). Adjust top corners until crossed lines make contact at the center.
5. Check for square, measuring diagonally and adjusting shims accordingly.
6. Install fasteners at the four corners.
7. Measure the vertical dimension between the head and sill at the face of the jambs and cut a rigid stick to this dimension. Move this stick along sill, keeping it plumb. Shim and fasten head. This method should ensure that head and sill are parallel.
8. Shim adjacent to each intermediate anchor point at jambs and install fasteners. Do not over-shim so as to cause the frame to bow. Check frame for plumb with a straight edge as shims are installed.
9. Re-check frame for square. A squared frame is of utmost importance for proper door operation. If door is delivered fully assembled, skip to step 16.
10. Install top and bottom tracks. Sill tracks are to be set in silicone sealant to prevent water penetration. If "channel style" head track P930 is used, front and rear door guides (one pair for each door panel) must be inserted into track prior to fastening head track in place.
11. The top and bottom insulation block must be installed in position indicated at head and/or at sill. Set in silicone sealant.



12. Install rolling door panels by first setting the door on the sill track, then tilting into a vertical position. Make sure that the wheels are retracted into the door panel. Do this by turning the operating handle 180° so that handle points up.
13. Slide the top front and rear guides into position at the door head and fasten with screws provided.
14. Raise the door onto its wheels and roll to within $\pm \frac{1}{2}$ " of the jamb. Check to ensure there is a consistent gap between door panel and frame. If the gap is not consistent, roll the door away from the jamb ± 18 " and recheck. If the gap has the same inconsistency as previously measured, the jamb needs to be checked for plumb. If the inconsistency is different in the two positions, then the sill needs to be checked for level.
15. Install the rolling screen doors. Note that these doors are supplied with adjustable wheels and should be adjusted upward to leave a minimum of space between top of door and door track so as to prevent derailment.
16. Follow steps 8 through 14 in section 1.B, General Installation Instructions.

E. Swing Door, WinDoor™

1. Stand door frame in opening, making sure unit is positioned properly within the wall, especially at the sill condition.
2. Shim sill level and jambs plumb and straight. Door sill must be level and true for door to swing properly and seal tightly.
3. Check unit for in/out location and shim jambs at bottom corners.
4. Check head of unit for plumb and shim jambs at top corners.
5. Check for square, measuring diagonally and adjusting shims accordingly.
6. Install fasteners at the four corners.
7. Shim adjacent to each intermediate anchor point and install fasteners. Do not over-shim so as to cause the frame to bow. Check frame for plumb with a straight edge as shims are installed.
8. Re-check for square. On pre-hung doors, make sure door swings freely and seats firmly, and tighten all fasteners.
9. Follow steps 8 through 14 in section 1.B, General Installation Instructions.
10. Fit and machine the door leafs for specified hardware according to hardware manufacturer's instructions. Door leaf is typically installed flush with exterior face of frame; refer to factory-prepared shop drawings for detailing. After machining for hardware, but prior to hardware installation, completely seal all surfaces of door, particularly areas that will be subsequently hidden by hardware.



3. Installation for Multiple Windows

A. Horizontal and/or Vertical Meeting Mullion, All Units

1. Individual window units not factory-mulled should be joined, if possible, prior to setting the entire assembly into the rough opening.
It is important that the assembly area be level, smooth and clean to prevent any damage to units and insure proper alignment.
2. Bolt units together in assembly area.
 - A. Horizontal and vertical mullions are factory-prepared for connector bolts supplied by Duratherm.
 - B. Care should be taken when aligning units to avoid stripping threads. Use clamps to pull window frames together before bolting.
 - C. Install rigid insulation within meeting mullions prior to assembly.
3. If wood reveal strips are provided for meeting mullion conditions, ensure that they are placed properly to give the desired reveal and to correspond with any factory-installed reveal strips.
4. Open sash at operable units to access the factory-prepared bolt holes.
Remove factory-installed sash shims when opening window. Relocate after window units have been bolted together, insuring proper clearances at sash after entire assembly has been installed.
5. Set entire assembly into rough opening and complete the installation as described in section 1.B, General Installation Instructions.

B. Window-Wall Installations

1. For large openings with continuous multiple units, lay out unit dimensions both horizontally and vertically in opening prior to starting installation. This provides a check to eliminate creep.
2. Install steel stiffeners and/or steel structural members as per approved factory-prepared shop drawings. Flat steel stiffeners provided as part of project by Duratherm are pre-punched in factory for through-bolt connectors. Ensure that steel is set at proper elevation to align slots in steel with the predrilled anchor locations in adjacent units.
3. Follow steps 1 through 4 in section 3.A, Horizontal and/or Vertical Meeting Mullion, All Units.



MAINTENANCE INFORMATION

1. Glass Cleaning

A. Proper Procedures for Cleaning Architectural Glass

1. It is strongly advised that procedures and methods outlined in the following documents be strictly adhered to when cleaning architectural glass:
 - Glass Association of North America (GANA) Technical Bulletin 01-0300: *Glass Cleaning Procedure*
 - GANA Technical Bulletin TD-02-0402: *Heat-treated Glass Surfaces Are Different*
 - PPG Glass Technical Document TD-142: *Glass Cleaning Recommendations*Contact Duratherm for copies of the above referenced technical bulletins.
2. Take particular care when cleaning glass during or just after completion of construction activities. Refer to the above referenced documents for the proper methods and materials for the initial cleaning of glazing.

2. Periodic Maintenance

A. General Cleaning Information

1. Common household or light industrial cleaners are recommended.
2. Squeegees are probably the most effective method for cleaning glass and are necessary for exterior cleaning from interior of unit. However, refer to documentation from GANA (Glass Association of North America) referenced above for proper cleaning methods and equipment.

B. Cleaning Exterior Glass From Interior

1. Awning: With sash in open position, disengage finger loop from pushbar by removing machine screws. Slide pushbar completely through saddle until sash is open to maximum position. Provide adequate support for sash in this position. This will provide access between top of sash and frame through which a squeegee can reach the exterior glass surface.
2. Casement: With sash in open position, disengage finger loop from pushbar by removing machine screws. Slide pushbar completely through saddle until window is open to maximum position. There will now be access at side of unit through which a squeegee can reach the exterior glass surface.
3. Hopper, Tilt/Turn: Open sash to maximum, permitting exterior of unit to be easily washed from the inside.

C. Cleaning and Maintaining Hardware

1. Cleaning of hardware is best accomplished by brushing out or wiping all hinge tracks to free dirt and dust. Light washing will restore all finished surfaces to original appearance.
2. Periodic checking and adjustment of all screws may be necessary as some may loosen over an extended period of use.
3. If lubrication of hardware appears necessary, a light film of lubricant may be applied. Dri-Slide® or similar dry lubricant is recommended.



4. For Whitco® heavy-duty solid brass or zinc chromate hinges, hinge arm tension adjustment may be made where hinge arm connects to jamb frame by means of a very thin hex head nut. This hex nut controls the tension in the operation of the sash. Tightening (clockwise turning) the nut stiffens sash operation; loosening (counter-clockwise turning) the nut eases tension. Over a period of time this nut may need adjustment.

Regardless of tension on the hex nut, the sash is not designed to move freely. It will always provide some resistance, as these units are heavy and built to last. Therefore, do not over-loosen this nut.

D. Cleaning Screens

1. Replace screen mesh by removing the vinyl retaining spline at the screen cloth perimeter.
2. A simple dusting and seasonal washing is all that should be required to keep screen mesh and screen frames in original condition.
3. Removal and storage during winter months is recommended but not necessary.

E. Maintaining Decorative Wood Finish

Finish maintenance schedules are highly dependent on the type of wood and finish used, the exposure and environmental conditions at the project site, and the warranty requirements of the wood finish product used. Contact Duratherm or the finish manufacturer directly for recommendations specific to your application.



3. Component Repair and/or Replacement

A. Sash Removal, Awning (Hopper similar)

It is advisable to remove glass from sash before removing sash from frame. This is accomplished by removing glazing rubber and interior glass stops and carefully lifting glass out of sash. Refer to Reglazing of Sash.

1. With sash in open position, remove finger pull machine screws.
2. With finger pull removed, slide pushbar completely through saddle; open window to maximum; and support in this position. Guide tracks should now be visible at both the right and left jambs. Remove sash stops located in guide tracks.
3. Whitco® and Truth® brand hinges: Remove screws that attach hinge to window frame. **CAUTION:** When hinge arms are disconnected from frame, sash will drop if not adequately supported.
4. Tilt sash and pass through frame into building.
5. To install replacement sash, reverse above procedures.

B. Sash Removal, Out-Swing Casement

It is advisable to remove glass from sash before removing sash from frame. This is accomplished by removing glazing rubber and interior glass stops and carefully lifting glass out of sash. Refer to Reglazing of Sash.

1. With sash in open position, remove finger pull machine screws.
2. With finger pull removed, slide pushbar completely through saddle; open window to maximum; and support in this position. Guide tracks should now be visible at both the head and sill.
3. Whitco® and Truth® brand hinges: Remove screws that attach hinge to window frame. **CAUTION:** When hinge arms are disconnected from frame, sash will drop if not adequately supported.
4. Tilt sash and pass through frame into building.
5. To install replacement sash, reverse above procedures.

C. Sash Removal, Single-Hung (Caldwell Ultralift Balance)

NOTE: Follow steps in sequential order. If changing balances only (not removing sash) do not remove the balances on both sides at the same time. Remove and re-install balances one side at a time to ensure proper installation of balance and "L" bracket.

1. With the sash in the closed position, remove the two screws at the top of the cover piece. Remove cover piece exposing the tubular sash balance (you will see a gray round tube).
2. Open the sash partially to relieve tension on the spring balance.
3. Use a support to securely hold sash in partially open position.
4. Making sure support is in place, remove the screw at the top of the balance (at the underside of the header).
5. Remove the two screws holding the "L" bracket in place. This is located on the bottom of the sash sill.
6. Remove the "L" bracket from sash balance (a slight twist will remove it from its slot).
7. While supporting the weight of the sash, remove the support that is holding the sash open and carefully lower the sash to the closed position. **CAUTION:** Sash can be very heavy and may require two people to support when removing blocking.
8. Lift balance up and out of closed sash.
9. Follow above procedure for second balance.



10. Once both balances are removed, remove screws in the interior sash stop, remove stops, and carefully lift sash out of frame.
11. To re-install sash and balances, reverse above procedure.

D. Sash Removal, Single-Hung (Strybuc Spiral Balance)

1. Remove insect screen to prevent accidental damage.
2. With the sash in the closed position, remove the two screws at the top of each wood cover that conceals spiral balance. Remove covers.
3. Open the sash to the full open position and prop open with blocking to hold the weight of the sash. Locate blocking so as to provide access to the bottom corners of the sash.
4. Clamp a vise grips on the spring attachment plate at bottom of sash and remove the two screws from the plate. **CAUTION:** Hold tightly to vise grips to prevent sash spring from unwinding uncontrollably. Using the vise grips, carefully unwind the spring to release tension. It will take approximately 30 full turns by hand.
5. Remove the spring attachment plate from the spring and remove vise grips from plate.
6. Continue to do the same to all springs in steps 4 & 5 (there are either two or four springs per sash).
7. While supporting the weight of the sash, have another person remove the blocking that is propping the sash open and carefully lower the sash to the closed position. **CAUTION:** Sash can be very heavy and may require two people to support when removing blocking.
8. Remove screws in the interior sash stop and remove stops so sash can tilt in.
9. If not replacing balances, go to step # 10. If replacing sash balances, remove screws from the top of the sash spring tubes and lift tubes out.
10. Carefully lift sash out of frame.
11. To reinstall sash, reverse the above procedure.

NOTE: For older single-hung units that use clock spring balances, concealed block and tackle balances, or gas strut balances, contact factory for removal procedures.

E. Sash Removal, Tilt/Turn

1. Open window in turn mode to 90°. Disconnect friction stay at sill and disconnect arm from slide at head by removing the Allen screw.
2. Close window and re-open window to maximum tilt position and support in this position.
3. Disconnect stay arm at head of unit by means of the sliding clip attachment.
CAUTION: Support sash as this disconnects sash from frame at head.
4. Lift sash off bottom ball hinge.
5. To install replacement sash, reverse above procedure.

F. Sash Removal, In-Swing Casement

1. Open window in turn mode to 90°. Disconnect friction stay at sill and disconnect arm from slide at head by removing the Allen screw.
2. With sash in the open position, lift sash up until bottom hinge clears its receiver; tilt sash in at bottom; and slide down off top hinge.
3. To install replacement sash, reverse above procedure.



G. Panel Removal, Lift/Roll Door

1. Open door partially to provide access to the two guide caps mounted at the top edges of the operable panel.
2. Remove three screws on each guide cap and slide caps away from door panel.
CAUTION: Support door after disengaging guide caps so that door does not fall to interior.
3. Turn door handle so that wheels retract and door is sitting on bottom track.
4. Tilt panel towards the interior to clear door frame and lift off bottom track.
5. To install replacement panel, reverse above procedure.



4. Reglazing of Sash

NOTE: Sashes utilize removable interior glass stops.

A. Dry Glazing System

1. Starting at bottom center of sash, carefully pry interior glazing rubber up with a putty knife, screw driver, or other blunt object. Continue around entire perimeter of sash until glazing rubber is removed. Avoid marring exposed surfaces of glass stop.
2. Remove all screws in glass stops and carefully pull stops away from sash. Sill sash stop is bed in sealant, so careful prying may be required. Lift out damaged glass using vacuum cups (follow step 3 below if glass does not easily come out).
3. If glass does not easily come out with suction cups, it may be necessary to separate the exterior gasket and its silicone setting bead from the glass. Slide a thin putty knife between the glass and exterior gasket, freeing the glass from the silicone bedding bead. Work your way around the perimeter until glass can be lifted free of gasket.
4. To replace glass, reverse above steps. Check that exterior gasket is firmly seated in groove in exterior glass stop and setting blocks are in their original positions. Apply a small bead of clear silicone sealant on the exterior gasket, between gasket and glass, prior to installing the new glass.

B. Wet Glazing System

1. Remove all screws holding interior glass stops in place.
2. On the interior, insert a putty knife or similar tool between the glass stop and the glass to separate the silicone seal between the two. This seal is minimal and should not require penetration to the full $\frac{3}{4}$ " depth of the glass stop. Continue around entire perimeter of glass until interior sash stop is free. Work carefully to avoid marring exposed surfaces of glass stop.
3. Carefully pull interior glass stops away from sash. Sill sash stop is bed in sealant, so careful prying may be required. Temporarily reinstall head glass stop to act as a safety stop while proceeding with the next step.
4. On the exterior, insert a putty knife or de-glazing wheel between the exterior trim and the glass to separate the silicone seal between the two. Make sure that the tool extends to the full depth of the glazing channel. Continue around entire perimeter of glass until glass is free of the exterior trim. During this process, have someone on the interior with a vacuum cup exerting gentle pressure to help separate the glass from the exterior trim.
5. Once glass is loose, remove interior head stop and lift out damaged glass using vacuum cups. Note position of glass setting blocks and remove for cleaning glazing channel.
6. Remove all silicone from the glazing channel, exterior trim and interior glass stops.
7. Reinstall sill setting blocks in original positions. Do not block weep holes.
8. Apply a generous bead of silicone to the groove in the exterior trim. Set new glass in place and firmly but CAREFULLY press glass against silicone so that excess silicone is pressed out at the exterior.
9. Apply a small bead of silicone to the groove on the interior removable glass stops and in the tongue groove in the window sill/bottom rail and 6" up the tongue grooves on the jambs. Set stops in place and reinstall stop screws.
10. Clean uncured silicone from exterior and interior using denatured alcohol. Make sure the glass is wet when removing silicone to avoid scratching.



OWNER PRECAUTIONS

1. Heat

- A. Do not allow heat to be directed against insulating glass, as large temperature differentials between interior and exterior surfaces may result in glass breakage.
- B. Excessive heat may also cause insulating glass seal failure.

2. Drapery

- A. Maintaining a 6" minimum separation between the interior pane of glass and draperies is recommended to permit proper air circulation and avoid excessive heat build-up.
- B. Draperies should have a perimeter clearance of 2" to allow for air circulation.

3. Reflective Films

- A. Applying reflective or heat-absorbing films to the inner panes of glass will cause excessive heat build-up within the insulating glass, and may result in breakage.
- B. In most cases, installation of reflective or heat-absorbing film voids the insulating glass manufacturer's seal failure warranty.

4. Obstructions

- A. If windows are opened during winter months, it is important to remove snow, ice, and water from sills prior to closing sash. This prevents damage to sash and weather-strip and allows proper sealing.



TROUBLESHOOTING

1. Condensation

A. Within Insulating Glass

1. Failed insulating glass.
Remedy: Replace.

B. On Interior Surface Of Insulating Glass

1. Excess building humidity.
Remedy: Dehumidify.

2. Sash Operating Difficulties

A. Sash Binding In Frame

1. Faulty installation.
Remedy: Check for square, adjust frame, adjust sash to frame.
2. Foreign material between sash and frame.
Remedy: Inspect and clean.
3. Bent, misaligned hardware.
Remedy: Adjust or replace.
4. Sash rubbing at sill.
Remedy: Raise and tighten hinge arms; refit sash to sill.

3. Air and/or Water Penetration

A. Between Sash and Frame

1. Sash not properly latched.
Remedy: Check operating hardware for damage or misalignment.
2. Faulty or damaged weather-strip.
Remedy: Repair or replace.

B. At Unit Perimeter

1. Faulty installation.
Remedy: Contact installer; consult factory-prepared shop drawings.
2. Improper or failed sealant joint.
Remedy: Re-caulk.

C. Sash Not Properly Contacting Weather-Strip

1. Improper hardware adjustment.
Remedy: Adjust hardware.*
2. Sash warped or twisted.
Remedy: Replace sash.*
3. Foreign material between frame and sash.
Remedy: Inspect and clean.

* Contact factory for recommendations.



TEST RESULTS

PERFORMANCE DATA – MECHANICAL

All units tested at independent testing laboratories. Contact factory for detailed reports.		Fixed Frame & Storefront	Awning	Out-Swing Casement	Hopper	Tilt/Turn & In-Swing Casement	Single-Hung	Out-Swing Door	In-Swing Door	Lift/Roll Door (OX)
Unit Size Tested → Data/Detail Page → Performance Grade →		60" x 99" 60, 64 AW-PG60-FW	58" x 34" 68 AW-PG60-AP	36" x 60" 72 AW-PG60-C	60" x 48" 84 AW-PG60-AP	60" x 99" 76, 80 CW-PG55-DAW	60" x 99" 88 CW-PG60-H	48" x 95" 100 AW-PG40-SHD	42" x 90" 108 AW-PG40-SHD	123" x 95" 128 AW-PG50-SD
STATIC AIR INFILTRATION	Allowed →	0.10	0.10	0.10	0.10	0.30	0.30	0.10	0.10	0.30
	Results →	0.00	0.03	0.07	0.05	0.01	0.02	0.01	0.02	0.08
ASTM E283 cfm/ft ² at 1.57 psf pressure										
WATER INFILTRATION		12 psf PASSED	12 psf PASSED	12 psf PASSED	12 psf PASSED	8 psf PASSED	8 psf PASSED	10 psf PASSED	8 psf PASSED	10 psf PASSED
ASTM E547-cyclic ASTM E331-static	Allowed →	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Results →	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNIFORM LOAD STRUCTURAL		+ & - 90 psf PASSED	+ & - 90 psf PASSED	+ & - 90 psf PASSED	+ & - 90 psf PASSED	+ & - 82.5 psf PASSED	+ & - 90 psf PASSED	+ & - 60 psf PASSED	+ & - 60 psf PASSED	+ & - 75 psf PASSED
ASTM E330 held for 10 sec. Allowable: 0.4%										
SASH TORSION		N/A	PASSED	PASSED	PASSED	N/A	N/A	N/A	N/A	N/A
AAMA / WDMA / CSA 101 / I.S.2 / A440										
LOAD TEST		N/A	PASSED	PASSED	N/A	N/A	N/A	PASSED	PASSED	N/A
AAMA / WDMA / CSA 101 / I.S.2 / A440										
FORCED ENTRY		PASSED	PASSED	PASSED	PASSED	N/A	N/A	PASSED	PASSED	PASSED
ASTM F588 windows ASTM F842 doors										

Continues on following page.

TEST RESULTS

PERFORMANCE DATA – MECHANICAL (continued)

All units tested at independent testing laboratories. Contact factory for detailed reports.	Fixed Frame & Storefront	Awning	Out-Swing Casement	Hopper	Tilt/Turn & In-Swing Casement	Single-Hung	Out-Swing Door	In-Swing Door	Lift/Roll Door (OX)
Unit Size Tested → Data/Detail Page → Performance Grade →	60" x 99" 60, 64 AW-PG60-FW	58" x 34" 68 AW-PG60-AP	36" x 60" 72 AW-PG60-C	60" x 48" 84 AW-PG60-AP	60" x 99" 76, 80 CW-PG55-DAW	60" x 99" 88 CW-PG60-H	48" x 95" 100 AW-PG40-SHD	42" x 90" 108 AW-PG40-SHD	123" x 95" 128 AW-PG50-SD
LIFE CYCLE TESTING AAMA 910	N/A	PASSED	PASSED	PASSED	N/A	N/A	PASSED	PASSED	PASSED
OPERATING FORCE ASTM E2068 AAMA / WDMA / CSA 101 / I.S.2 / A440-05 & -08	N/A	PASSED	PASSED	PASSED	N/A	N/A	PASSED	PASSED	PASSED



TEST RESULTS

PERFORMANCE DATA – THERMAL AND ACOUSTIC

All units tested at independent testing laboratories. Contact factory for detailed reports.		Fixed Frame & Storefront	Awning	Out-Swing Casement	Hopper	Tilt/Turn & In-Swing Casement	Single-Hung	Out-Swing Door	In-Swing Door	Lift/Roll Door (OX)
Unit Size Tested → Data/Detail Page →		65" x 65" 60, 64	48" x 36" 68	36" x 60" 72	48" x 48" 84	48" x 72" 76, 80	56" x 91" 88	42" x 90" 100	41¼" x 90" 108	96" x 90" 128
THERMAL TRANSMISSION										
Center of glass	1" Low E →	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
	w/Argon →	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Total unit	1" Low E →	0.33	0.36	0.35	0.35	0.34	0.34	0.34	0.34	0.33
	w/Argon →	0.29	0.32	0.32	0.31	0.30	0.30	0.30	0.30	0.29
ASTM C-236 U-value		Thermal transmission information is calculated using Viracon VE1-2M Low E glass and Lawrence Berkeley Laboratories Window 5.2 analysis program. Duratherm Fixed Frame, Awning, Out-Swing Casement and Lift/Roll Door units are NFRC certified.								
SOUND TRANSMISSION										
Double glazing → Triple glazing →		NT	NT	STC 32 STC 38	STC 31 STC 39	NT	NT	NT	NT	NT
ASTM E90-75 E413-73		NT = Not Tested								



TEST RESULTS

PERFORMANCE DATA – HURRICANE IMPACT

All units tested at independent testing laboratories. Contact factory for detailed reports.	Fixed Frame & Storefront	Awning	Out-Swing Casement	Tilt/Turn & In-Swing Casement	Out-Swing Door	In-Swing Door	Lift/Roll Door (OXXO)
Unit Size Tested →	72" x 118"	72" x 72"	36" x 60"	48" x 72"	48" x 102"	48" x 102"	288" x 118" *
LARGE MISSILE IMPACT & CYCLICAL AIR PRESSURE Tested to 42 psf Wind Zone 3 Missile Level D performance class	PASSED	PASSED	PASSED	PASSED	PASSED	PASSED	PASSED
ASTM E1996-05, ASTM E1886-05							
NOTES	1. All units listed have met the performance requirements set forth in the referenced test procedures for a 42 psf design pressure with missile impacts corresponding to Missile Level D and Wind Zone 3, not including Dade County, Florida. 2. Unit sizes for hurricane impact applications cannot exceed the height and width dimensions shown, but smaller sizes are acceptable. 3. Contact factory for custom detailing and glazing requirements for hurricane impact tested units. * 4. The Lift/Roll Door tested was an OXXO configuration 288" wide x 118" high. The certification is applicable to proportionally sized units of different configurations. For example, the maximum size allowable for an OX configuration would be half the tested width, or 144" wide by 118" high. The maximum size for an OXO configuration would be ¾ the width or 216" x 118".						



TEST RESULTS

SEALANT COMPATIBILITY

Contact factory for test reports.	TEAK			CYPRESS		MAHOGANY		SPANISH CEDAR
SEALANTS ↓	Sikkens	Cabot's 0241 Bleaching Oil	Unfinished	Sikkens	Cabot's 0241 Bleaching Oil	Sikkens	Unfinished	Sikkens
DOW CORNING								
#791	App	NR	App ¹	App	NR	App	NT	NT
#795	App	NR	App ¹	App	NR	App	NT	NT
#995	App	NR	App ¹	App	NR	App	App	NT
GE SILICONES								
Silglaze II	App	NR	App ¹	App	NR	App	App ¹	App
Silpruf	NT	App ¹	App	NT	NR	App	App	NT
TREMCO								
Dymerc 511	App ¹	NR	NR	NT	NR	NT	App ²	NT
Mono 555	NR	NR	App ¹	NT	NR	NT	NT	NT
Spectrem 1	NT	App ²	App ¹	NT	NR	NT	NR	NT
Tremflex 834	NT	NR	NR	NT	NR	NT	NR	NT
CHEMREX								
Sonneborn NP-1	App ¹	App ¹	NT	NT	App ¹	NT	NT	NT
Sonneborn NP-2	App	App	NT	NT	App	NT	NT	NT
Sonolastic NP-1	NT	NT	NT	NT	NT	App ²	NT	App ²
Sonolastic NP-2	NT	NT	NT	NT	NT	App ²	NT	App ²
PECORA								
Dynatrol I	App ¹	NR	NR	NT	NR	App ¹	NT	App ¹
Dynatrol II	App ¹	App ¹	NR	NT	NR	App ¹	NT	App ¹
AC-20	NR	NR	NT	NT	NR	NT	NT	NR
#863	NT	NR	NT	NT	NT	NT	NT	NT
App = Approved. 1 = Approved with primer. 2 = Approved with primer and wipe with isopropyl alcohol prior to priming. NR = Not recommended. NT = Not tested.								



Duratherm

TEST RESULTS

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Approved for hurricane impact applications. See Test Results section for additional information.

FIXED FRAME

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from 1/8" single glazed to a maximum of 1 3/4" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder.

Clear glass opening: Unit height minus 4 1/4", unit width minus 3 1/2".

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 8"
or per glazing restrictions.
Maximum per glazing restrictions.

HEIGHT: Minimum: 8"
or per glazing restrictions.
Maximum per glazing restrictions.

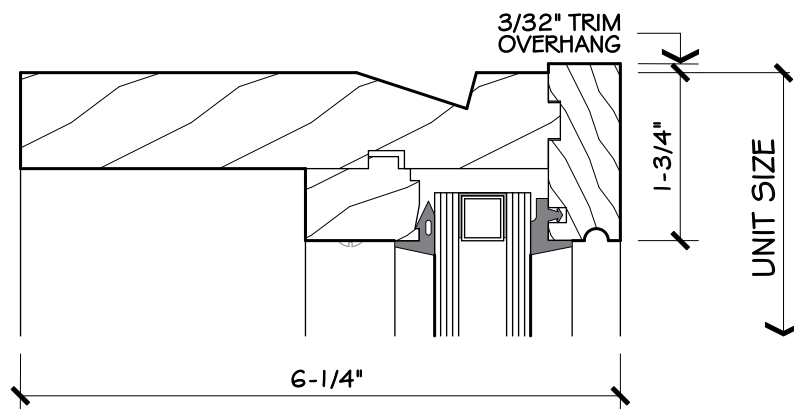
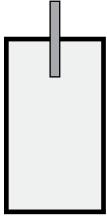
Frame Depths

Standard frame depth: 6 1/4"
Minimum frame depth *: 4"
Maximum frame depth: 10"

* Contact factory for frame depths less than 6 1/4".



FIXED FRAME – HEAD

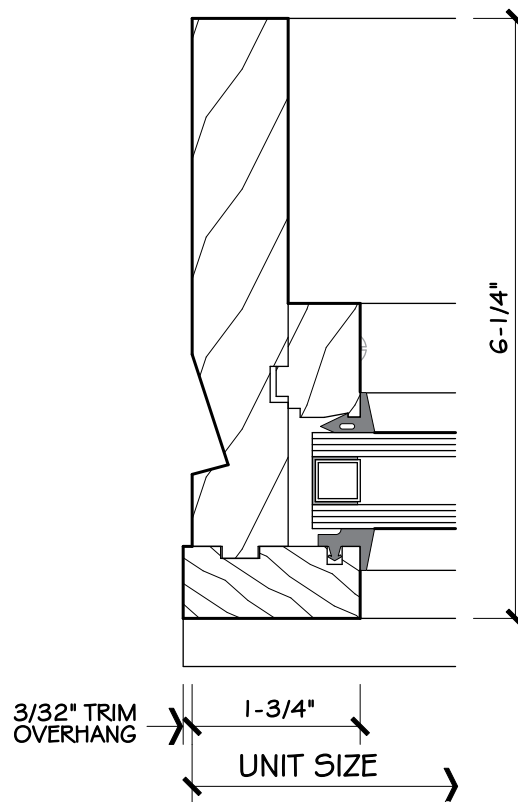
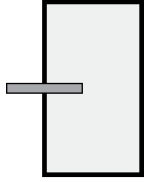


Head

½ Full Size



FIXED FRAME – JAMB

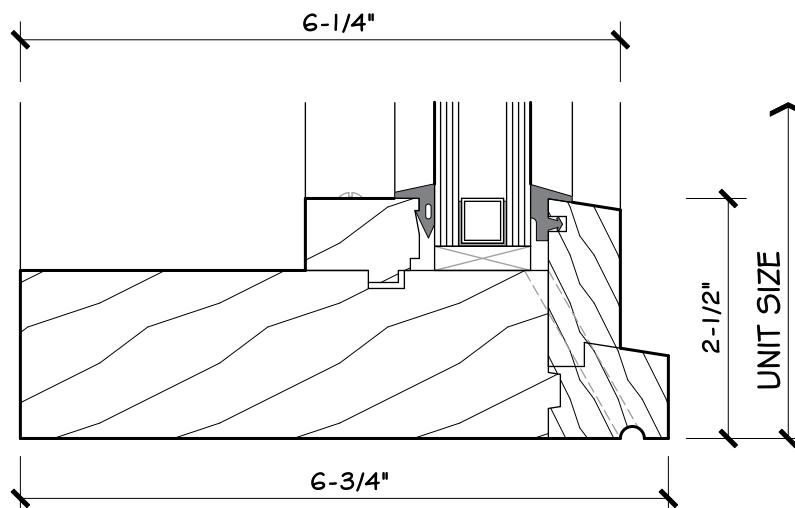
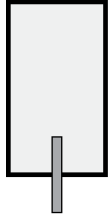


Jamb

½ Full Size



FIXED FRAME – SILL



Sill

½ Full Size



Approved for hurricane impact applications. See Test Results section for additional information.

STOREFRONT

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from 1/8" single glazed to a maximum of 1 3/4" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder.
Clear glass opening: Unit height minus 3 1/2", unit width minus 3 1/2".

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

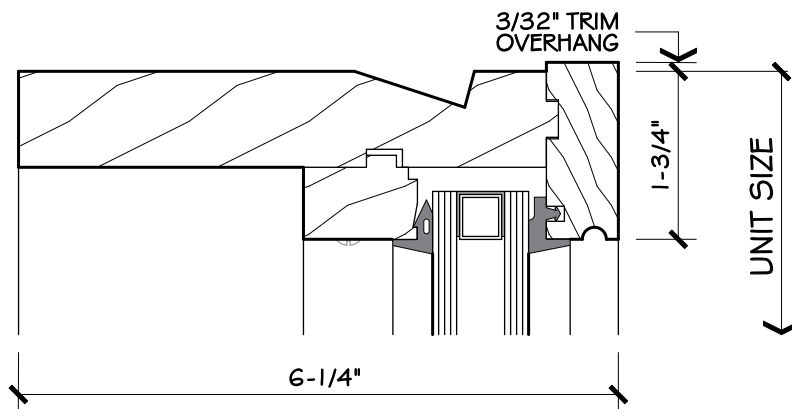
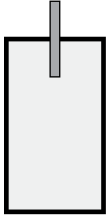
WIDTH: Minimum: 8"
or per glazing restrictions.
Maximum per glazing restrictions.
HEIGHT: Minimum: 8"
or per glazing restrictions.
Maximum per glazing restrictions.

Frame Depths

Standard frame depth: 6 1/4"
Minimum frame depth*: 4"
Maximum frame depth: 10"
* Contact factory for frame depths less than 6 1/4".



STOREFRONT – HEAD

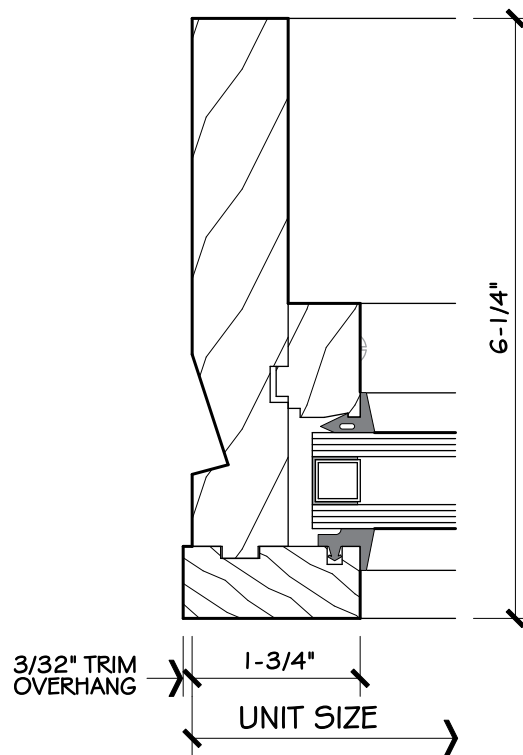
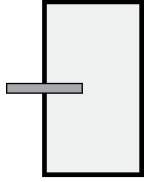


Head

½ Full Size



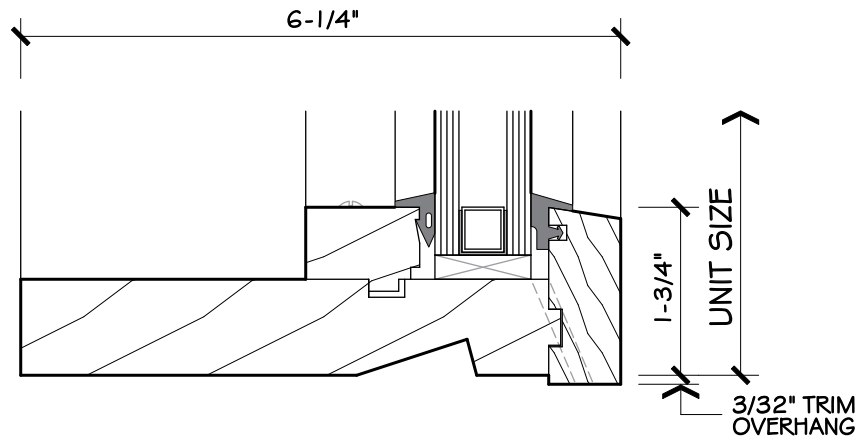
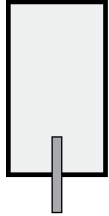
STOREFRONT – JAMB



Jamb
½ Full Size



STOREFRONT – SILL



Sill
½ Full Size





Approved for hurricane impact applications. See Test Results section for additional information.

AWNING

Hardware

Pushbar Operator

Duratherm proprietary pushbar comprised of oxidized bronze alloy components and a solid brass bar, copper plated and oxidized to match bronze. The sill-mounted pushbar operator is designed to be manually operated for the entire length and to hold the sash at intermediate points. Available in one piece or hinged at mid-point.

Finishes: Oil-rubbed Bronze (US10B), Lacquered Red Bronze (US20A), White Bronze (US26D).

Egress: Available as quick-release pin at sash connection.

Roto-Gear Operator

Truth Maxim® stainless steel or EntryGard® steel roto gear operator with hardened steel drive worm and plastic slider for smooth operation. Cover and crank handle in high pressure die-cast zinc.

Finishes: Oil-rubbed Bronze (US10B), Satin Nickel (US15).

Egress: Available as quick-release lever at sash connection.

Sash Locks

Oxidized bronze alloy latches ensure positive, uniform locking action.

Finishes: Oil-rubbed Bronze (US10B), Lacquered Red Bronze (US20A), White Bronze (US26D).

Hinges

Heavy duty extension hinges, solid brass or zinc chromate coated steel. Hinges are designed to help the operator hold the sash in open positions, and to permit ready removal and replacement of the sash. Truth Maxim® 300 series stainless steel hinges are available for appropriate-sized units.

Optional Hardware

Custodial locks, sash restrictors, electric or manual remote operators.

Insect Screens

1" x ¼" tubular extruded frames in anodized bronze, mill finish aluminum or custom color painted aluminum. Mesh of 18 x 16 screen cloth held with vinyl spline, available in charcoal finished aluminum, mill finish aluminum, stainless steel or bright brass. Maximum width of screen mesh is 72". Wood-framed screens are available.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅛" single glazed to a maximum of 1¾" security glass. Refer to Glass and Glazing Guide in the Introduction section of this binder. Clear glass opening: Unit height minus 6⅞", unit width minus 7".

Weather-Stripping

Continuous extruded silicone flap gasket set in rebate around the perimeter of the sash. Engaging the sash locks compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 18"
Maximum: 66"
HEIGHT: Minimum: 18"
Maximum: 84"

Egress

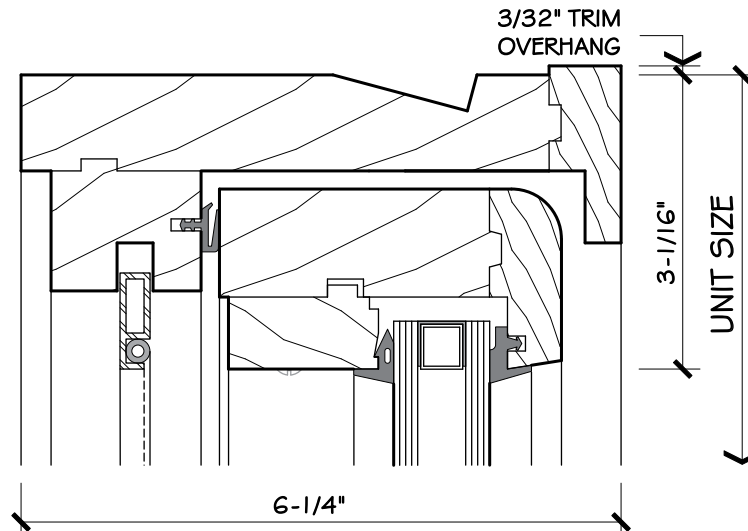
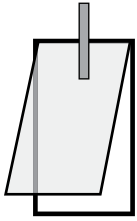
Based on:
20" clear width
24" clear height
5.7 sq ft clear opening
Minimum unit width: 27"
Minimum unit height: * 36"
* with use of egress extension hinges
To meet egress requirements:
At minimum unit width of: 27"
height must be at least: 48"
At minimum unit height of: 48"
width must be at least: 27"

Frame Depths

Standard frame depth: 6¼"
Minimum frame depth*: 5½"
Maximum frame depth: 10"
* Contact factory for frame depths less than 6¼".



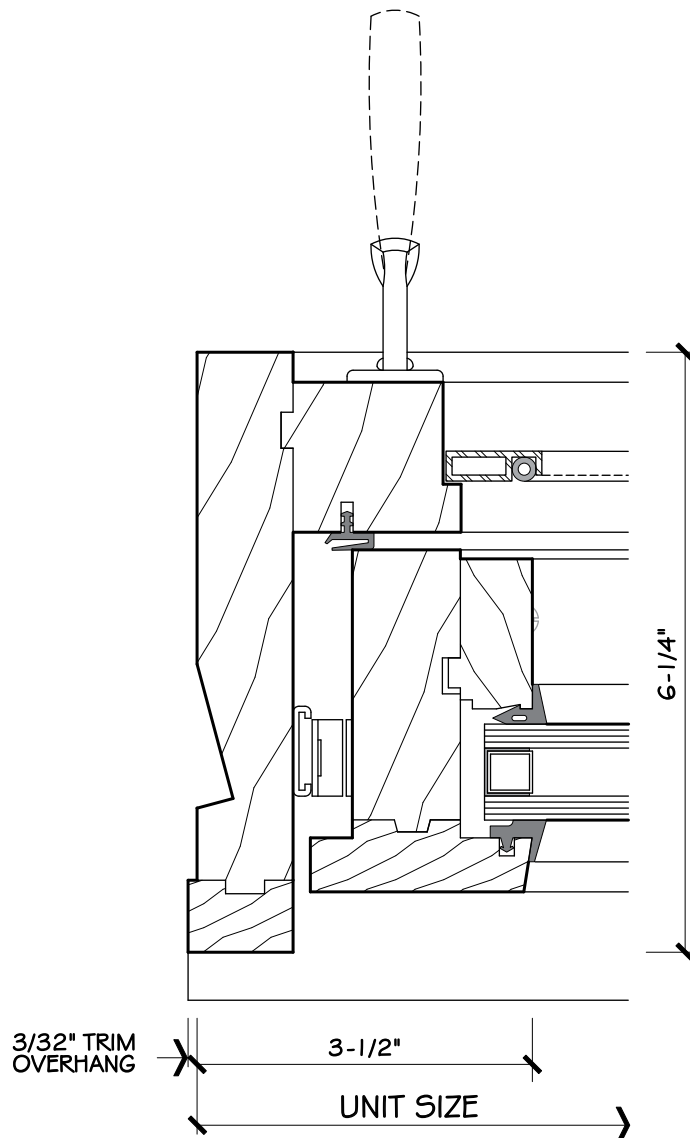
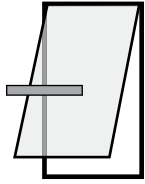
AWNING – HEAD



Head
½ Full Size



AWNING – JAMB

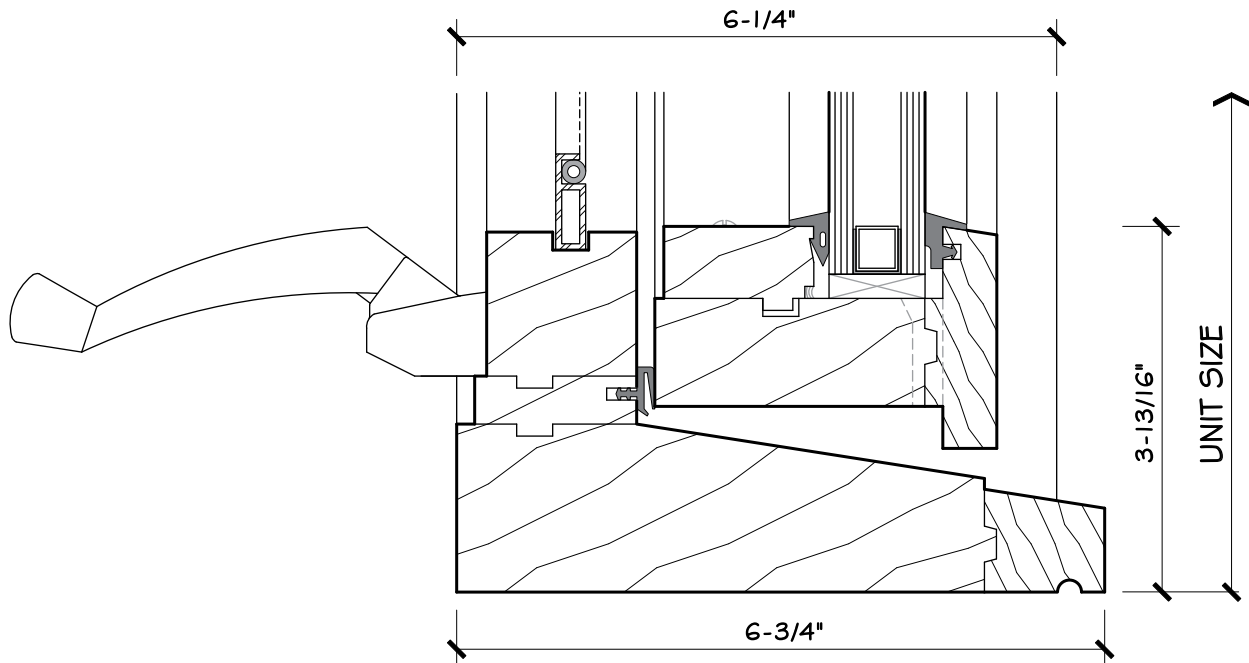
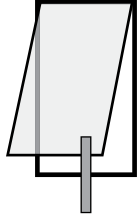


Jamb

½ Full Size

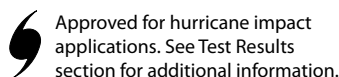


AWNING – SILL



Sill
With Roto-Gear Operator
 ½ Full Size





OUT-SWING CASEMENT

Hardware

Pushbar Operator

Duratherm proprietary pushbar comprised of oxidized bronze alloy components and a solid brass bar, copper plated and oxidized to match bronze. The sill-mounted pushbar operator is designed to be manually operated for the entire length and to hold the sash at intermediate points. Available in one piece or hinged at mid-point.

Finishes: Oil-rubbed Bronze (US10B), Lacquered Red Bronze (US20A), White Bronze (US26D).

Egress: Available as quick-release pin at sash connection.

Roto-Gear Operator

Truth Maxim[®] stainless steel or EntryGard[®] steel roto gear operator with hardened steel drive worm and plastic slider for smooth operation. Cover and crank handle in high pressure die-cast zinc.

Finishes: Oil-rubbed Bronze (US10B), Satin Nickel (US15).

Egress: Available as quick-release lever at sash connection.

Sash Locks

Oxidized bronze alloy latches ensure positive, uniform locking action.

Finishes: Oil-rubbed Bronze (US10B), Lacquered Red Bronze (US20A), White Bronze (US26D).

Hinges

Heavy duty extension hinges, solid brass or zinc chromate coated steel. Hinges are designed to help the operator hold the sash in open positions, and to permit ready removal and replacement of the sash. Truth heavy duty 4-bar stainless steel hinges are available for appropriate-sized units. Solid brass 4" five-knuckle flush ball-bearing butt hinges available for egress units.

Optional Hardware

Custodial locks, sash restrictors, electric or manual remote operators, adjustable friction stays.

Insect Screens

1" x ¼" tubular extruded frames in anodized bronze, mill finish aluminum or custom color painted aluminum. Mesh of 18 x 16 screen cloth held with vinyl spline, available in charcoal finished aluminum, mill finish aluminum, stainless steel or bright brass. Maximum width of screen mesh is 72". Wood-framed screens are available.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅛" single glazed to a maximum of 1¾" security glass. Refer to the Glass and Glazing Guide in the Introduction of this binder. Clear glass opening: Unit height minus 7 ⅝", unit width minus 7".

Weather-Stripping

Continuous extruded silicone flap gasket set in rebate around the perimeter of the sash. Engaging the sash locks compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 18"
Maximum: 36"

HEIGHT: Minimum: 18"
Maximum: 84"

To ensure smooth and trouble-free operation over time:

At maximum width of: 36"
limit height to: 60"

At maximum height of: 84"
limit width to: 28"

Egress

Based on:
20" clear width
24" clear height
5.7 sq ft clear opening

Minimum unit width: 28"
Minimum unit height: 30"

To meet egress requirements:

At minimum unit width of: 28"
height must be at least: 48"

At minimum unit height of: 30"
width must be at least: 36"

Frame Depths

Standard frame depth: 6¼"

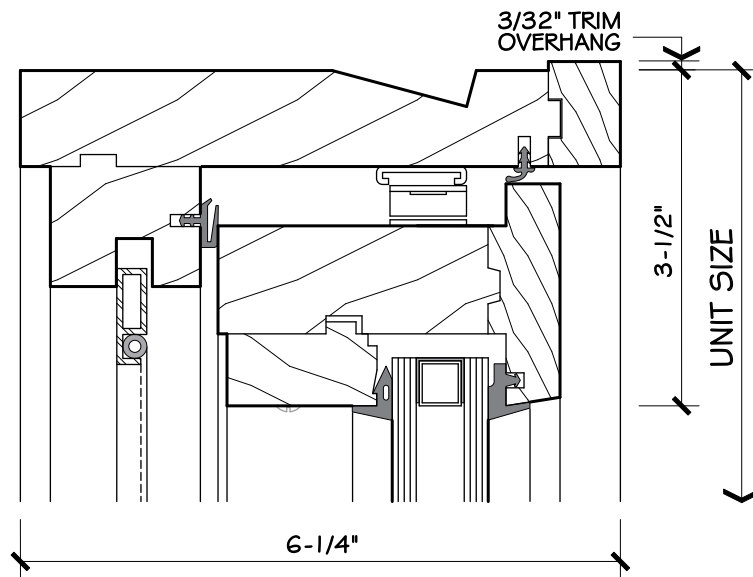
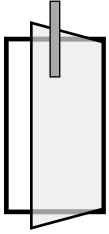
Minimum frame depth*: 5½"

Maximum frame depth: 10"

* Contact factory for frame depths less than 6¼".



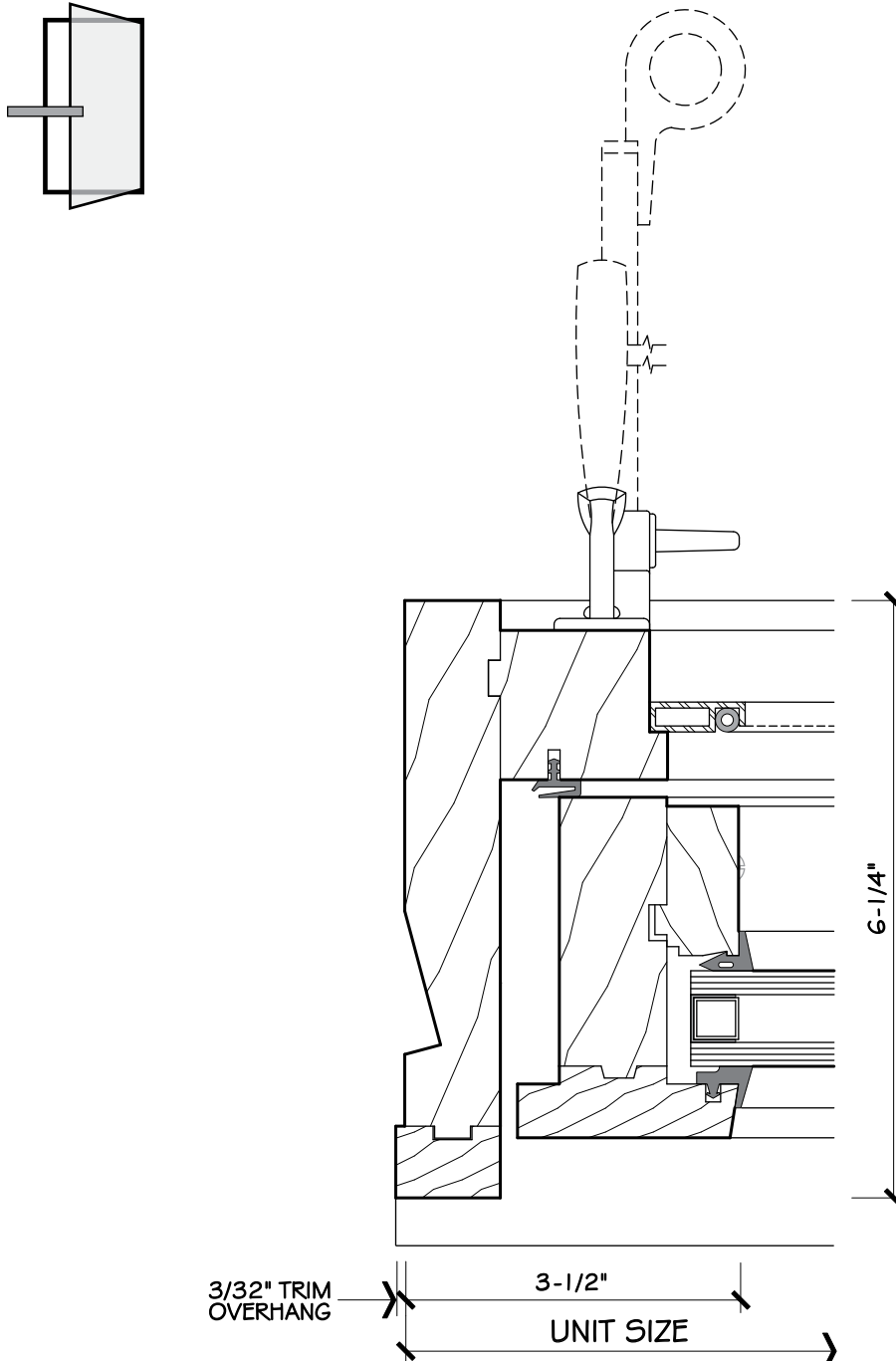
OUT-SWING CASEMENT – HEAD



Head
½ Full Size



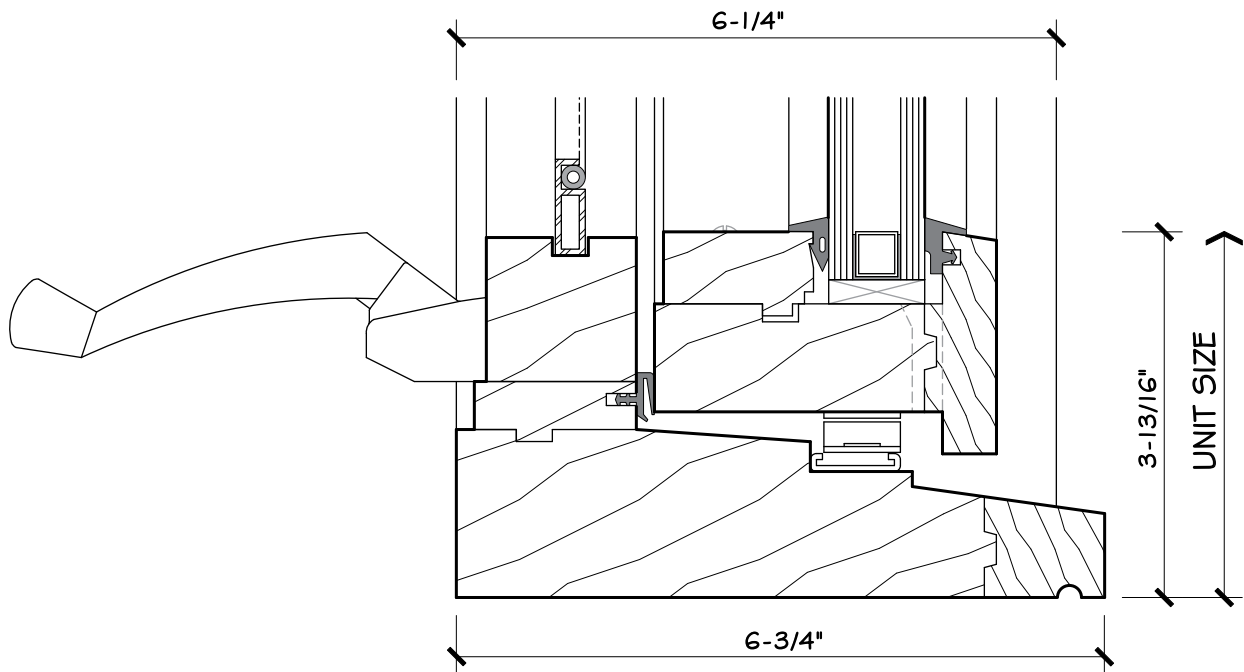
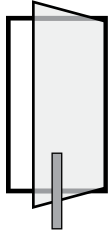
OUT-SWING CASEMENT – JAMB



Jamb
With Pushbar Operator
½ Full Size

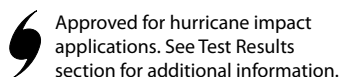


OUT-SWING CASEMENT – SILL



Sill
With Roto-Gear Operator
 ½ Full Size





TILT/TURN

Hardware

Operator

Multi-latchpoint fully-concealed locking hardware controlled by single lever handle control. Horizontal and vertical perimeter locking points ensure weather-tight performance and security. In the turn mode, an adjustable friction stay holds window in any open position from 0° to 90°. In the tilt mode, the sash projects in at head approximately 10° to provide controlled ventilation without compromising security.

Egress: Available as quick-release pin at sash connection.

Lever Handle

Operating hardware accepts any lever handle with 43mm attachment spacing and 7mm sq. spindle. A wide variety of styles and finishes are available from various manufacturers.

Optional Hardware

Custodial locks, sash restrictors, removable operating handle.

Insect Screens

1" x ¼" tubular extruded frames in anodized bronze, mill finish aluminum or custom color painted aluminum. Mesh of 18 x 16 screen cloth held with vinyl spline, available in charcoal finished aluminum, mill finish aluminum, stainless steel or bright brass. Maximum width of screen mesh is 72". Wood-framed screens are available.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅛" single glazed to a maximum of 1¾" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder.

Clear glass opening: Unit height minus 7¾", unit width minus 6¾".

Weather-Stripping

Double continuous extruded silicone flap gasket set in rebate around the perimeter of the sash. Engaging the multi-latchpoint espagnolettes compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 18"
Maximum: 62"

HEIGHT: Minimum: 30"
Maximum: 96"

To ensure smooth and trouble-free operation over time:

At maximum width of: 62"
limit height to: 60"

At maximum height of: 96"
limit width to: 36"

Maximum area for a single sash: 25 sq ft

Egress

Based on:

20" clear width
24" clear height
5.7 sq ft clear opening

Minimum unit width: 28"
Minimum unit height: 30"

To meet egress requirements:

At minimum unit width of: 28"
height must be at least: 48"
At minimum unit height of: 30"
width must be at least: 40"

Frame Depths

Standard frame depth: 6¼"

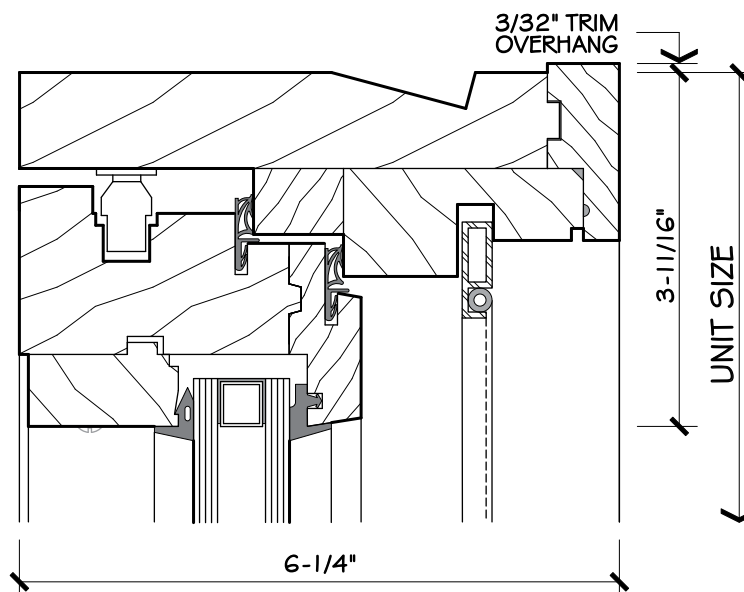
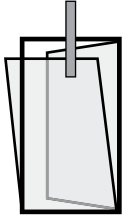
Minimum frame depth*: 4¾"

Maximum frame depth: 10"

* Contact factory for frame depths less than 6¼".



TILT/TURN – HEAD

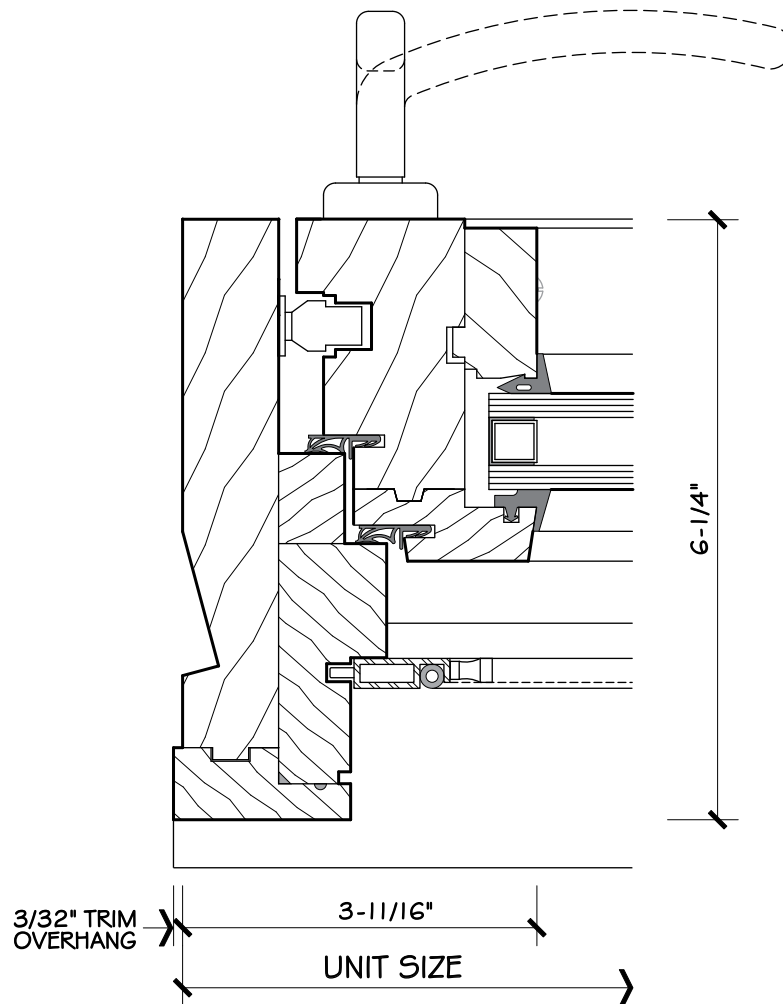
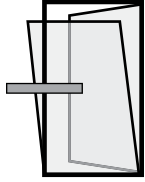


Head

½ Full Size



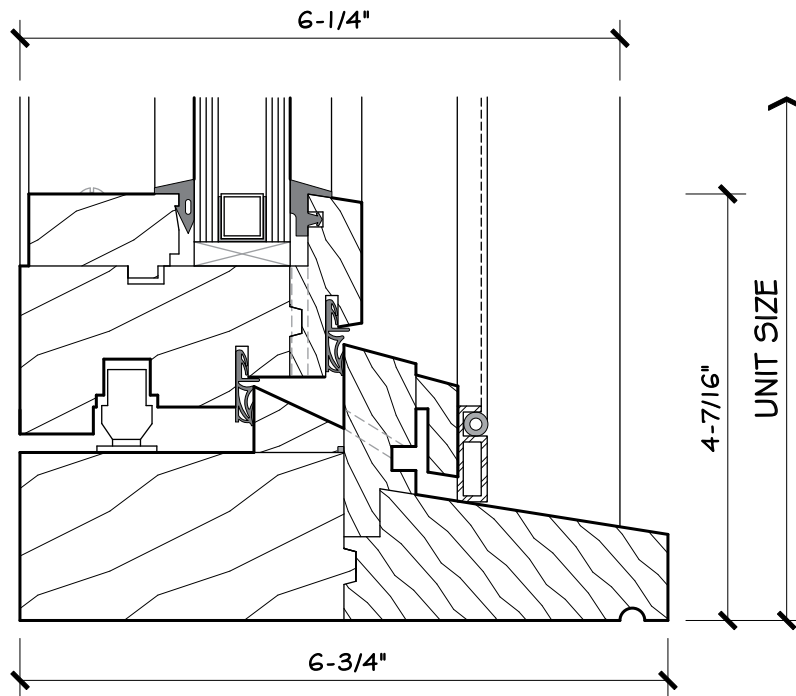
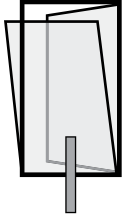
TILT/TURN – JAMB



Jamb
½ Full Size



TILT/TURN – SILL



Sill

½ Full Size





Approved for hurricane impact applications. See Test Results section for additional information.

IN-SWING CASEMENT

Hardware

Operator

Multi-latchpoint fully-concealed locking hardware controlled by single lever handle control. Horizontal and vertical perimeter locking points ensure weather-tight performance and security. An adjustable friction stay holds window in any open position from 0° to 90°.

Egress: Available as quick-release pin at sash connection.

Lever Handle

Operating hardware accepts any lever handle with 43mm attachment spacing and 7mm sq. spindle. A wide variety of styles and finishes are available from various manufacturers.

Optional Hardware

Custodial locks, sash restrictors, removable operating handle.

Insect Screens

1" x ¼" tubular extruded frames in anodized bronze, mill finish aluminum or custom color painted aluminum. Mesh of 18 x 16 screen cloth held with vinyl spline, available in charcoal finished aluminum, mill finish aluminum, stainless steel or bright brass. Maximum width of screen mesh is 72". Wood-framed screens are available.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅛" single glazed to a maximum of 1¾" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder.

Clear glass opening: Unit height minus 7⅝", unit width minus 6⅝".

Weather-Stripping

Double continuous extruded silicone flap gasket set in rebate around the perimeter of the sash. Engaging the multi-latchpoint espagnolettes compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 18"
Maximum: 62"

HEIGHT: Minimum: 30"
Maximum: 96"

To ensure smooth and trouble-free operation over time:

At maximum width of: 62"
limit height to: 60"

At maximum height of: 96"
limit width to: 36"

Maximum area for a single sash: 25 sq ft

Egress

Based on:
20" clear width
24" clear height
5.7 sq ft clear opening

Minimum unit width: 28"
Minimum unit height: 30"

To meet egress requirements:

At minimum unit width of: 28"
height must be at least: 48"

At minimum unit height of: 30"
width must be at least: 40"

Frame Depths

Standard frame depth: 6¼"

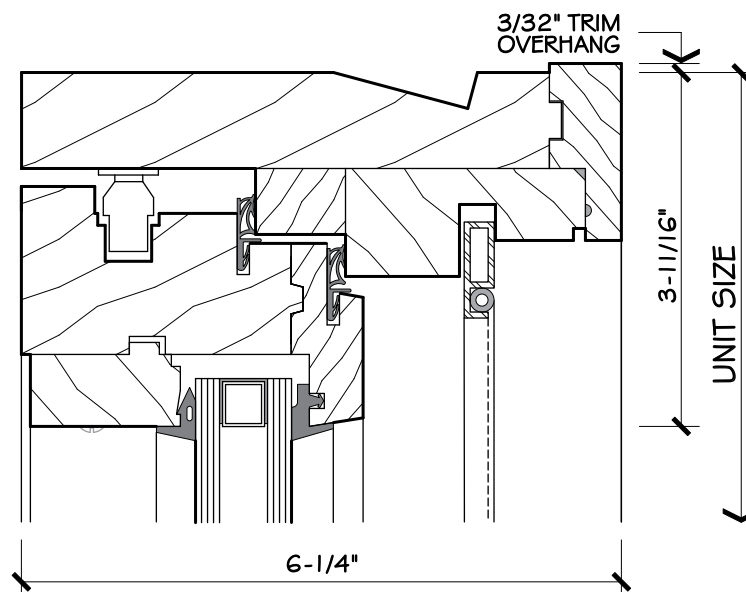
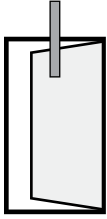
Minimum frame depth*: 4¾"

Maximum frame depth: 10"

* Contact factory for frame depths less than 6¼".



IN-SWING CASEMENT – HEAD

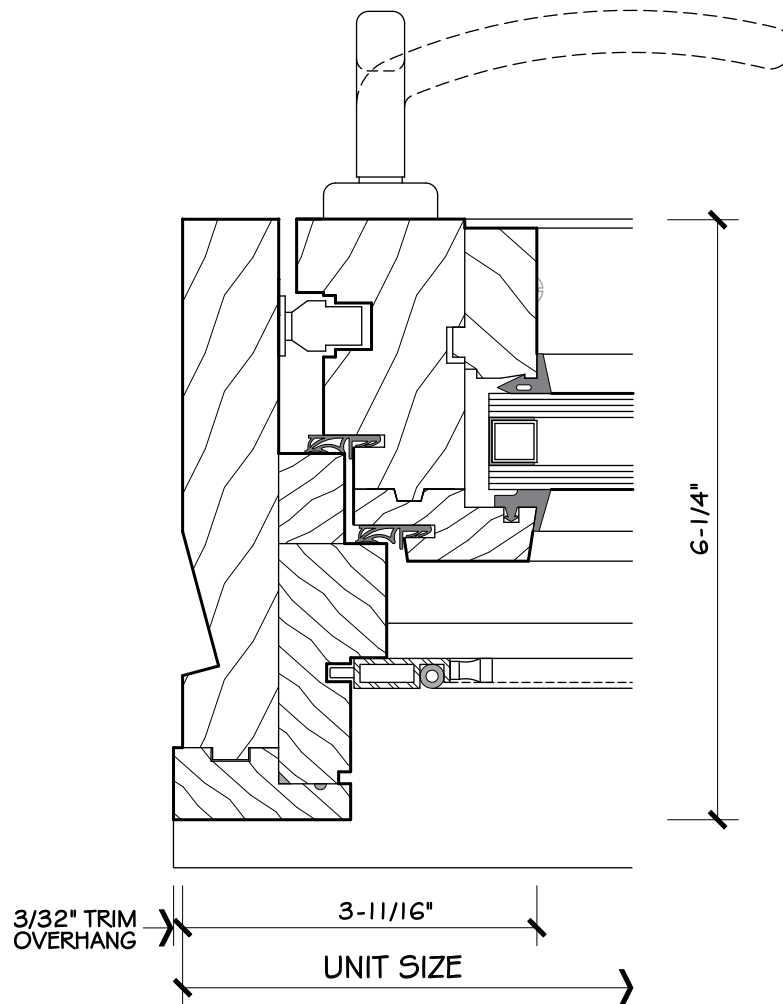
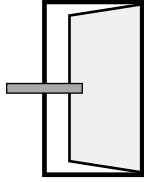


Head

½ Full Size



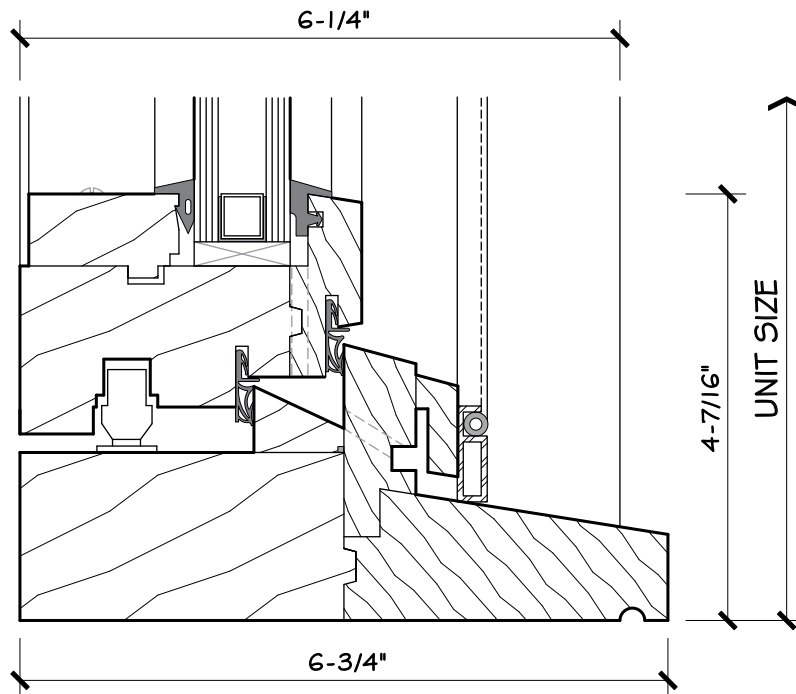
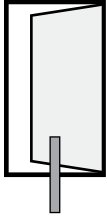
IN-SWING CASEMENT – JAMB



Jamb
½ Full Size



IN-SWING CASEMENT – SILL



Sill

½ Full Size



HOPPER

Hardware

Operator

Zinc chromate shoot bolt connected to lever handle controls. For tall, narrow units, shoot bolt is rebated into sash stiles (one each stile); short, wide units have shoot bolt rebated into top rail. Turning the lever handle engages the shoot bolts into strike plates at the head or jambs depending on configuration.
Egress: Properly-sized units meet egress requirements using standard hardware configuration.

Lever Handle

Operating hardware accepts any lever handle with 43mm attachment spacing and 7mm square spindle. A wide variety of styles and finishes is available from various manufacturers.

Optional Hardware

Custodial locks, sash restrictors, removable handles, remote pole operation.

Insect Screens

1" x ¼" tubular extruded frames in anodized bronze, mill finish aluminum or custom color painted aluminum. Mesh of 18 x 16 screen cloth held with vinyl spline, available in charcoal finished aluminum, mill finish aluminum, stainless steel or bright brass. Maximum width of screen mesh is 72". Wood-framed screens are available.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅛" single glazed to a maximum of 1¾" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder.
Clear glass opening: Unit height minus 7¾", unit width minus 6¾".

Weather-Stripping

Double continuous extruded silicone flap gasket set in rebate around the perimeter of the sash. Engaging the lever handle compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 18"
Maximum: 72"
HEIGHT: Minimum: 18"
Maximum: 96"
To ensure smooth and trouble-free operation over time:
At maximum width of: 72"
limit height to: 36"
At maximum height of: 96"
limit width to: 28"

Egress

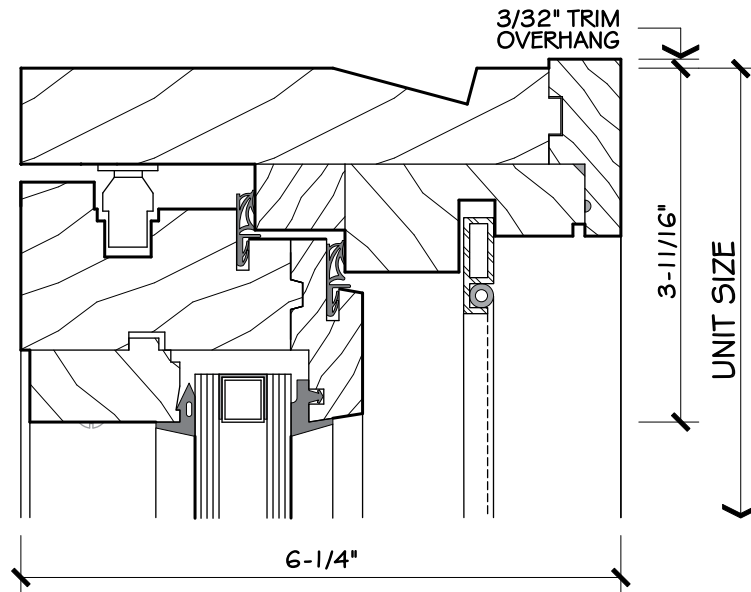
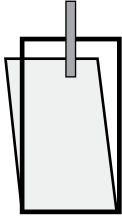
Based on:
20" clear width
24" clear height
5.7 sq ft clear opening
Minimum unit width: 25"
Minimum unit height: 72"
To meet egress requirements:
At minimum unit width of: 25"
height must be at least: 72"
At minimum unit height of: 72"
width must be at least: 25"

Frame Depths

Standard frame depth: 6¼"
Minimum frame depth*: 5½"
Maximum frame depth: 10"
* Contact factory for frame depths less than 6¼".



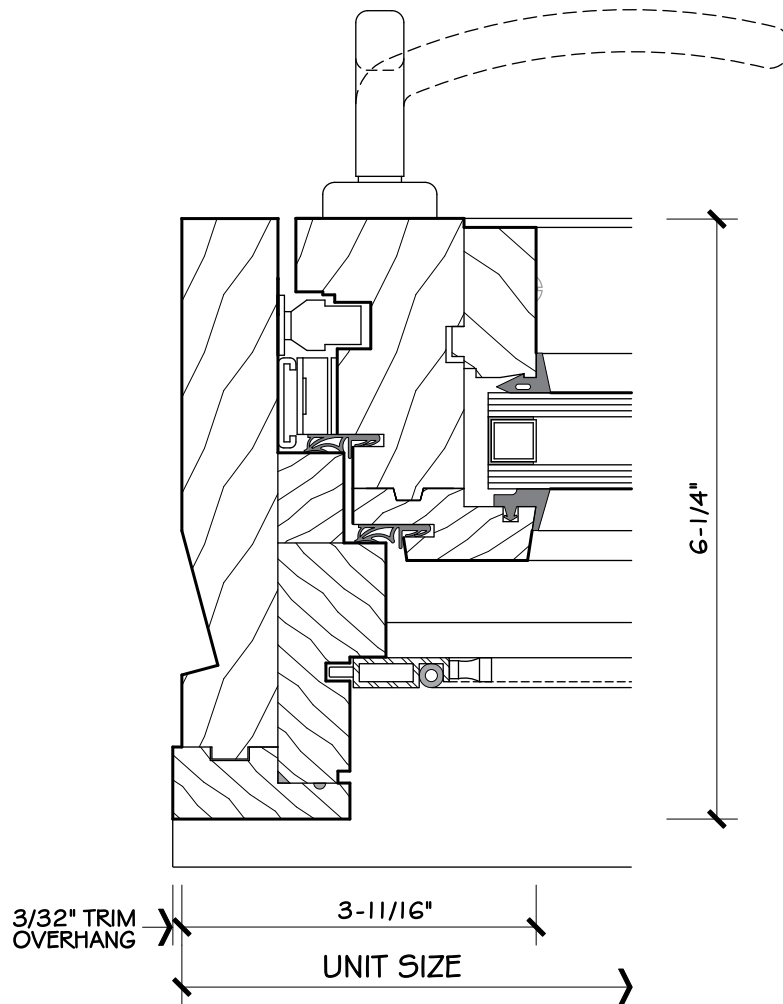
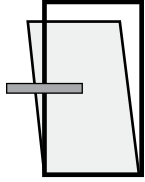
HOPPER – HEAD



Head
½ Full Size



HOPPER – JAMB

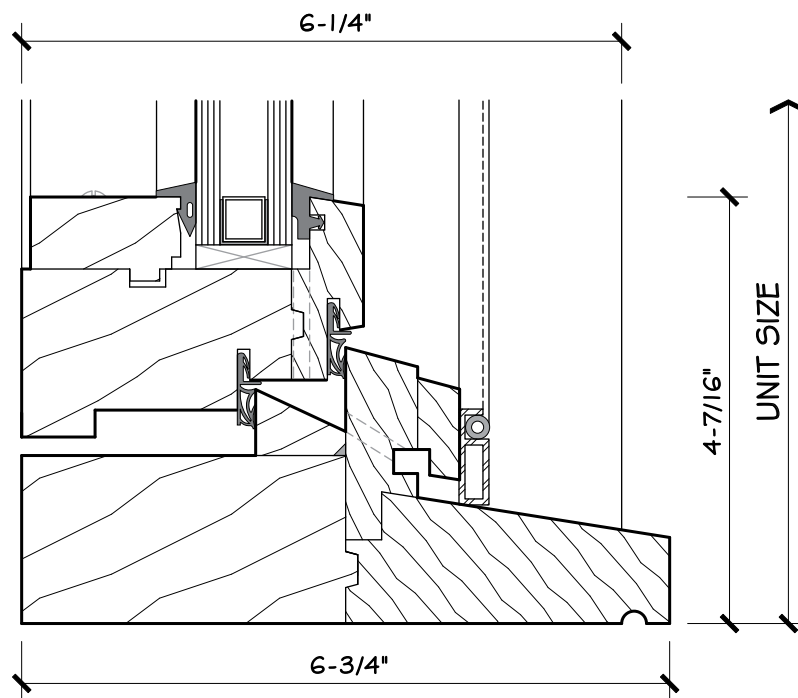
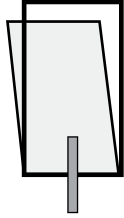


Jamb

½ Full Size



HOPPER – SILL



Sill

½ Full Size



SINGLE-HUNG

Hardware

Meeting Rail Latch

Oxidized bronze alloy. Located at the center of the meeting rail, the latch's cam action manually draws the sash into a locked position.

Finishes: Oil-rubbed Bronze (US10B), Lacquered Red Bronze (US20A), White Bronze (US26D).

Balances

Standard: Ultralift 88L series 670 heavy duty tube / spring balances, Heavy Duty BSI, or Amesbury Group fully concealed block and tackle balances mortised into the stiles of the operable sash.

Custom: Traditional weight and chain or clock spring balance systems are available on a custom basis. Contact factory for more information

Sash Locks (Included for oversized units.)

Oxidized bronze alloy at midpoint of sash stiles. Turning the side latch compresses the weather-strip and locks the sash at each jamb.

Finishes: Oil-rubbed Bronze (US10B), Lacquered Red Bronze (US20A), White Bronze (US26D).

Egress: Properly-sized units meet egress requirements using standard hardware configuration.

Optional Hardware

Custodial locks, sash restrictors.

Insect Screens

1" x ¼" tubular extruded frames in anodized bronze, mill finish aluminum or custom color painted aluminum. Mesh of 18 x 16 screen cloth held with vinyl spline, available in charcoal finished aluminum, mill finish aluminum, stainless steel or bright brass. Maximum width of screen mesh is 72". Wood-framed screens are available.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅛" single glazed to a maximum of 1¾" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder.

Clear glass opening: Unit height minus 9¼", divided by 2. Unit width minus 5¾".

Weather-Stripping

Continuous extruded silicone flap gasket set in rebate around the perimeter of the sash. Engaging the sash locks compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 18"
Maximum: 72"
HEIGHT: Minimum: 36"
Maximum: 96"

Egress

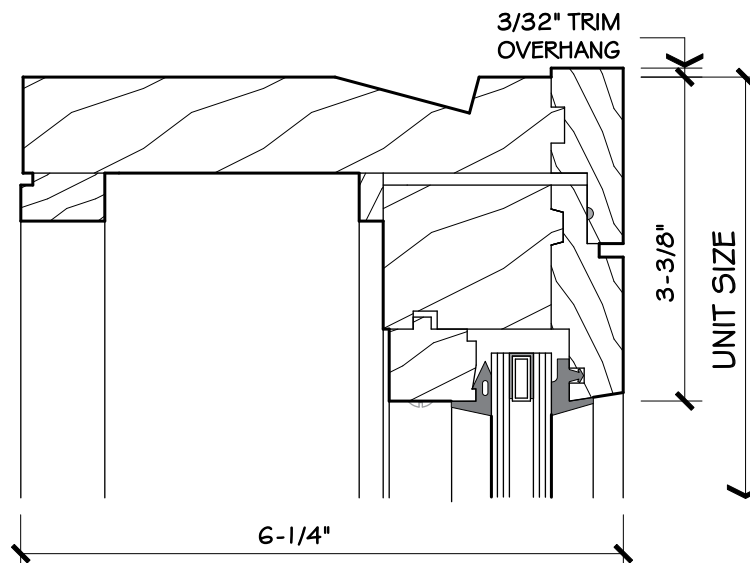
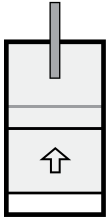
Based on:
20" clear width
24" clear height
5.7 sq ft clear opening
Minimum unit width: 25"
Minimum unit height: 68"
To meet egress requirements:
At minimum unit width of: 25"
height must be at least: 68"
At minimum unit height of: 68"
width must be at least: 25"

Frame Depths

Standard frame depth: 6¼"
Minimum frame depth*: 6¼"
Maximum frame depth: 10"



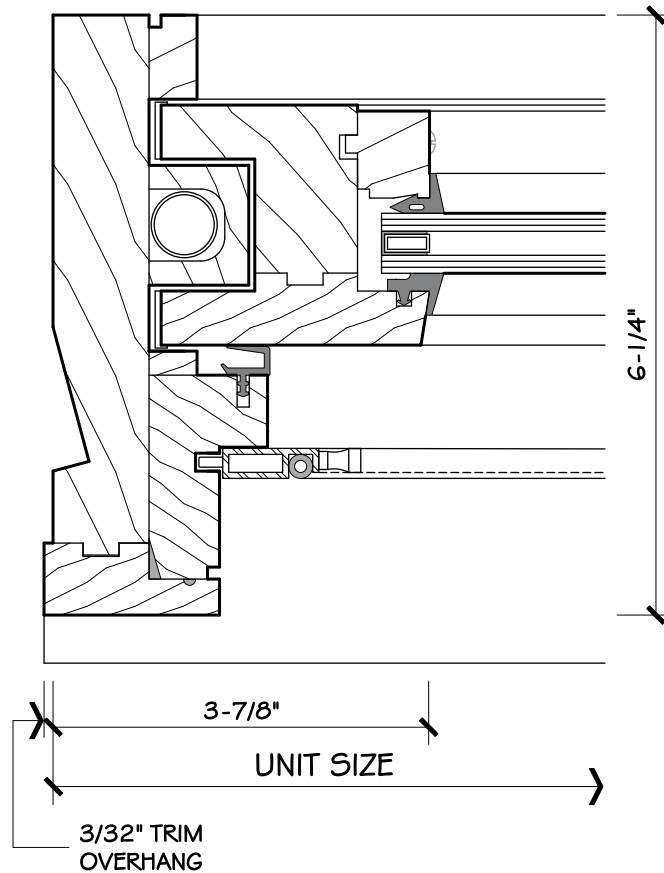
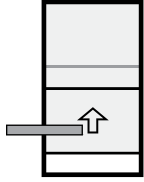
SINGLE-HUNG – HEAD



Head
½ Full Size



SINGLE-HUNG – JAMB AT LOWER SASH

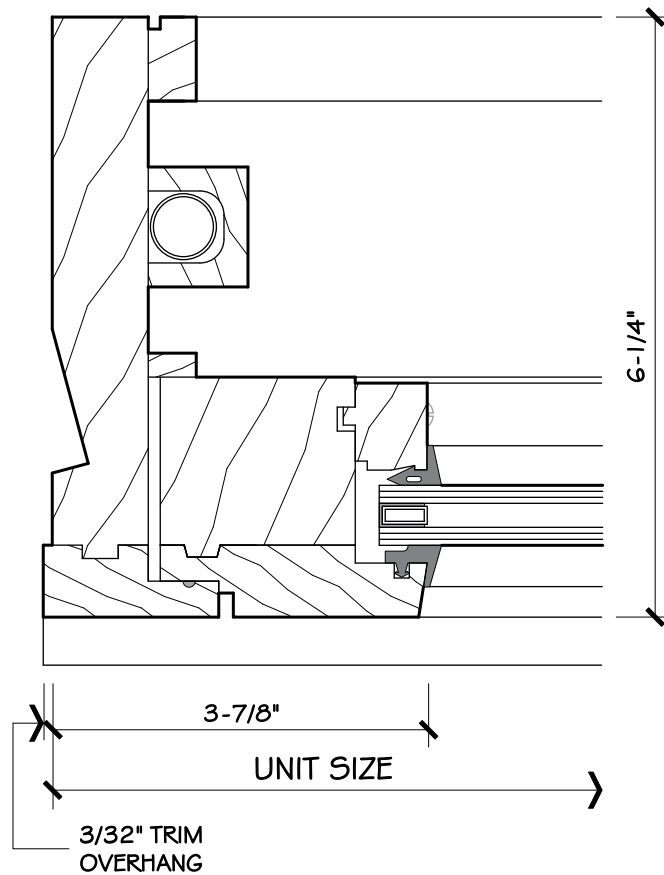
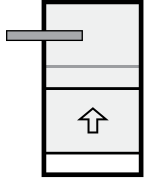


Jamb at Lower Sash

½ Full Size



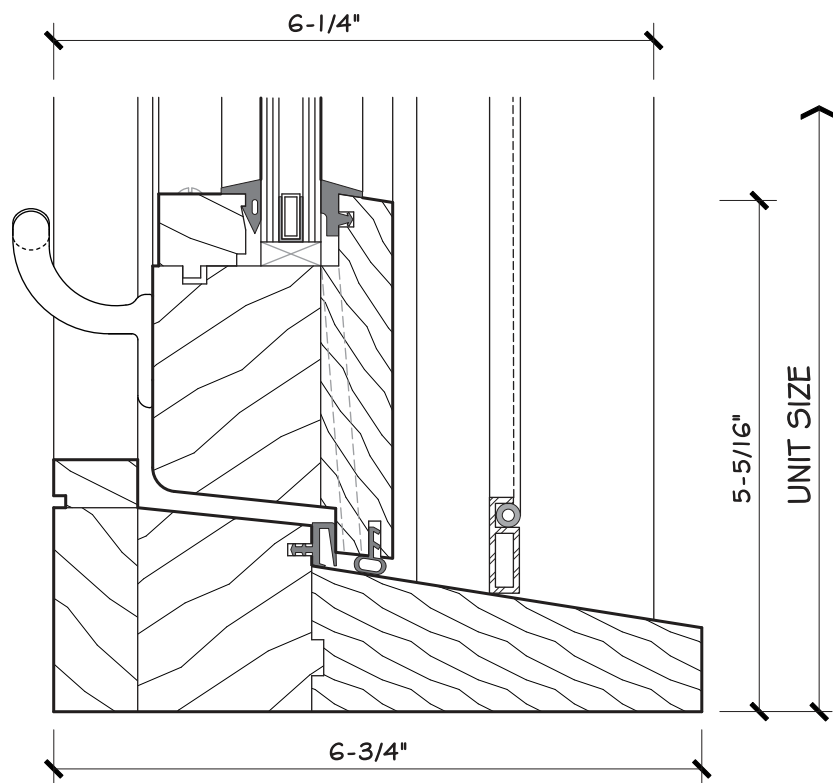
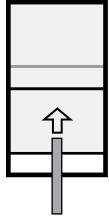
SINGLE-HUNG – JAMB AT UPPER SASH



Jamb at Upper Sash
 $\frac{1}{2}$ Full Size

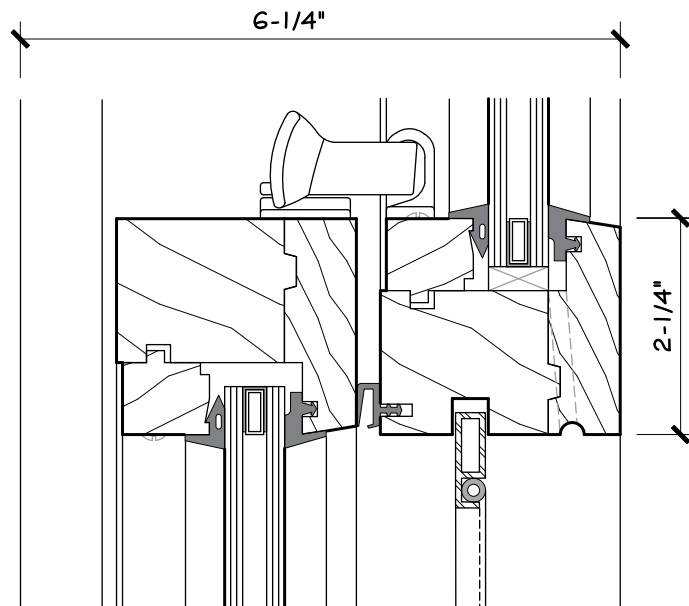
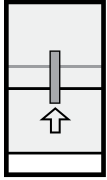


SINGLE-HUNG – SILL



Sill
½ Full Size



SINGLE-HUNG – MEETING RAIL

Meeting Rail
½ Full Size



LIFT/ROLL WINDOW

Hardware

Operating Assembly

Window sashes ride on carriages consisting of two sets of twin rollers mortised into the bottom of each moving sash. The sash is raised onto its carriage by rotating the operating lever handle 180°. Lifting gear connected to a tie rod transmits motion to the carriage, lifting sash. Based on G-U 933 or FFI Lift/Roll operating hardware.

Finishes: Internal carriage assembly (drive bars, wheel hub, shafts, rivets), lock kit, link rods, and connectors are zinc chromate coated steel or 304 stainless steel.

Lock face and edge stile cover are clear anodized (EV-1) or dark bronze anodized (EV-5) aluminum.

External guides and tracks are clear anodized (EV-1) or dark bronze anodized (EV-5) aluminum.

Egress: Properly-sized units meet egress requirements using standard hardware configuration.

Lever Handle

Standard handles are solid brass.

Finishes: Satin Nickel (US15), Polished Brass (US3), Satin Anodized Aluminum (US28).

Optional Hardware

Keyed locks.

Insect Screens

¾" x ¼" tubular extruded frames set in wood frame surround. Extruded frames in anodized bronze, mill finish aluminum or custom color painted aluminum. Mesh of 18 x 16 screen cloth held with vinyl spline, available in charcoal finished aluminum, mill finish aluminum, stainless steel or bright brass. Maximum width of screen mesh is 72".

Standard Configurations

X = Operable sash, O = Fixed sash, P = Pocket

OX OXXO OXO XP PXXP

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅛" single glazed to a maximum of 1" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder. Clear glass opening: Unit height minus 10¼". For clear glass width, contact factory.

Weather-Stripping

Doubled, continuous extruded silicone flap gasket set in rebate around the perimeter of the sash. Rotating the multi-latchpoint lever handle lowers the sash and compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 36"
for OX configuration.
Maximum varies per
configuration.

HEIGHT: Minimum: 36"
Maximum: 66"

Egress

For OX configuration, equal-sized
sashes.

Based on:

20" clear width
24" clear height
5.7 sq ft clear opening

Minimum unit width: 50"
Minimum unit height: 36"

To meet egress requirements:

At minimum unit width of: 50"
height must be at least: 56"

At minimum unit height of: 36"
width must be at least: 61"

Frame Depths

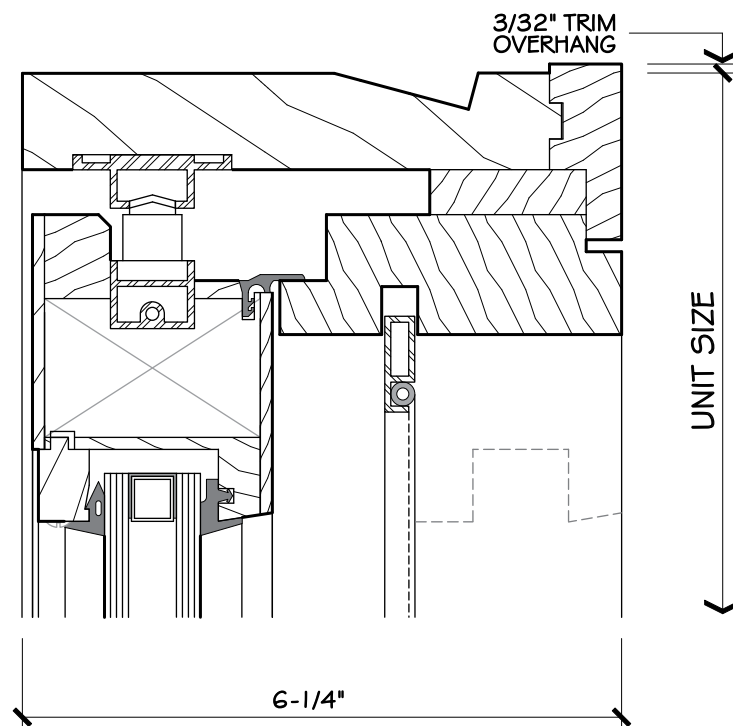
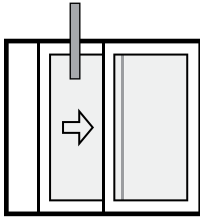
Standard frame depth: 6¼"
(OX configuration)

Minimum frame depth*: 6¼"

Maximum frame depth: 10"



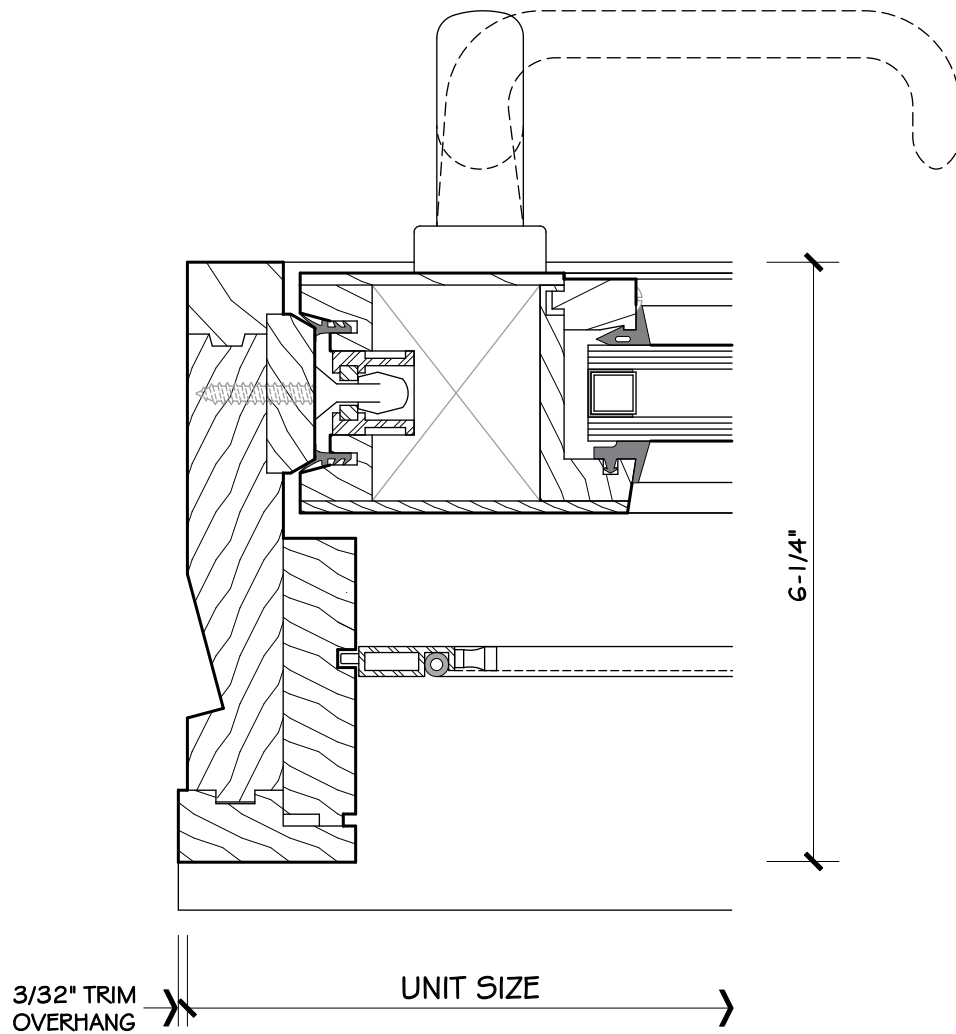
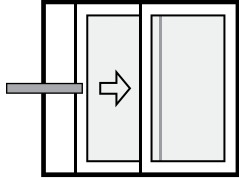
LIFT/ROLL WINDOW – OPERABLE HEAD



Operable Head
½ Full Size



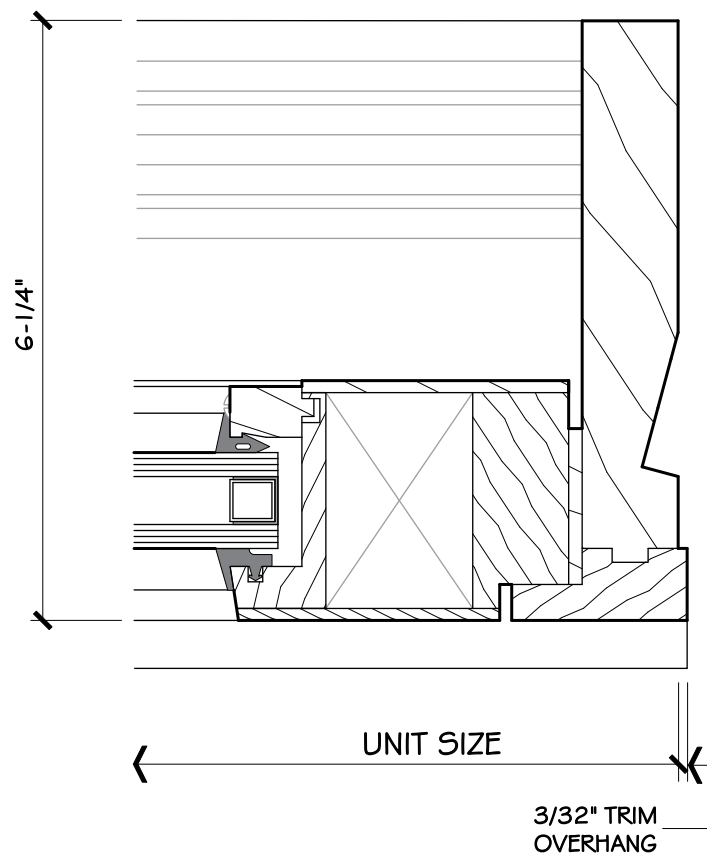
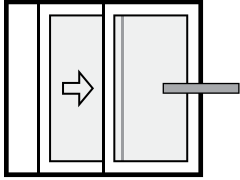
LIFT/ROLL WINDOW – OPERABLE JAMB



Operable Jamb
½ Full Size



LIFT/ROLL WINDOW – FIXED JAMB

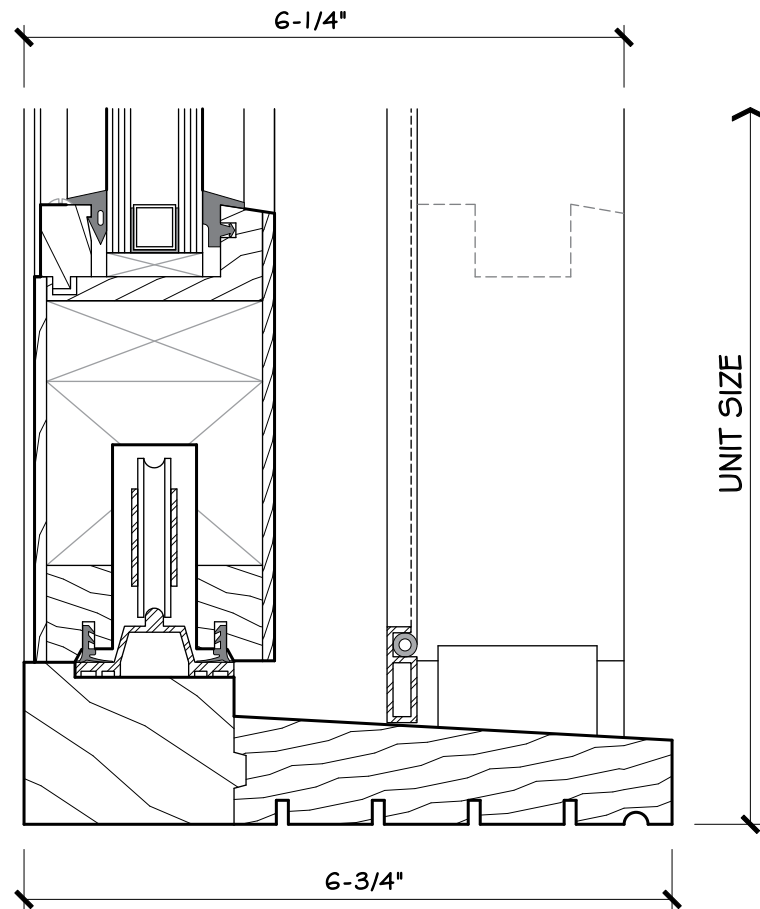
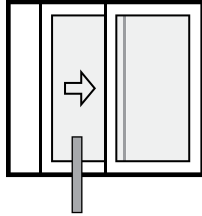


Fixed Jamb

½ Full Size



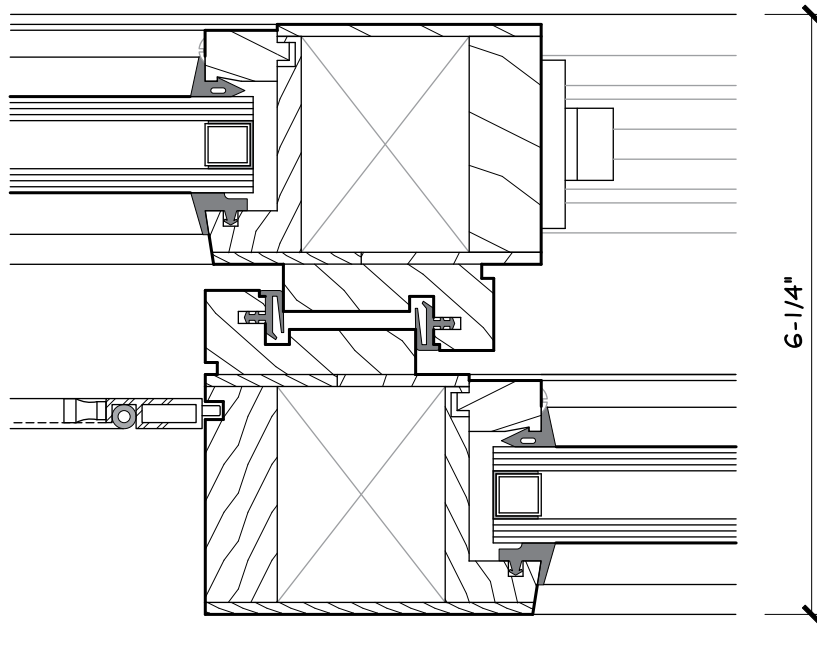
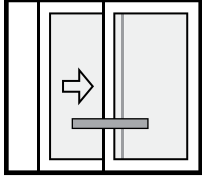
LIFT/ROLL WINDOW – SILL



Sill
½ Full Size

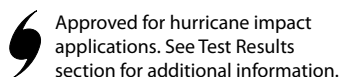


LIFT/ROLL WINDOW – MEETING STILE



Meeting Stile
½ Full Size





OUT-SWING DOOR

Standard Hardware (residential applications only)

Lockset

Heavy duty mortise construction. Half-turn lever controls hook bolts, dead bolt, and latch. Hook bolt assembly fully mortised into rail to provide 3- or 4-point latching at frame and adjacent door/frame. Locking mechanism incorporates a standard US cylinder. Based on G-U Cremona or Tripact door bolt system.

Finishes: Yellow Dichromate or black powder coated steel. Cremona locksets are available in stainless steel.

Escutcheons / Lever Handles

Escutcheons, roses, and lever handles are available in a variety of styles and configurations from various manufacturers.

Finishes: A variety of finishes are available from various manufacturers.

Hinges

Solid brass 4½" x 4½" five-knuckle ball-bearing butt hinges, minimum 1½ pair per leaf, in manufacturer's standard finishes.

Finishes: A variety of finishes are available from various manufacturers.

Commercial Hardware

Most commercial hardware can be incorporated into our door panels, including flush bolts, exit devices (rim, mortise, surface vertical rod and concealed vertical rod), door closers, electric strikes, and others.

NOTE: Some hardware installations may require modifications to door leaf or frame detailing, such as concealed closers and meeting rail weather-strip at concealed vertical rod assemblies. Contact factory for assistance. Hardware must be suitable for our standard 2¼" leaf thickness.

Optional Hardware

Screen doors, astragals, ADA-compliant metal thresholds.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅛" single glazed to a maximum of 1" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder. Clear glass opening: Unit height minus 15⅝", unit width minus 14½".

Weather-Stripping

Continuous extruded silicone flap gasket set in rebate in door frame around perimeter of door panel. Engaging the multi-latchpoint espagnolettes (standard hardware) compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 24"
Maximum: 48"

HEIGHT: Minimum: 74"
Maximum: 120"

ADA Compliance

Clear-opening sizing based on 32" clear width requirement.

Minimum unit width: 36½"
(assuming 180° door swing)

NOTE: Standard wood threshold may not meet ADA maximum height requirements. Doors that are not able to open a full 180° may need to increase in width.

Consult factory with specific clearance questions

Frame Depths Leaf Thickness

Standard primary door leaf thickness: 2¼"

Standard screen door leaf thickness: 1⅜"

Standard frame depth *: 6¼"
Minimum frame depth *: 4¾"
Maximum frame depth: 10"

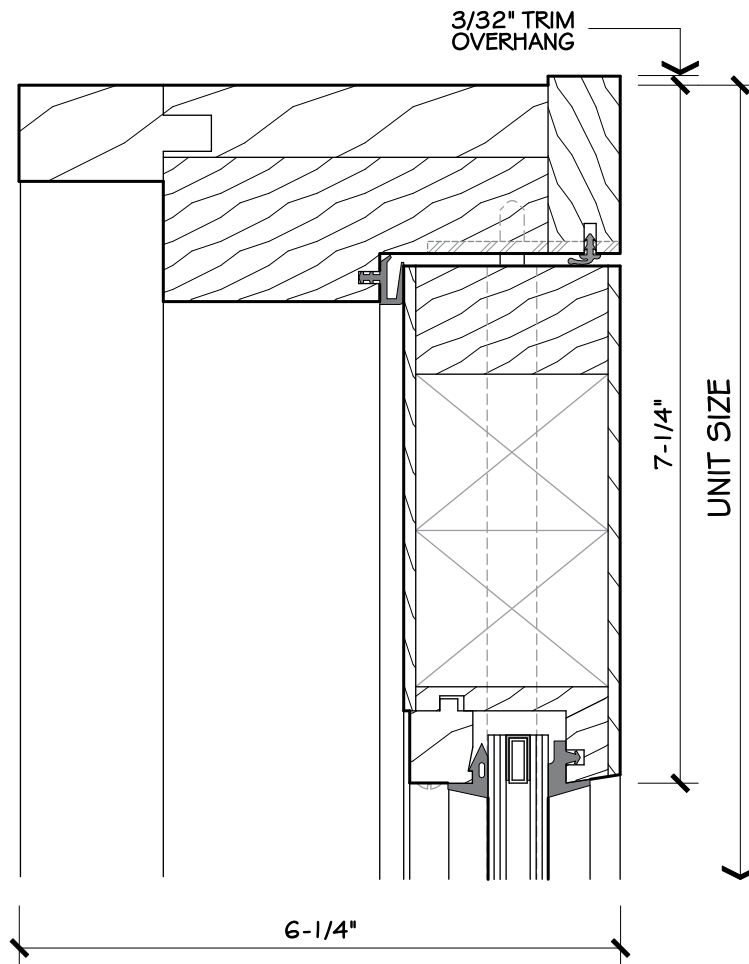
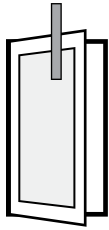
* Contact factory for frame depths less than 6¼".

NOTE: When screen doors are specified, handle clearances must be considered when determining appropriate frame depths.



OUT-SWING DOOR – HEAD

Shown with standard operating hardware.*



Head

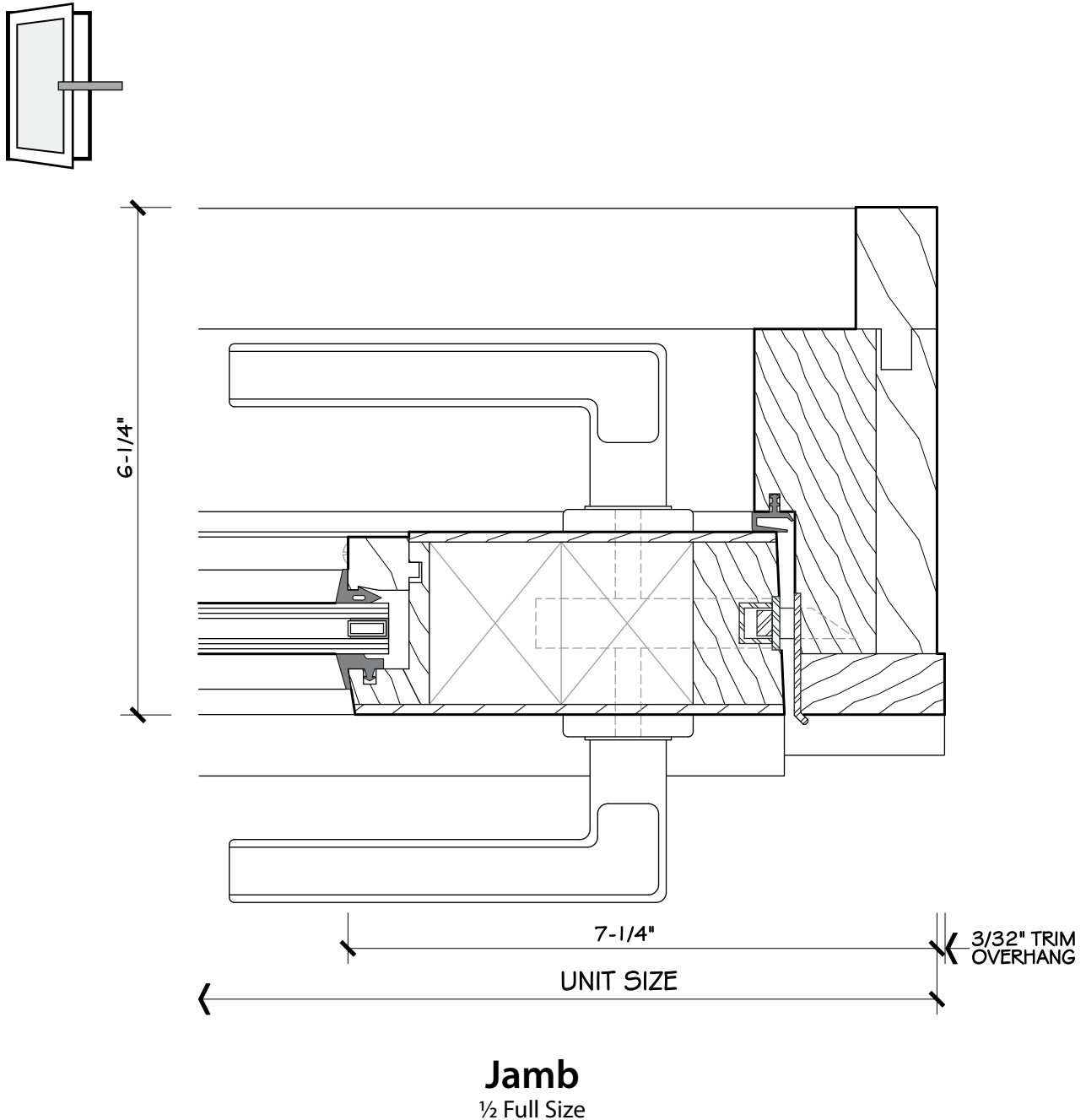
½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



OUT-SWING DOOR – JAMB

Shown with standard operating hardware.*

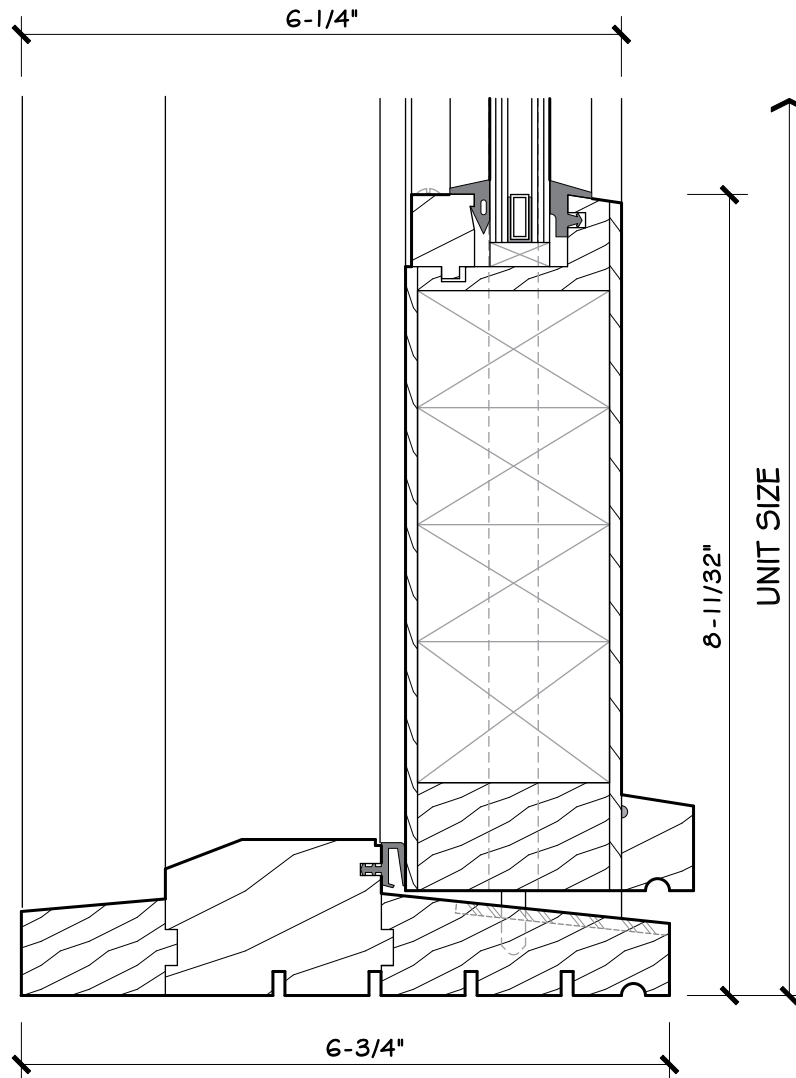
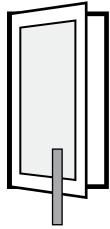


* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



OUT-SWING DOOR – WOOD SILL

Shown with standard operating hardware.*



Sill

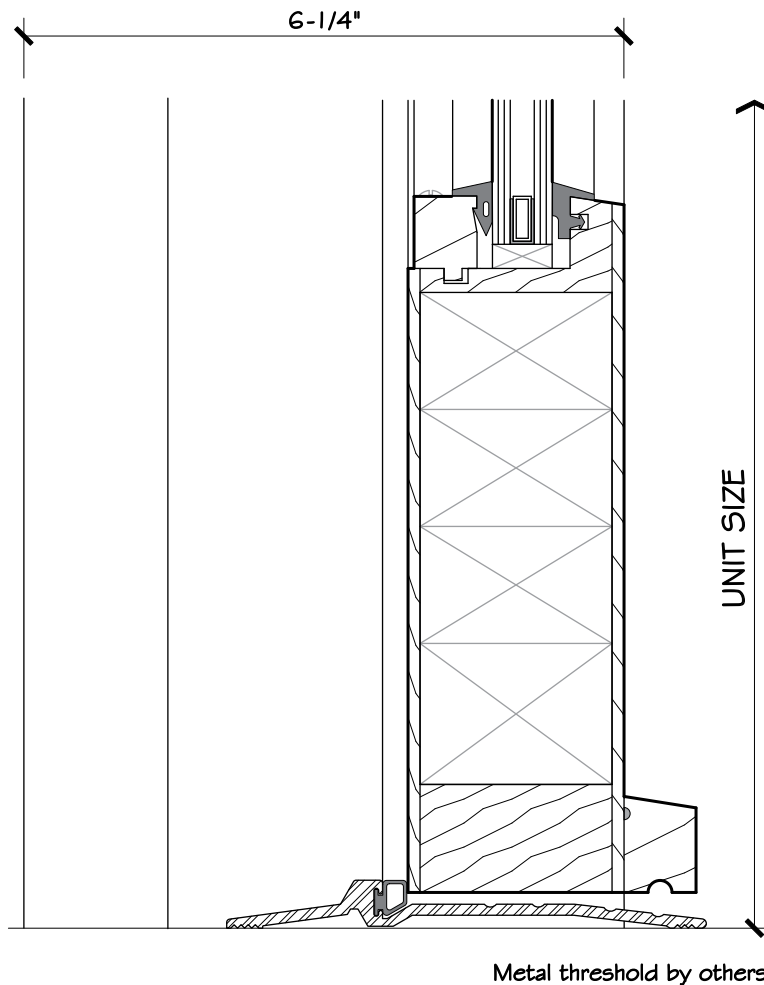
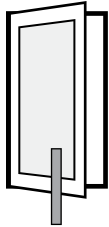
½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



OUT-SWING DOOR – METAL SILL

To achieve ADA compliance, we prepare doors for use with thresholds supplied by others.*



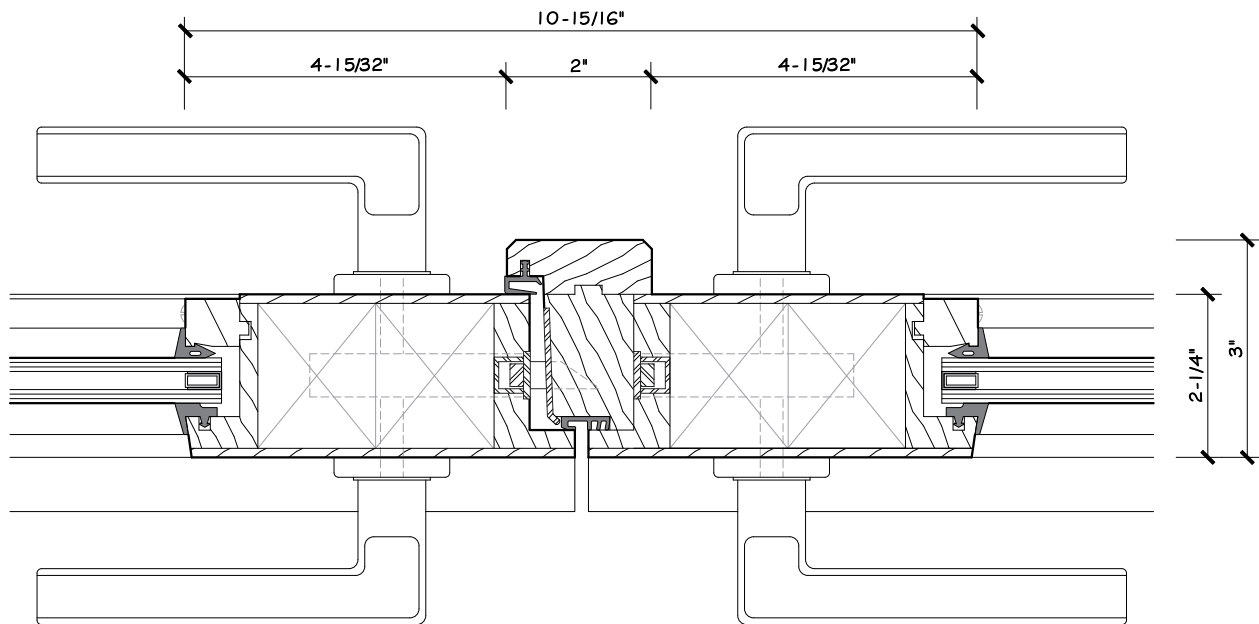
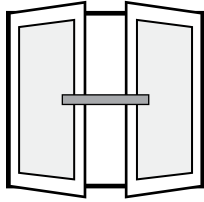
Sill
½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



OUT-SWING DOOR – MEETING STILE

Shown with standard operating hardware.*



Meeting Stile With Astragal

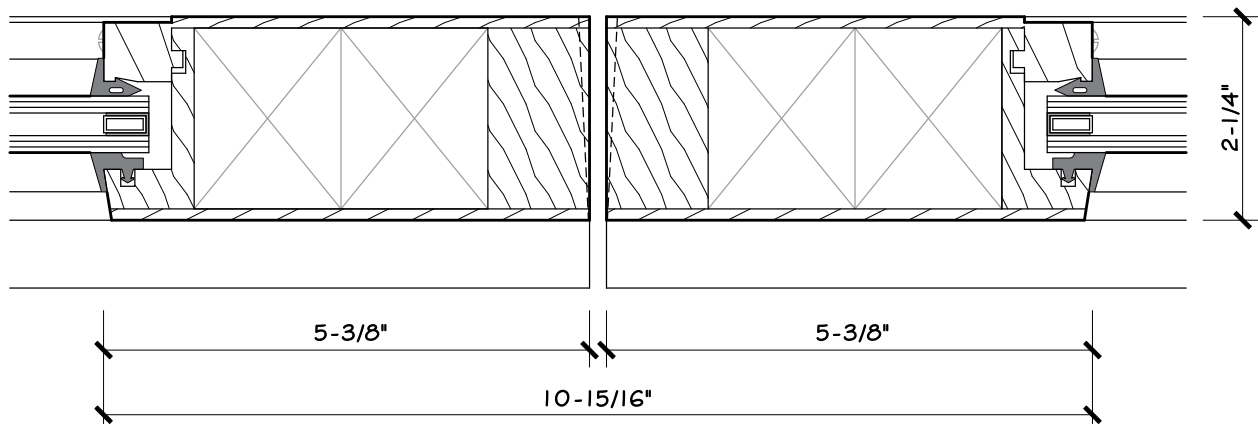
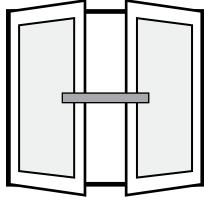
Not to scale

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



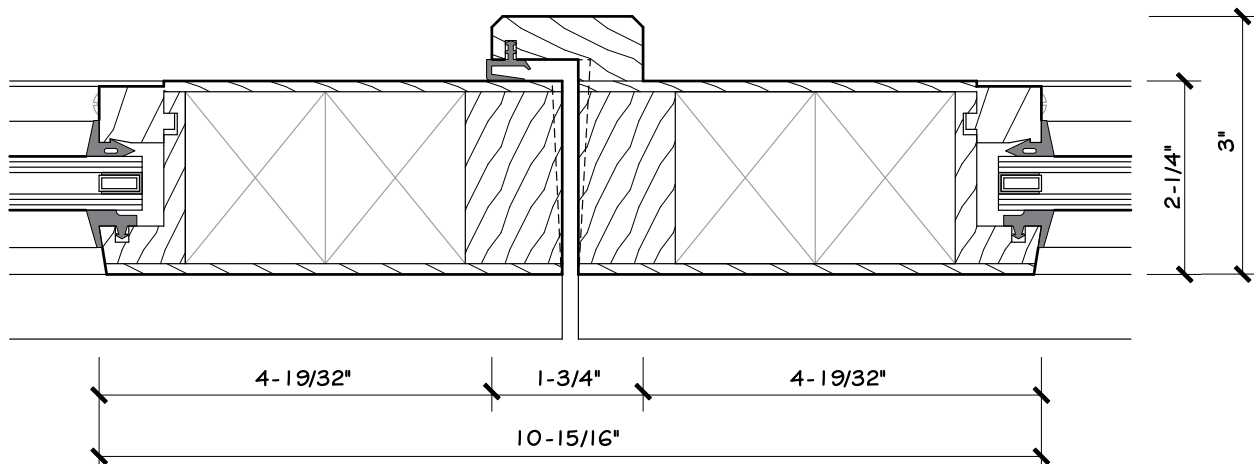
OUT-SWING DOOR – MEETING STILES

For hardware supplied by others.*



Meeting Stile

Not to scale



Meeting Stile With Astragal

Not to scale

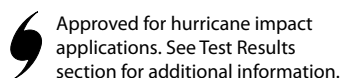
* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



DATA AND DETAILS – STANDARD

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DATA AND DETAILS – STANDARD

A-48

IN-SWING DOOR

Standard Hardware (residential applications only)

Primary Door Lockset

Heavy duty mortise construction. Half-turn lever controls hook bolts, dead bolt, and latch. Hook bolt assembly fully mortised into rail to provide 3- or 4-point latching at frame and adjacent door/frame. Locking mechanism incorporates a standard US cylinder. Based on G-U Cremona or Tripact door bolt system.

Finishes: Yellow Dichromate or black powder coated steel. Cremona locksets are available in stainless steel.

Screen Door Lockset

Heavy duty mortise construction. Single doors have mortised lockset. Paired screen doors have mortised lockset on active leaf, dummy handle and top & bottom shoot bolts on inactive leaf. Based on G-U Monolock operating hardware.

Finishes: Yellow Dichromate or black powder coated steel. Faceplate available in stainless steel.

Escutcheons / Lever Handles

Escutcheons, roses, and lever handles are available in a variety of styles and configurations from various manufacturers. Finishes: A variety of finishes are available from various manufacturers.

Hinges

Solid brass five-knuckle ball-bearing butt hinges, minimum 1½ pair per leaf, in manufacturer's standard finishes.

Primary Door: 4½" x 4½" Screen Door: 3½" x 3½"

Commercial Hardware

Most commercial hardware can be incorporated into our door panels, including flush bolts, exit devices (rim, mortise, surface vertical rod and concealed vertical rod), door closers, electric strikes, and others.

NOTE: Some hardware installations may require modifications to door leaf or frame detailing, such as concealed closers and meeting rail weather-strip at concealed vertical rod assemblies. Contact factory for assistance. Hardware must be suitable for our standard 2¼" leaf thickness.

Optional Hardware

Screen doors, astragals, ADA-compliant metal thresholds.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅛" single glazed to a maximum of 1" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder. Clear glass opening: Unit height minus 15½", unit width minus 12".

Weather-Stripping

Continuous extruded silicone flap gasket set in rebate in door frame around perimeter of door panel. Engaging the multi-latchpoint espagnolettes (standard hardware) compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 24"
Maximum: 48"

HEIGHT: Minimum: 74"
Maximum: 120"

ADA Compliance

Clear-opening sizing based on 32" clear width requirement.

Minimum unit width: 35½"
(assuming 180° door swing)

NOTE: Standard wood threshold may not meet ADA maximum height requirements. Doors that are not able to open a full 180° may need to increase in width.

Consult factory with specific clearance questions

Frame Depths Leaf Thickness

Standard primary door leaf thickness: 2¼"

Standard screen door leaf thickness: 1⅜"

Standard frame depth *: 6¼"

Minimum frame depth *: 4¾"

Maximum frame depth: 10"

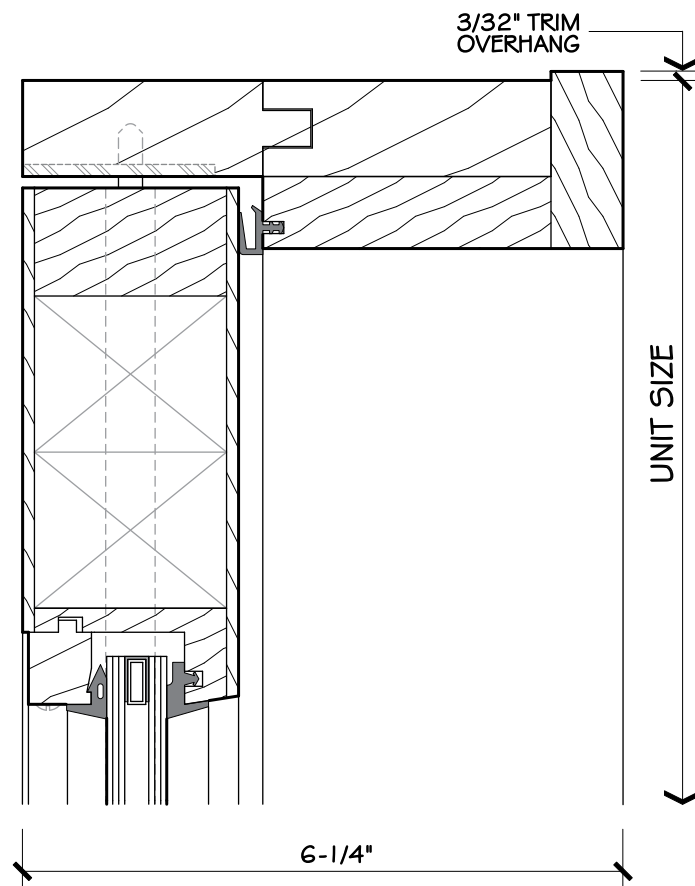
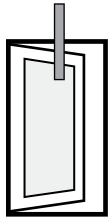
* Contact factory for frame depths less than 6¼".

NOTE: When screen doors are specified, handle clearances must be considered when determining appropriate frame depths.



IN-SWING DOOR – HEAD

Shown with standard operating hardware.*



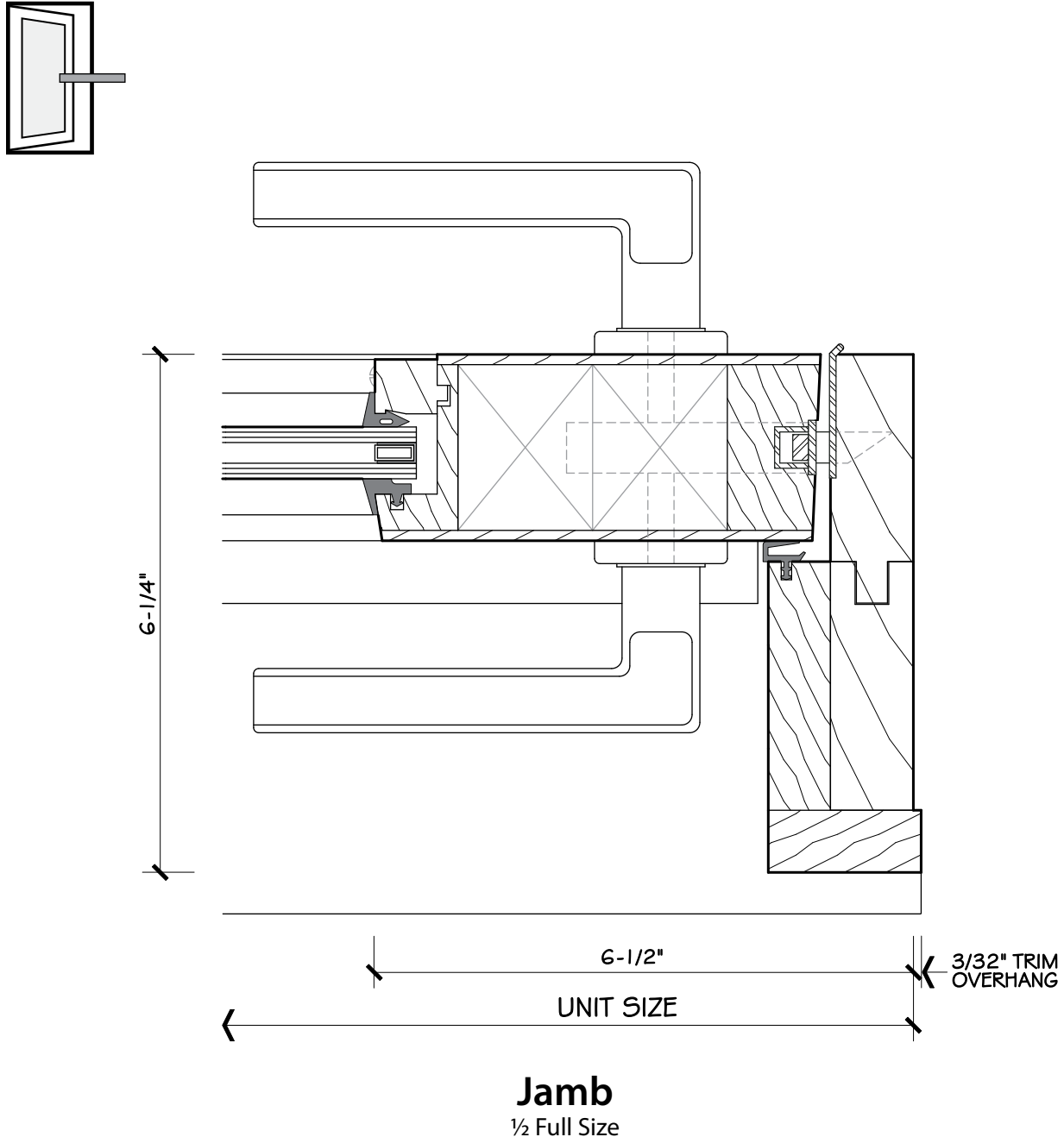
Head
½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – JAMB

Shown with standard operating hardware.*

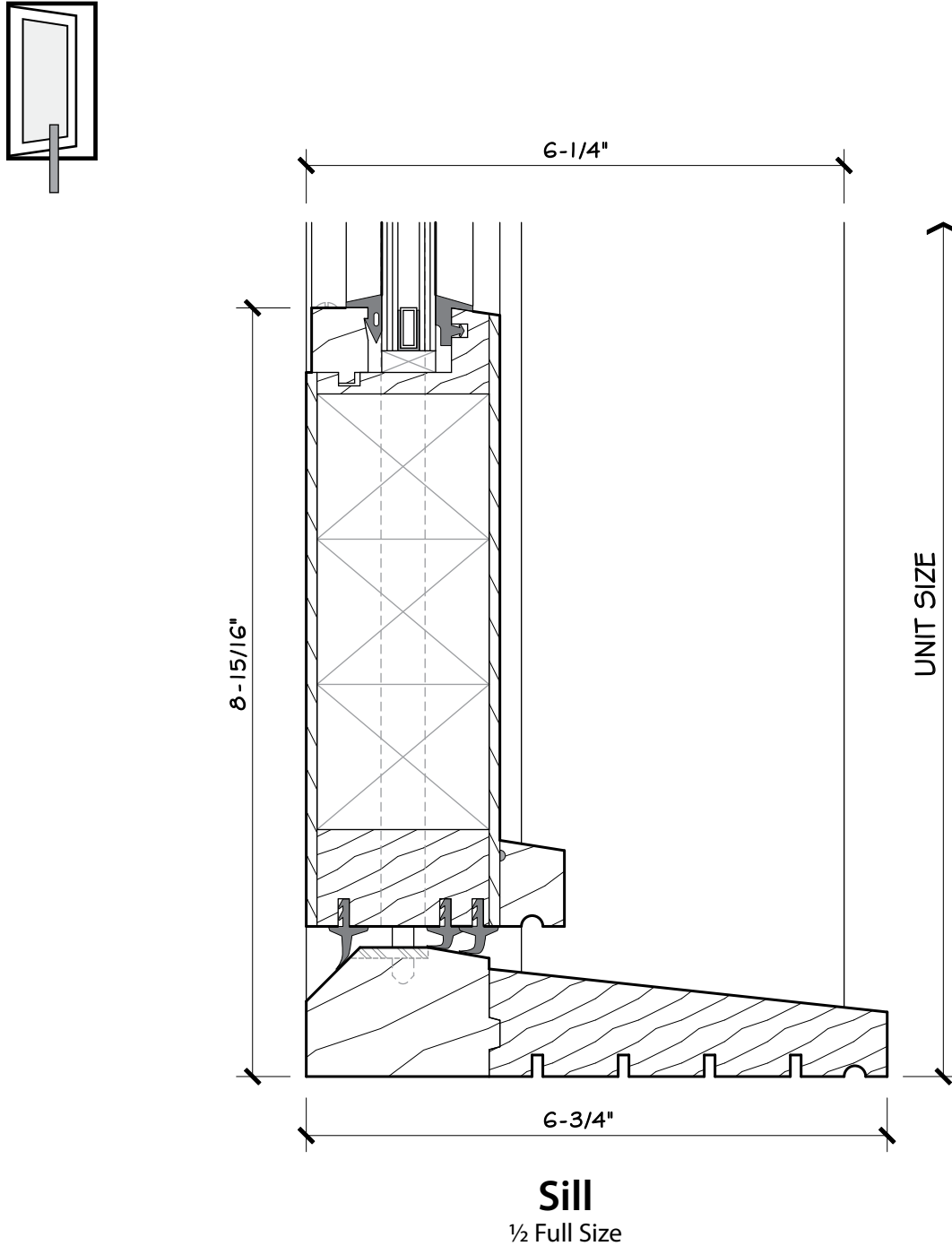


* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – WOOD SILL

Shown with standard operating hardware.*

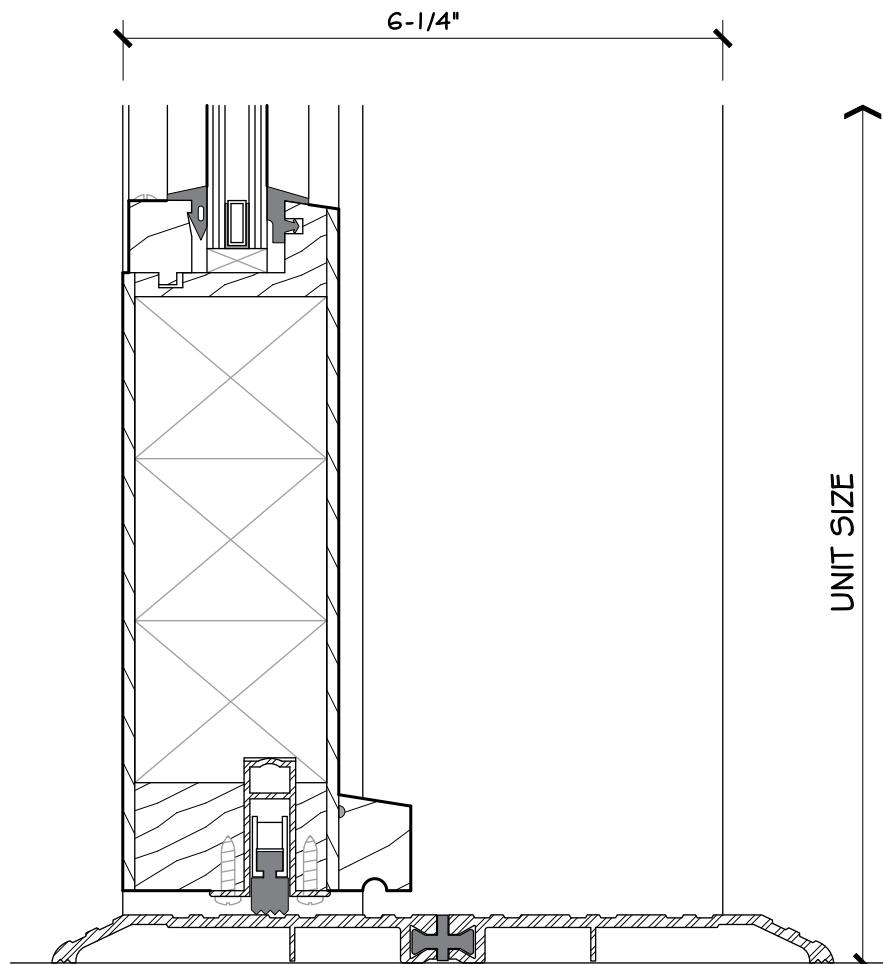
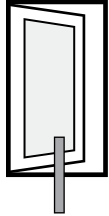


* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – METAL SILL

To achieve ADA compliance, we prepare doors for use with thresholds supplied by others.*



Metal threshold by others.

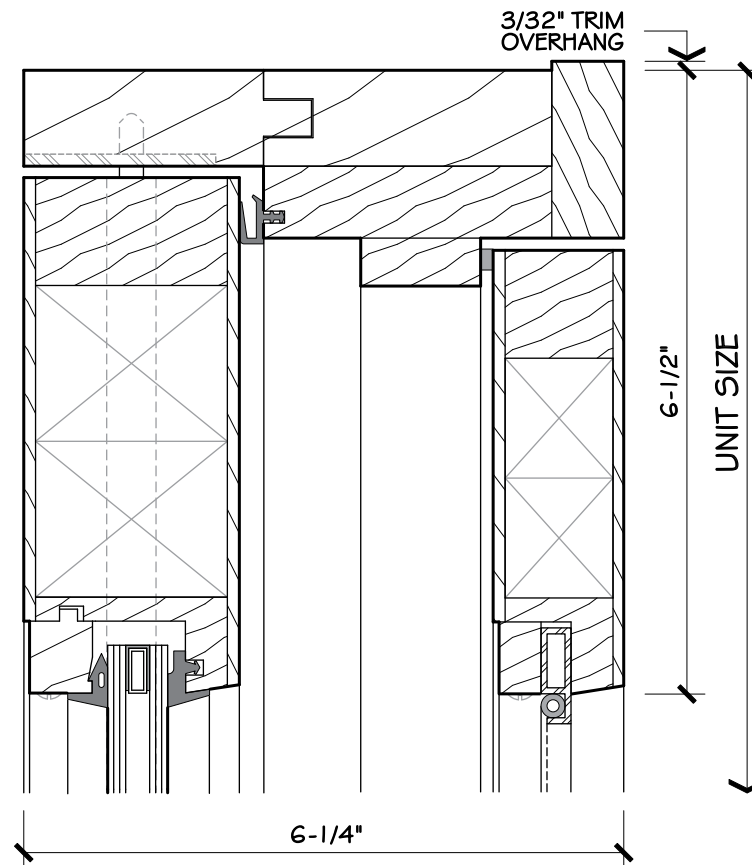
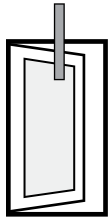
Sill
½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – HEAD – 6¼" FRAME DEPTH WITH OUT-SWING SCREEN DOOR

Shown with standard operating hardware.*



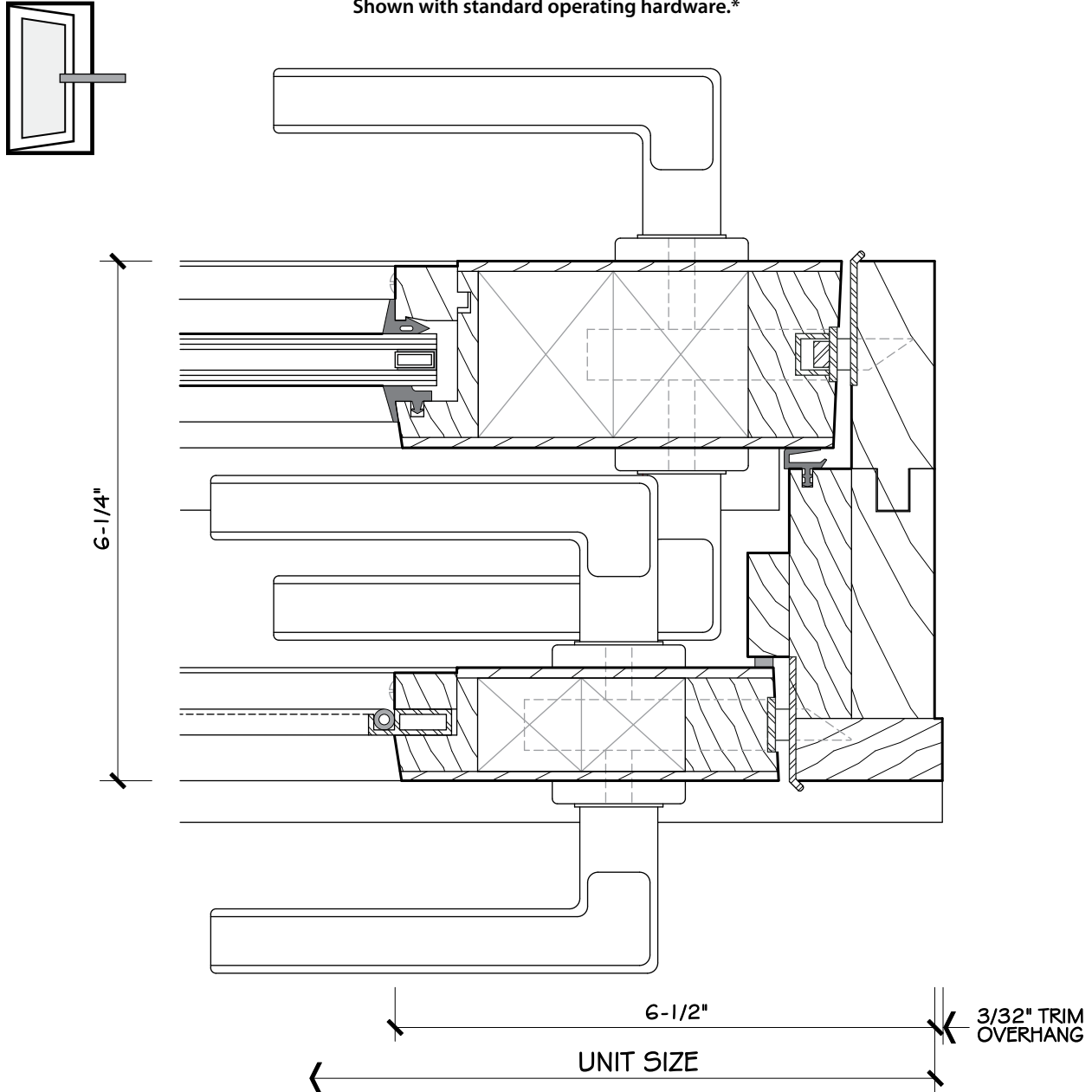
Head
With Out-Swing Screen Door
½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – JAMB – 6¼" FRAME DEPTH WITH OUT-SWING SCREEN DOOR

Shown with standard operating hardware.*



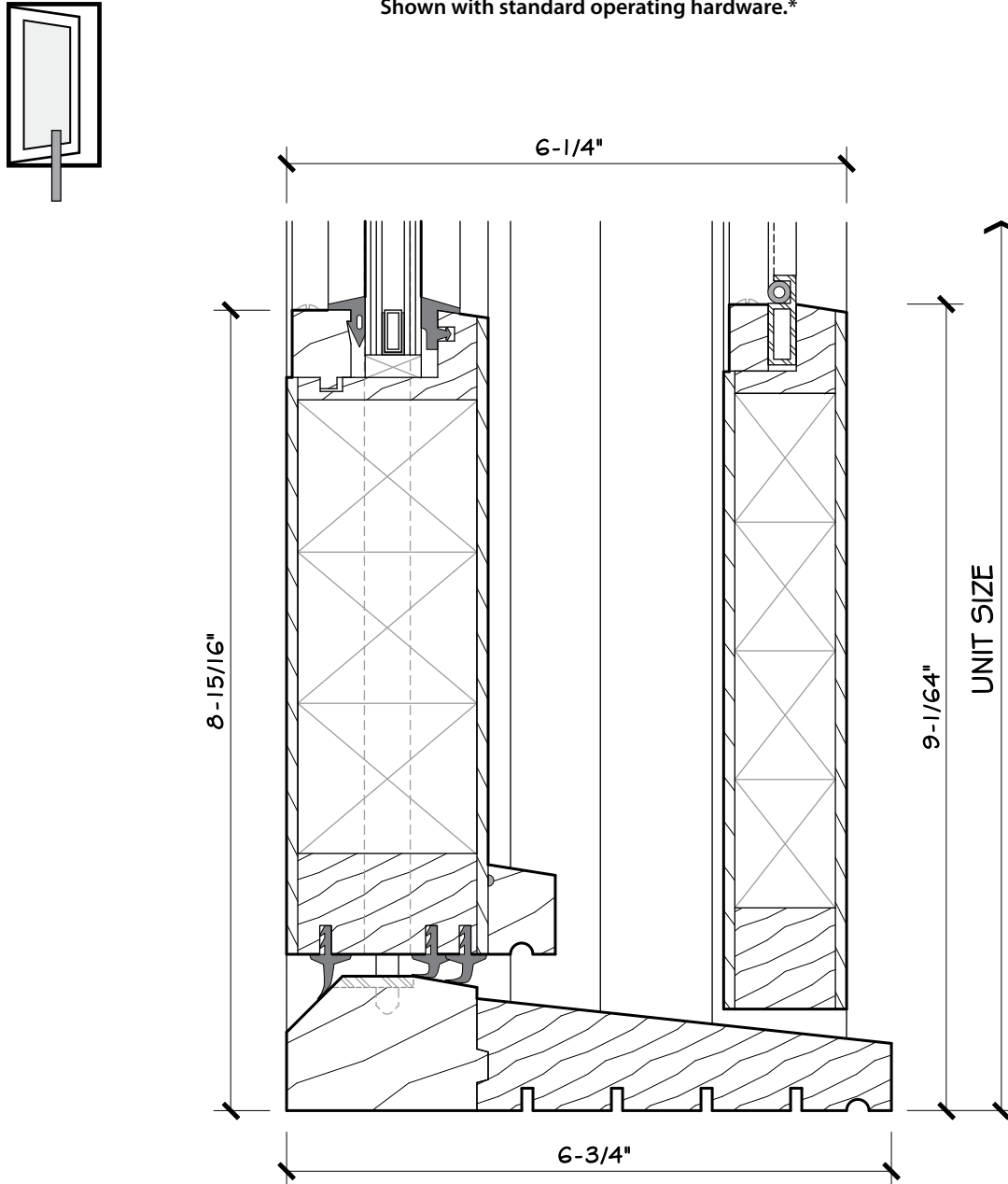
Jamb
With Out-Swing Screen Door
½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – SILL – 6 $\frac{1}{4}$ " FRAME DEPTH WITH OUT-SWING SCREEN DOOR

Shown with standard operating hardware.*



Sill

With Out-Swing Screen Door

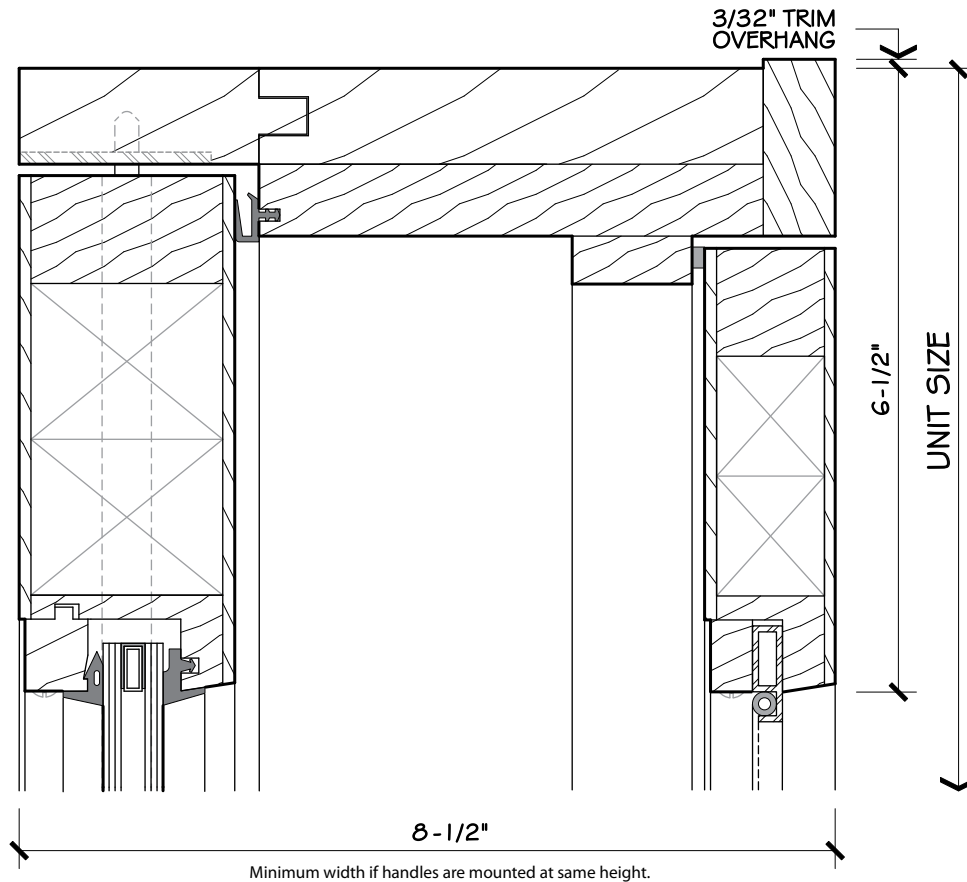
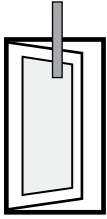
$\frac{1}{2}$ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – HEAD – 8½" FRAME DEPTH WITH OUT-SWING SCREEN DOOR

Shown with standard operating hardware.*



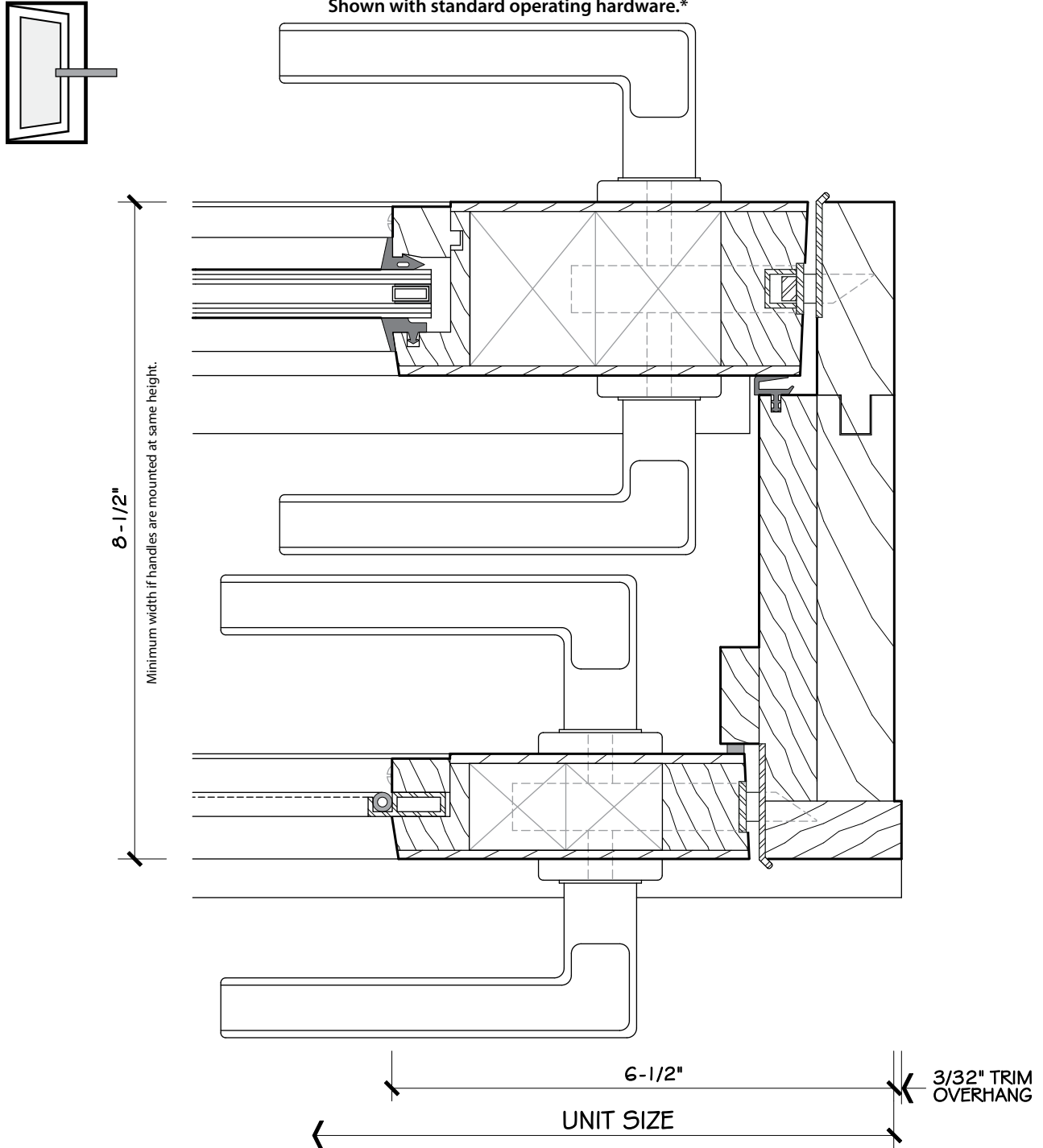
Head With Out-Swing Screen Door ½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – JAMB – 8½" FRAME DEPTH WITH OUT-SWING SCREEN DOOR

Shown with standard operating hardware.*



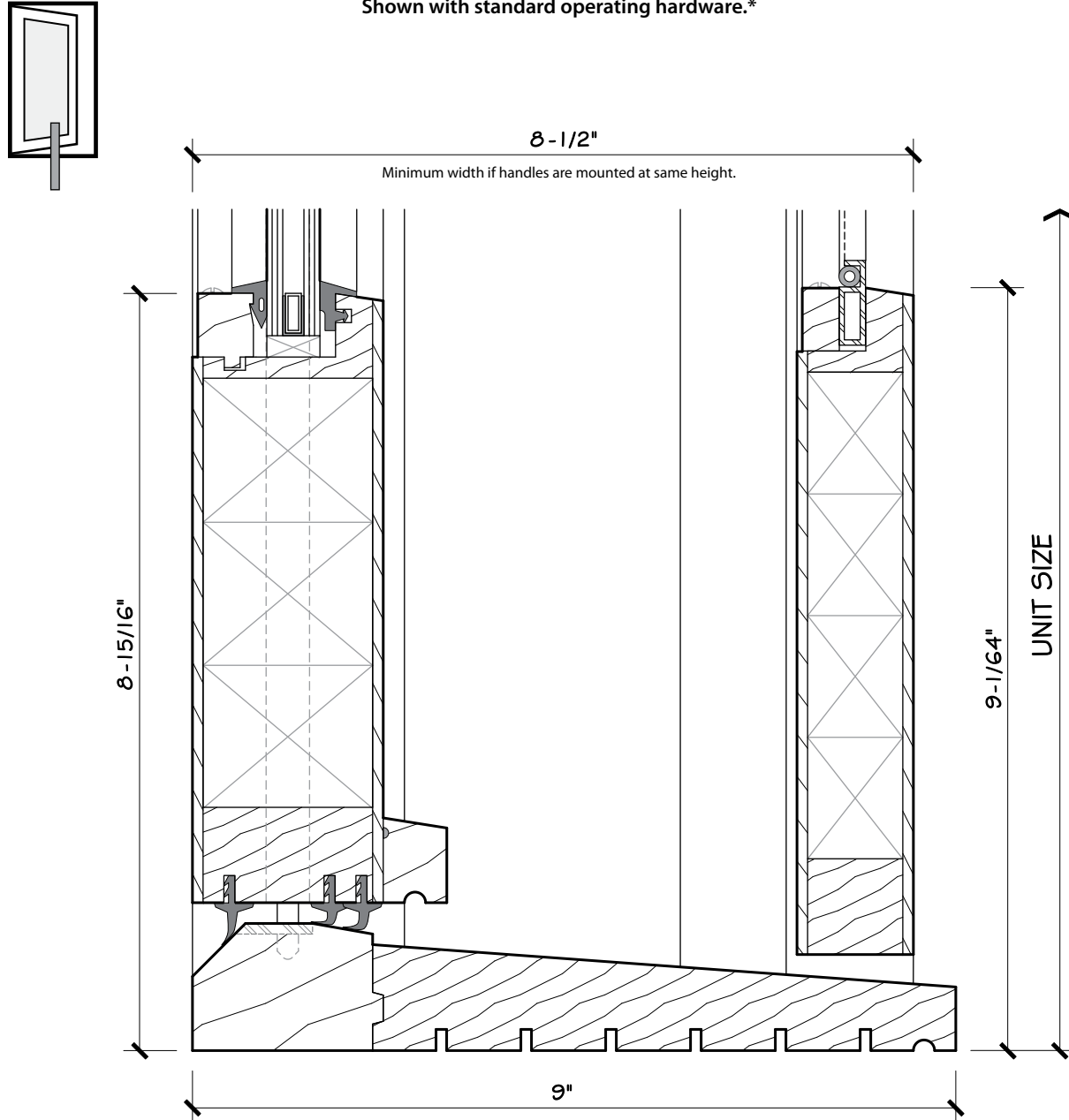
Jamb
With Out-Swing Screen Door
½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – SILL – 8½" FRAME DEPTH WITH OUT-SWING SCREEN DOOR

Shown with standard operating hardware.*



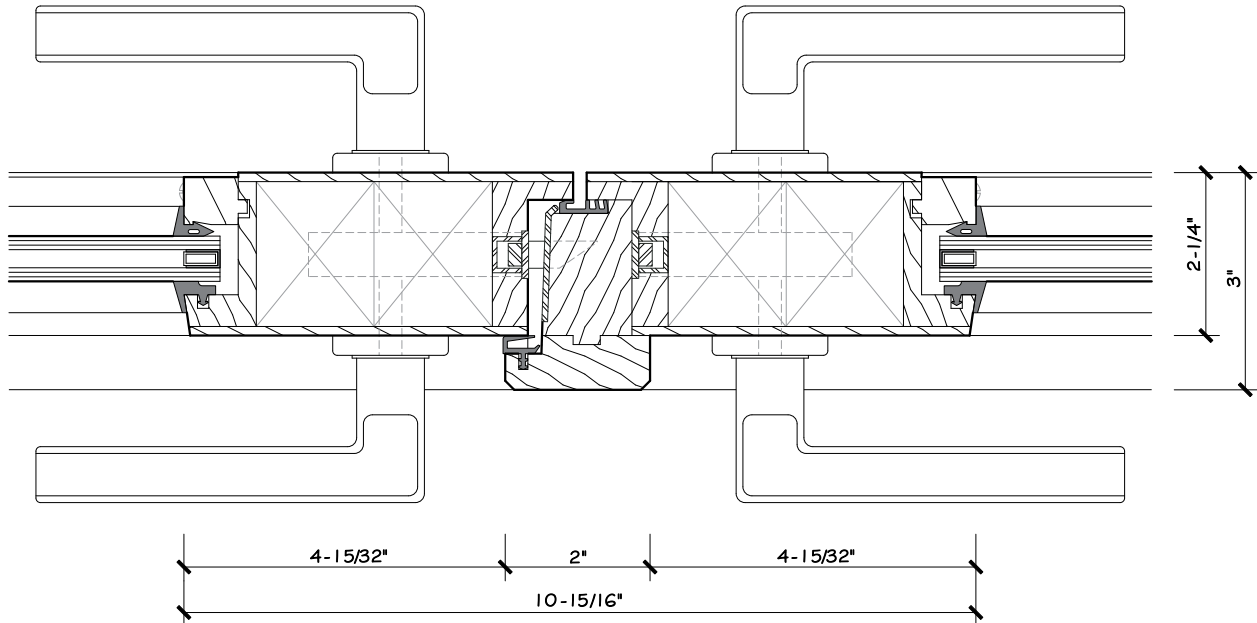
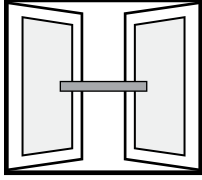
Sill
With Out-Swing Screen Door
½ Full Size

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



IN-SWING DOOR – MEETING STILE

Shown with standard operating hardware.*



Meeting Stile With Astragal

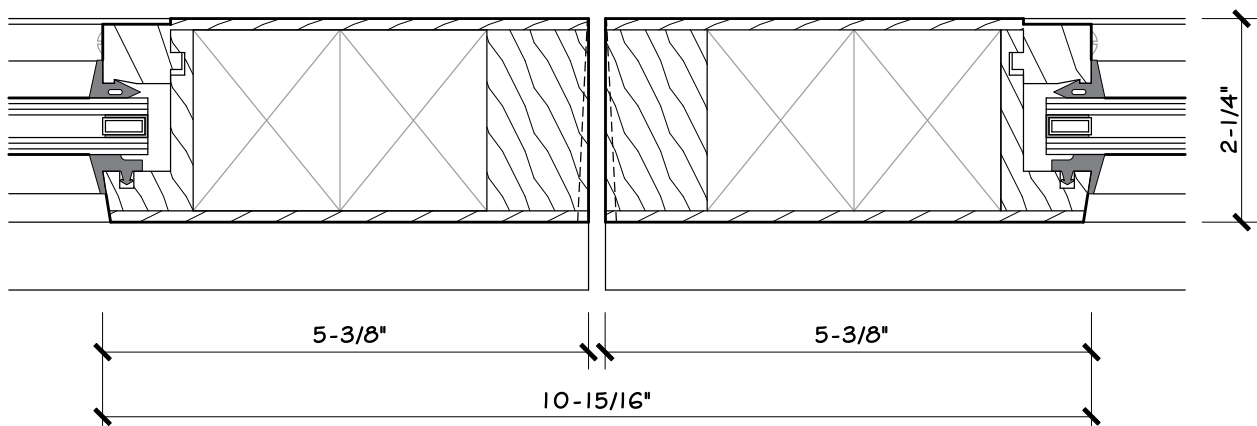
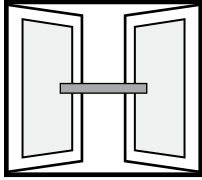
Not to scale

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



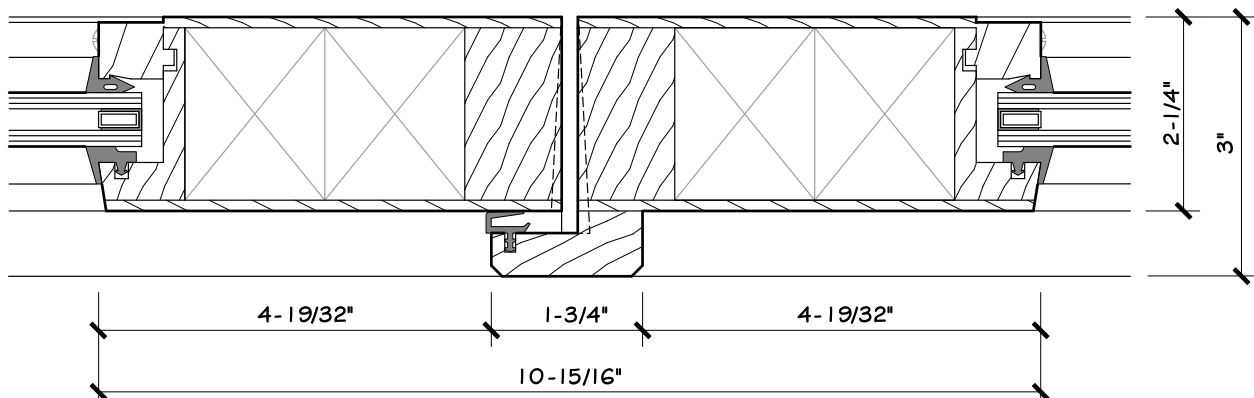
IN-SWING DOOR – MEETING STILES

For hardware supplied by others.*



Meeting Stile

Not to scale



Meeting Stile With Astragal

Not to scale

* For applications that do not include standard hardware supplied by Duratherm, we can premachine for hardware provided by others.



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WINDOOR™

Window Hardware

Operator

Duratherm proprietary pushbar comprised of oxidized bronze alloy components and a solid brass bar, copper plated and oxidized to match bronze. The pushbar operator is mounted on the door stile for casement window operation, the bottom rail for awning operation. It is designed to be manually operated for the entire length and to hold the sash at intermediate points. Available in one piece or hinged at mid-point of length.

Finishes: Oil-rubbed Bronze (US10B), Lacquered Red Bronze (US20A), White Bronze (US26D).

Sash Locks

Oxidized bronze alloy latches ensure positive, uniform locking action.

Finishes: Oil-rubbed Bronze (US10B), Lacquered Red Bronze (US20A), White Bronze (US26D).

Hinges

Casement sash: Full height stainless steel piano hinge.

Awning sash: Truth Maxim® 300 series stainless steel extension hinges.

Insect Screens

1" x ¼" tubular extruded frames in anodized bronze, mill finish aluminum or custom color painted aluminum. Mesh of 18 x 16 screen cloth held with vinyl spline, available in charcoal finished aluminum, mill finish aluminum, stainless steel or bright brass.

Door Standard Hardware (residential applications only)

Lockset

Heavy duty mortise construction. Half-turn lever controls hook bolts, dead bolt, and latch. Hook bolt assembly fully mortised into rail to provide 3- or 4-point latching at frame and adjacent door/frame. Locking mechanism incorporates a standard US cylinder. Based on G-U Cremona or Tripact door bolt system.

Finishes: Yellow Dichromate or black powder coated steel. Cremona locksets are available in stainless steel.

Escutcheons / Lever Handles

Escutcheons, roses, and lever handles are available in a variety of styles and configurations from various manufacturers.

Finishes: A variety of finishes are available from various manufacturers.

Hinges

Solid brass 4½" x 4½" five-knuckle ball-bearing butt hinges, minimum 1½ pair per leaf, in manufacturer's standard finishes.

Finishes: A variety of finishes are available from various manufacturers.

Door Commercial Hardware

Most commercial hardware can be incorporated into our door panels, including flush bolts, exit devices (rim, mortise, surface vertical rod and concealed vertical rod), door closers, electric strikes, and others.

NOTE: Some hardware installations may require modifications to door leaf or frame detailing, such as concealed closers and meeting rail weather-strip at concealed vertical rod assemblies. Contact factory for assistance. Hardware must be suitable for our standard 2¼" leaf thickness.

Optional Hardware

Screen doors, astragals, ADA-compliant metal thresholds.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from ⅝" single glazed to a maximum of 1" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder. Clear glass opening: Unit height minus 15⅝", unit width minus 12".



WINDOOR™

Weather-Stripping

Door Panel

Doubled continuous extruded silicone flap gasket set in rebate around the perimeter of the door leaf. Engaging the multi-latchpoint espagnolettes compresses the weather-strip to ensure a tight seal.

Casement and Awning Sash

Continuous extruded silicone flap gasket set in rebate around the perimeter of the sash. Engaging the sash locks and pusharm compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 24"
Maximum: 48"

HEIGHT: Minimum: 74"
Maximum: 96"

OPERABLE SASH:

WIDTH: Minimum: 12½"
Maximum: 36"

HEIGHT: Minimum: 24"
Maximum: 60"

Maximum sash area:
15 sq ft

ADA Compliance

Clear-opening sizing based on 32" clear width requirement.

Minimum unit width: 35½"
(assuming 180° door swing)

NOTE: Standard wood threshold may not meet ADA maximum height requirements. Doors that are not able to open a full 180° may need to increase in width.

Consult factory with specific clearance questions

Frame Depths
Leaf Thickness

Leaf thickness: 2¼"

Standard frame depth *: 6¼"

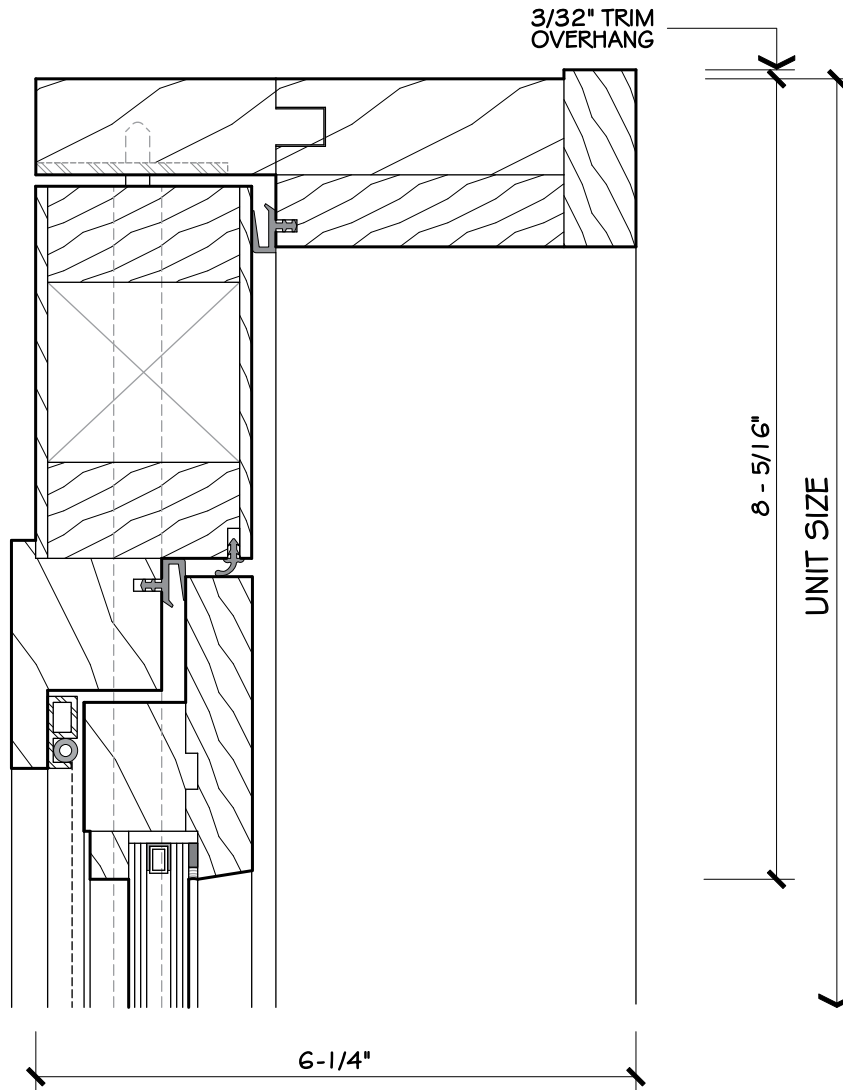
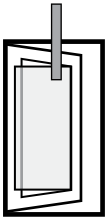
Minimum frame depth *: 4¾"

Maximum frame depth: 10"

* Contact factory for frame depths less than 6¼".



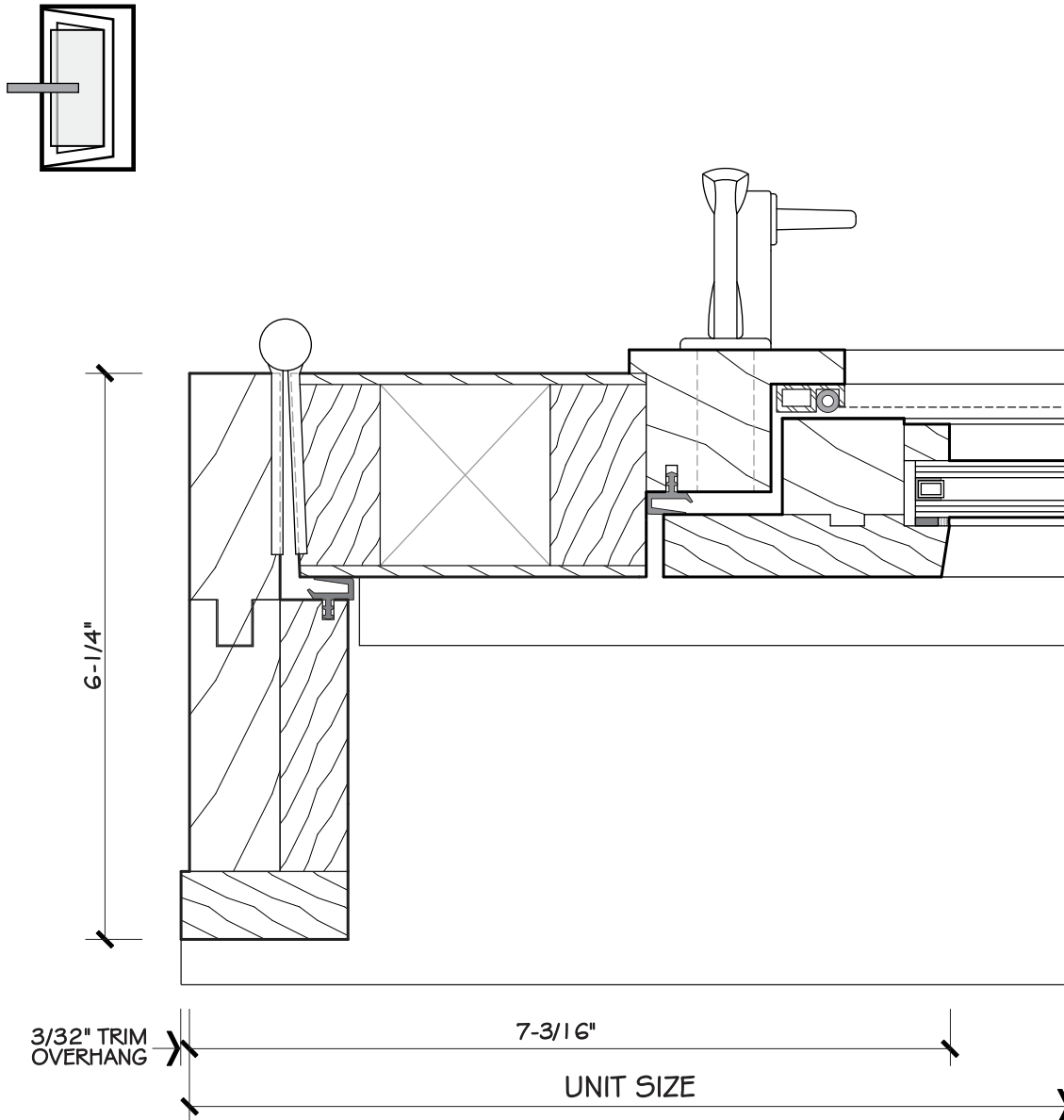
WINDOOR™ – HEAD



Head
½ Full Size



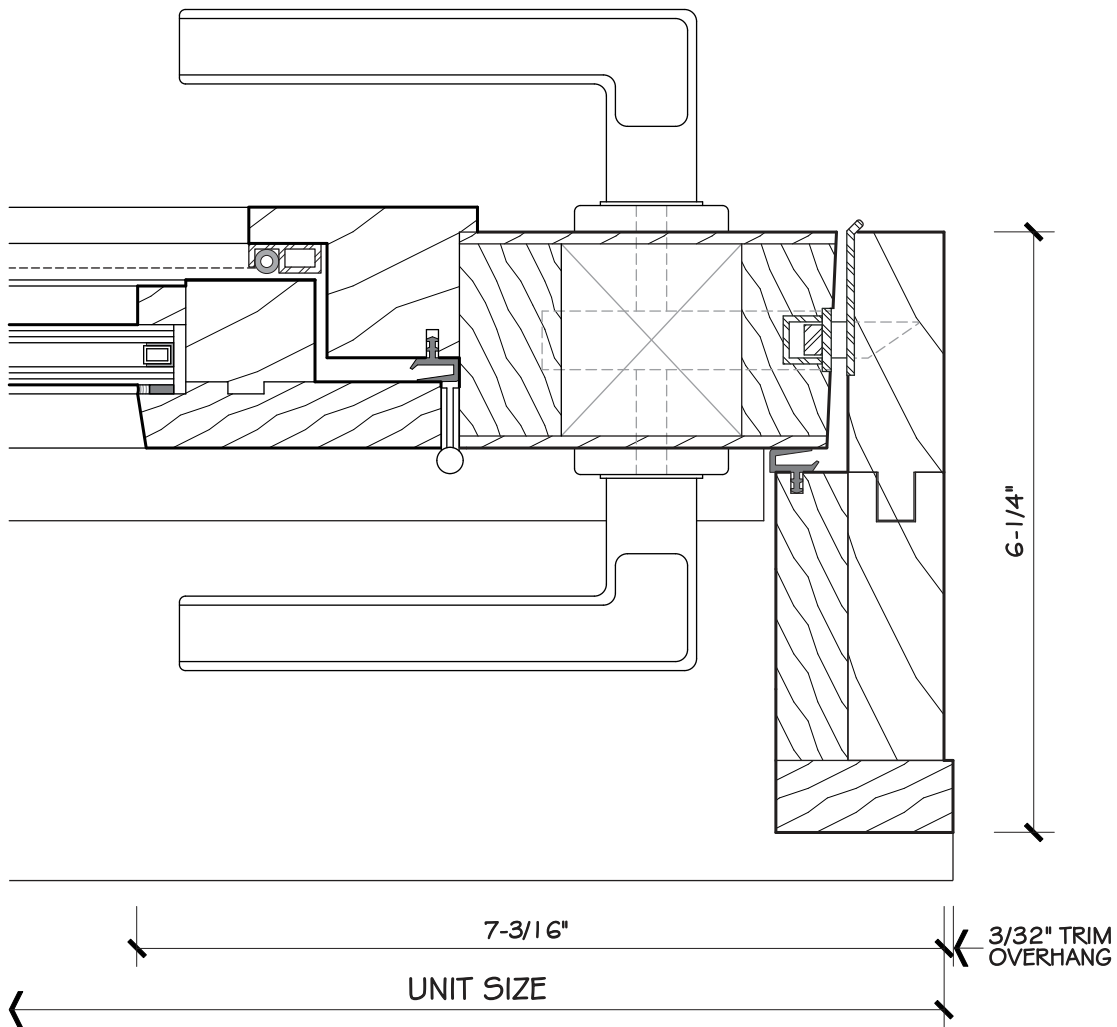
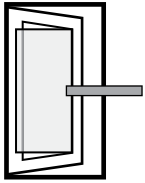
WINDOOR™ – HINGE JAMB



Hinge Jamb
1/2 Full Size



WINDOOR™ – LATCH JAMB

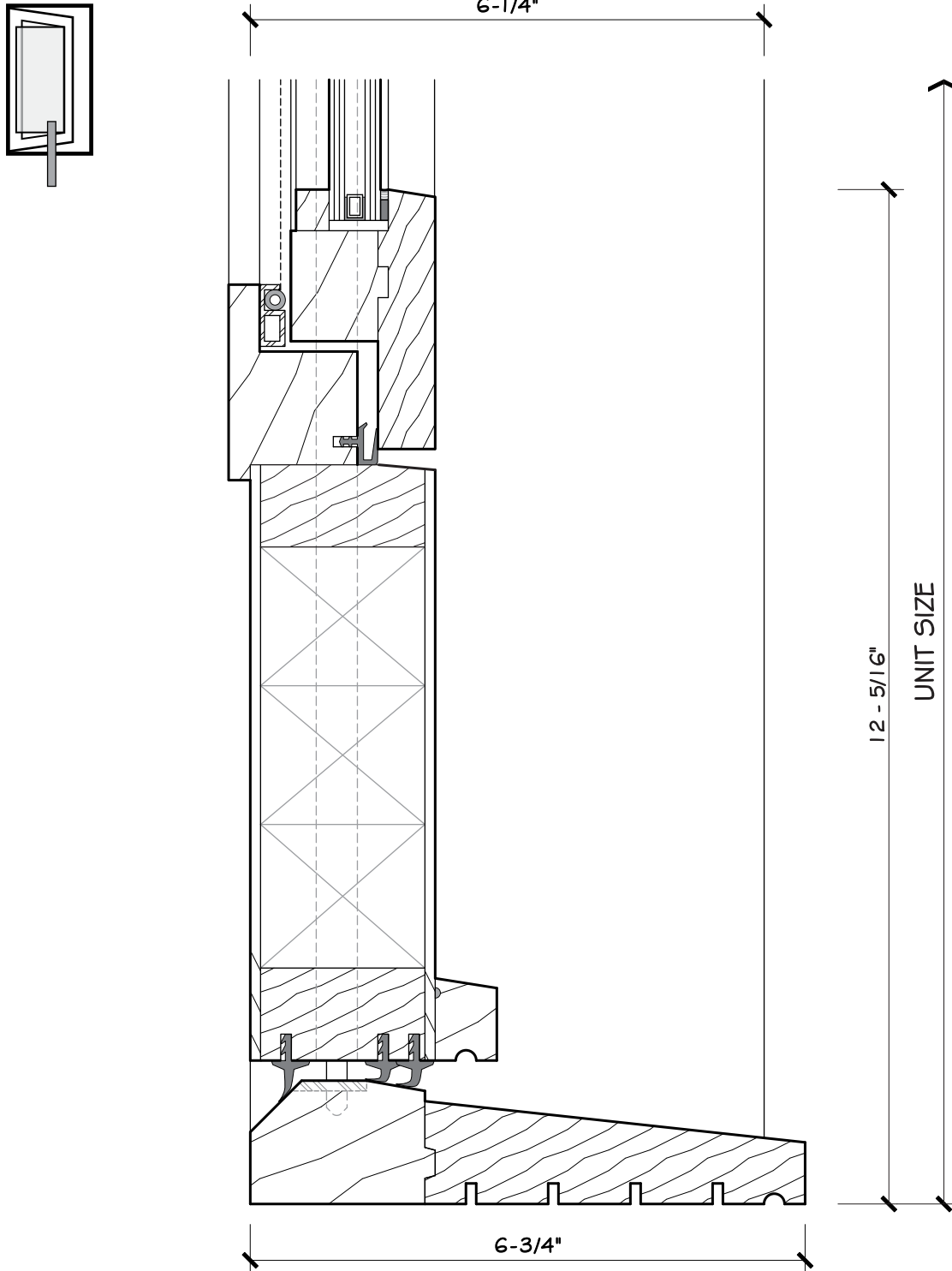


Latch Jamb

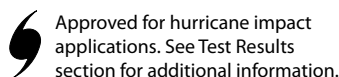
½ Full Size



WINDOOR™ – SILL



Sill
1/2 Full Size



LIFT/ROLL DOOR

Hardware

Operating Assembly

Door panels ride on carriages consisting of two sets of twin rollers mortised into the bottom of each moving panel. The door is raised onto its carriage by rotating the operating lever handle 180°. Lifting gear connected to a tie rod transmits motion to the carriage, lifting door. Based on G-U 933 or FFI Lift/Roll operating hardware.

Finishes: Internal carriage assembly (drive bars, wheel hub, shafts, rivets), lock kit, link rods, and connectors in zinc chromate coated steel or 304 stainless steel.

Lock face and edge stile cover are clear anodized (EV-1) or dark bronze anodized (EV-5) aluminum.

External guides and tracks are clear anodized (EV-1) or dark bronze anodized (EV-5) aluminum).

Escutcheons / Lever Handles

Escutcheons and lever handles are available in a variety of styles and configurations from various manufacturers.

Configurations include levers inside and outside; lever inside, finger pull outside; thumb turn lock inside, profile cylinder outside; profile cylinder inside and outside.

Finishes: A variety of finishes are available from various manufacturers.

Flush Sill / FASTrack Assembly

Flush sill detailing available for pocketing door assemblies. Track system includes stainless steel track blades and solid brass track bridge assemblies. As all flush systems are custom, contact factory for detailing.

Optional Hardware

Screen doors, bronze tracks, aluminum thresholds, removable handles.

Standard Configurations

X = Operable panel, O = Fixed panel

OX OXXO XX OXX XXXX OXO XXX OXXXXO

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from 1/8" single glazed to a maximum of 1" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder.

Clear glass opening: Unit height minus 14 1/8". For clear glass width, contact factory.

Weather-Stripping

Doubled, continuous extruded silicone flap gasket set in rebate around the perimeter of the door leaf. Rotating the multi-latchpoint lever handle lowers the door and compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 48"
for OX configuration.
Maximum varies per
configuration

HEIGHT: Minimum: 74"
Maximum: 120"

ADA Compliance

Clear-opening sizing assumes a two
panel OX configuration with equal sized
panels and is based on 32" clear width
requirement.

Minimum unit width: 70"

NOTE: Standard wood threshold
may not meet ADA maximum height
requirements.

Consult factory with specific clearance
questions

Frame Depths Leaf Thickness

Standard primary door
leaf thickness: 2 1/2"

Standard screen door
leaf thickness: 1 3/8"

Standard frame depth*: 8 1/2"
(OX configuration with screen door)

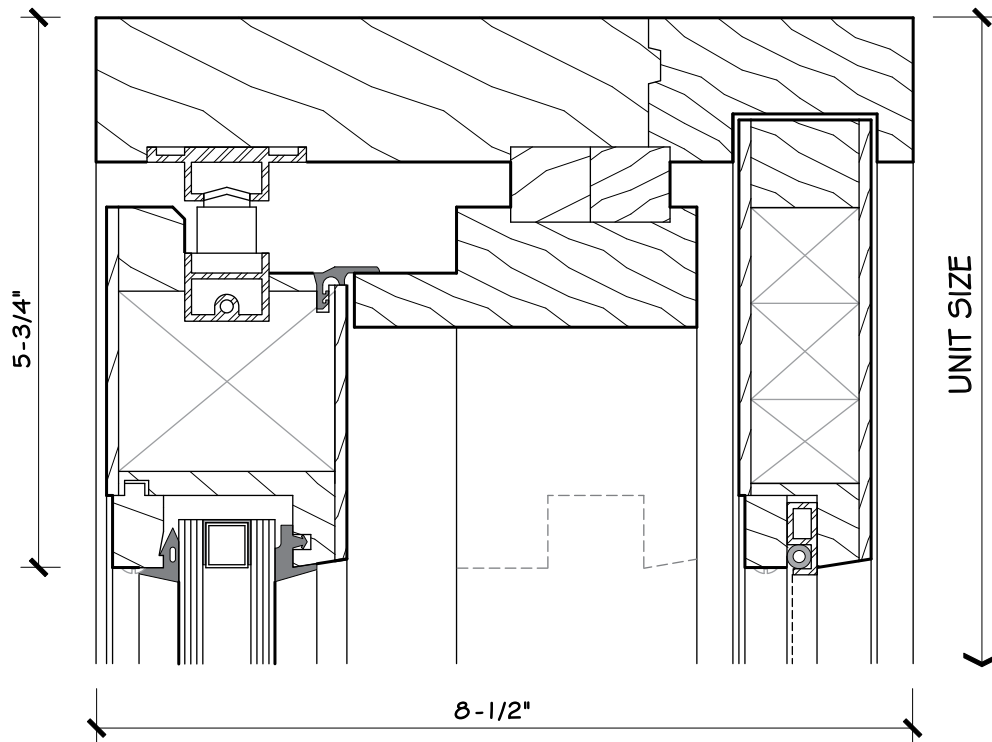
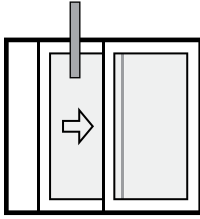
Minimum frame depth*: 6 1/4"
(OX configuration without screen
door)

Maximum frame depth varies by
configuration.

* Contact factory for frame depths
less than 6 1/4".



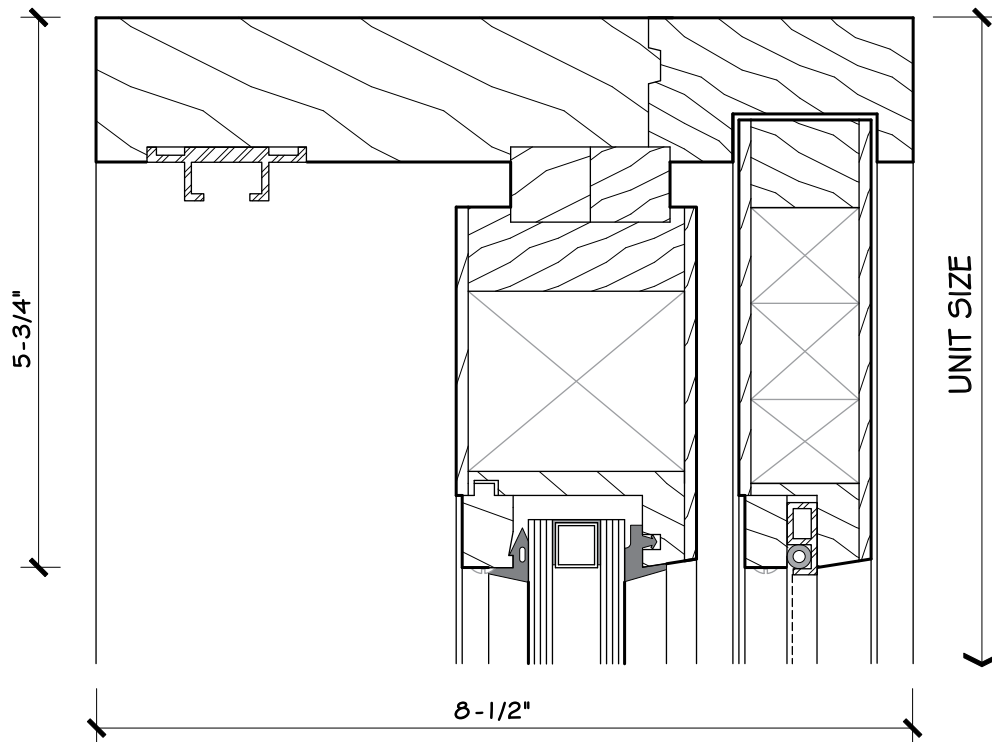
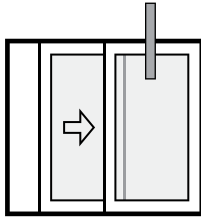
LIFT/ROLL DOOR – OPERABLE HEAD



Operable Head
½ Full Size



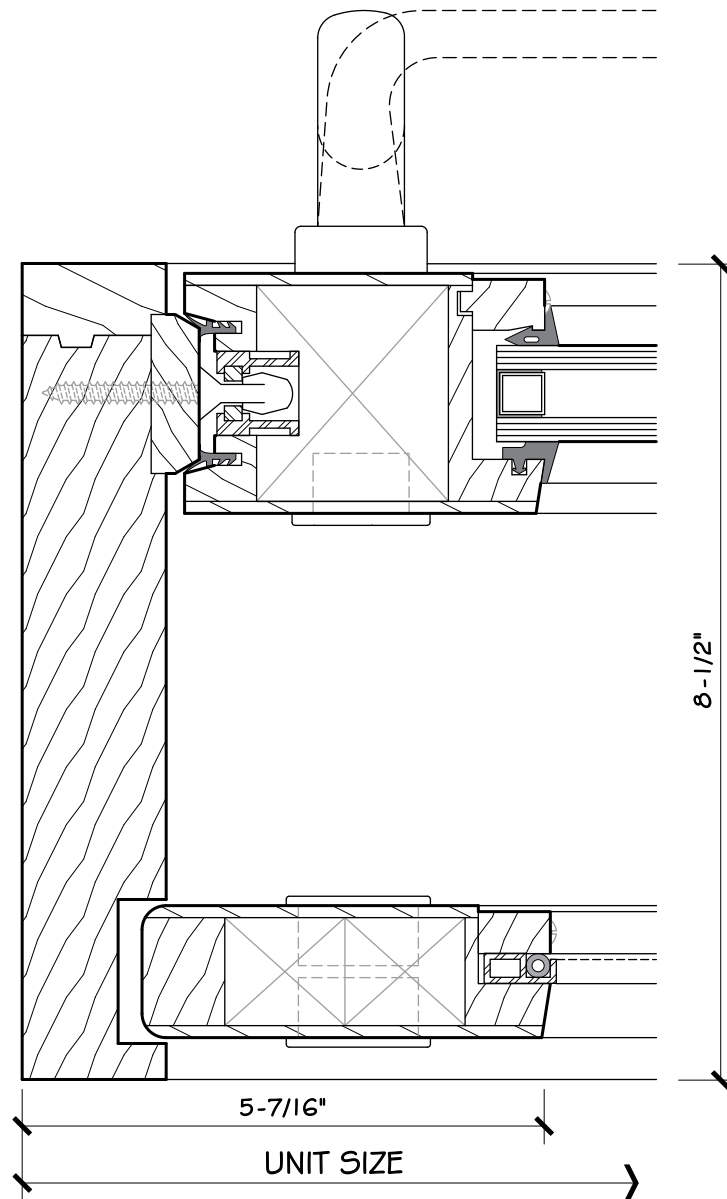
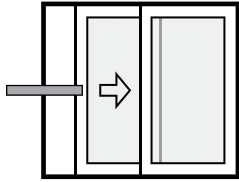
LIFT/ROLL DOOR – FIXED HEAD



Fixed Head
½ Full Size



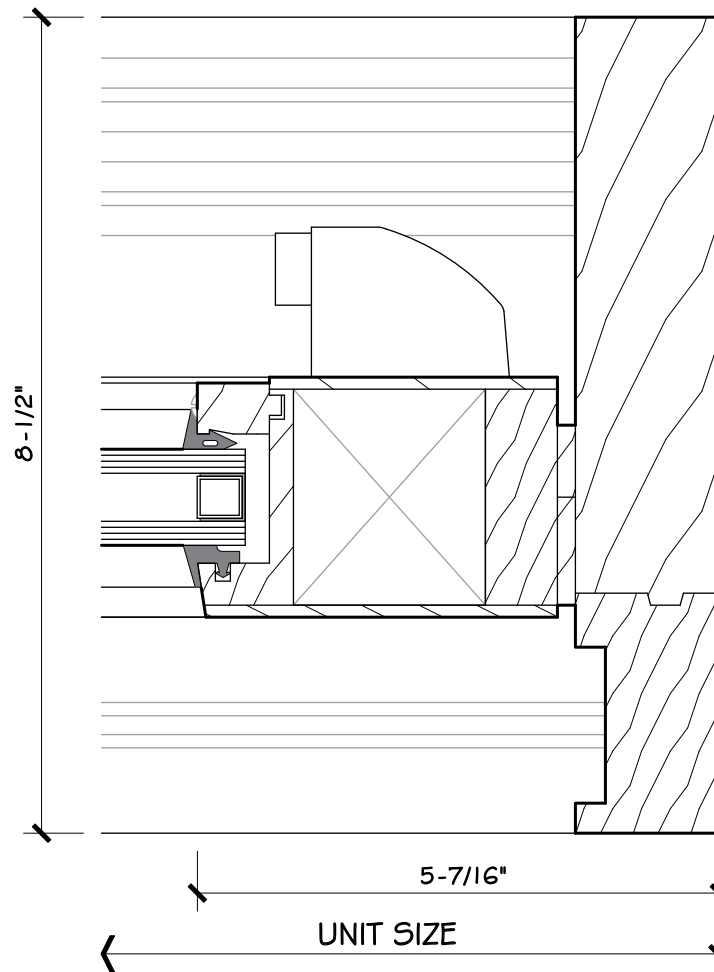
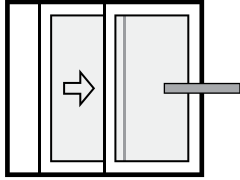
LIFT/ROLL DOOR – OPERABLE JAMB



Operable Jamb
½ Full Size



LIFT/ROLL DOOR – FIXED JAMB

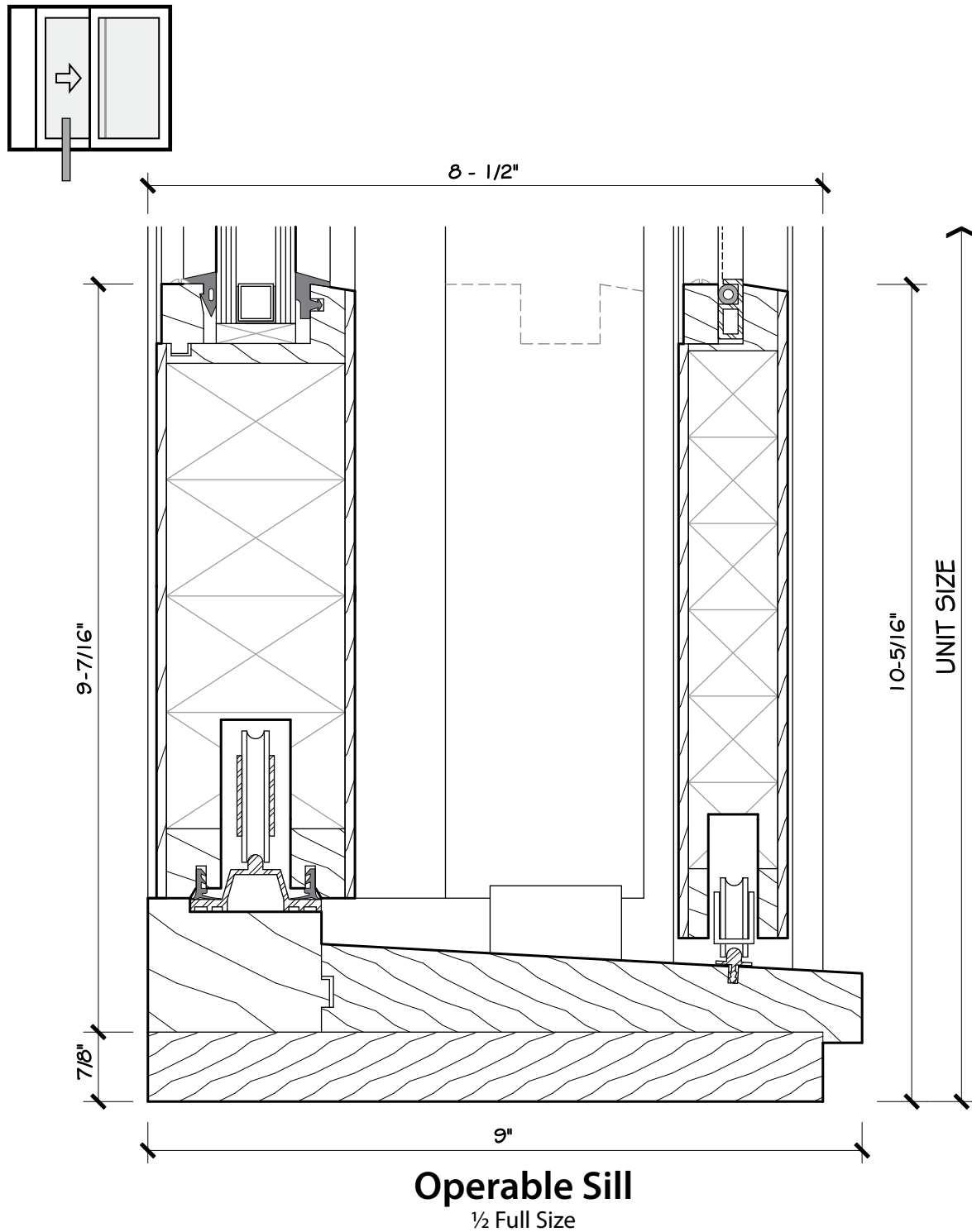


Fixed Jamb

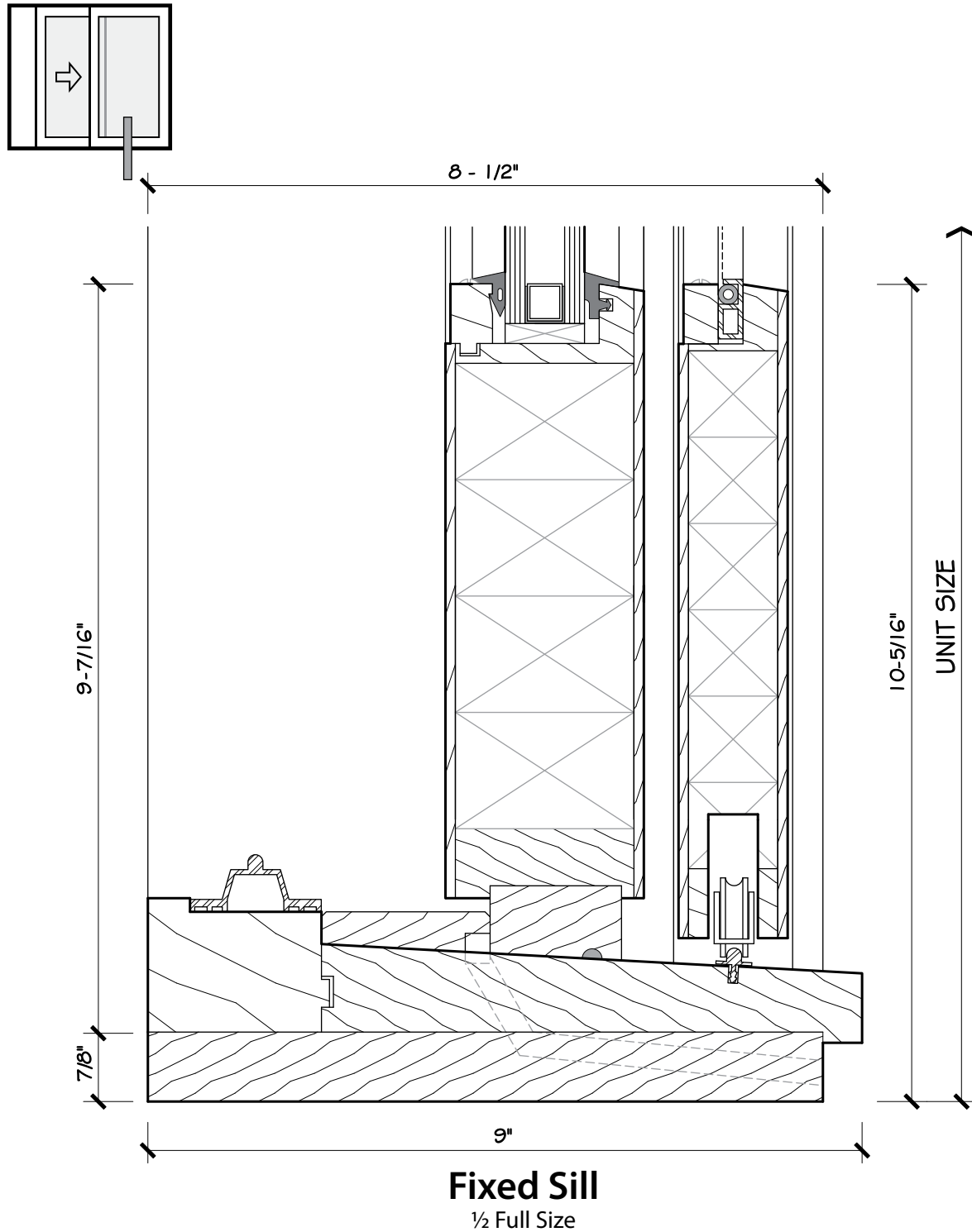
½ Full Size



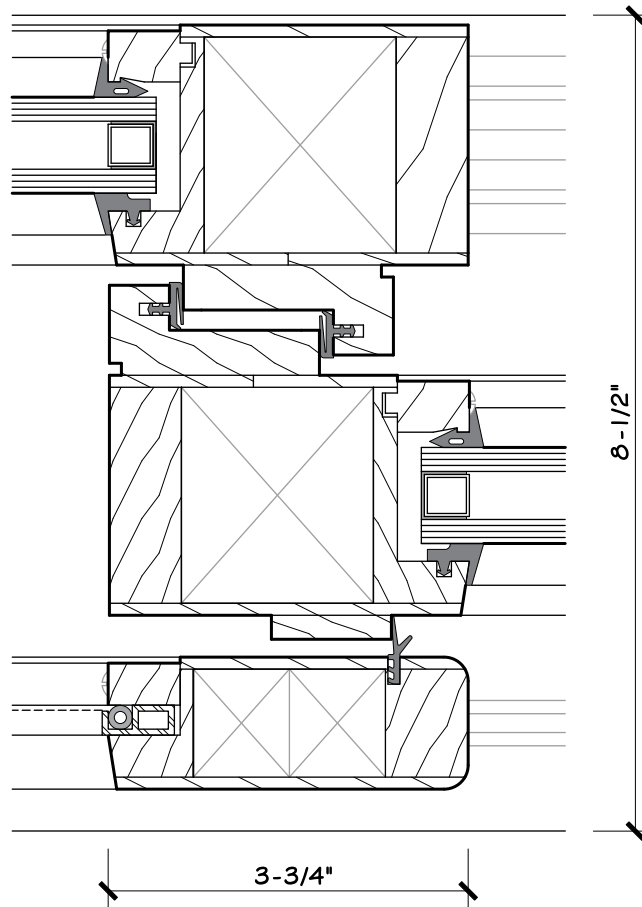
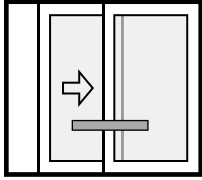
LIFT/ROLL DOOR – OPERABLE SILL



LIFT/ROLL DOOR – FIXED SILL



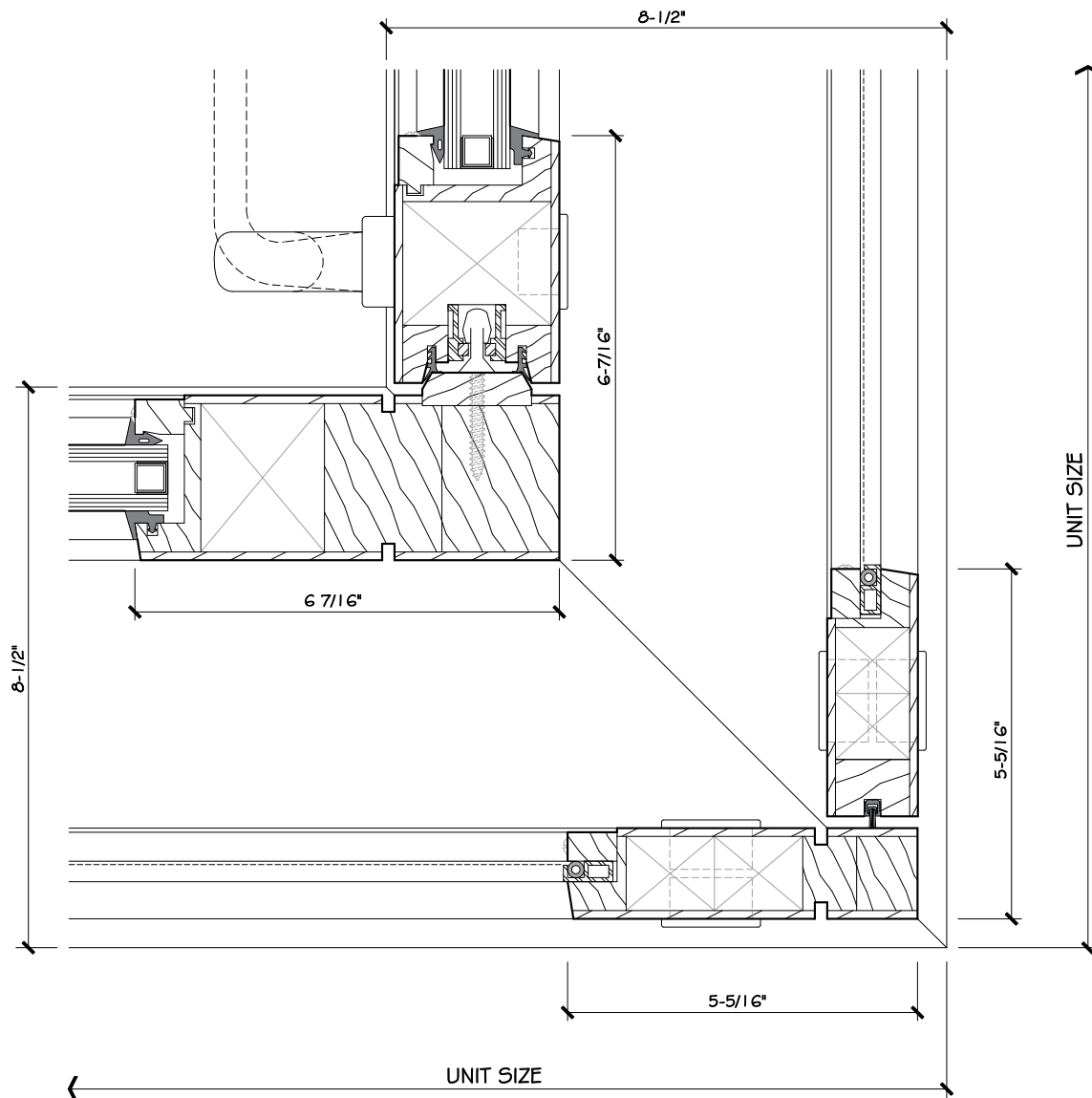
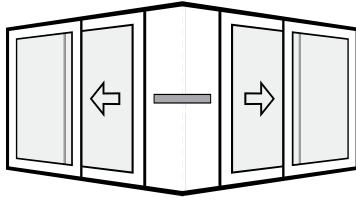
LIFT/ROLL DOOR – MEETING STILE



Meeting Stile
1/2 Full Size



LIFT/ROLL DOOR – 90° CORNER



90° Corner

Not to scale



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Approved for hurricane impact applications. See Test Results section for additional information.

LIFT/ROLL POCKET DOOR

Hardware

Operating Assembly

Door panels ride on carriages consisting of two sets of twin rollers mortised into the bottom of each moving panel. The door is raised onto its carriage by rotating the operating lever handle 180°. Lifting gear connected to a tie rod transmits motion to the carriage, lifting door. Based on G-U 933 or FFI Lift/Roll operating hardware.

Finishes: Internal carriage assembly (drive bars, wheel hub, shafts, rivets), lock kit, link rods, and connectors in zinc chromate coated steel or 304 stainless steel.

Lock face and edge stile cover are clear anodized (EV-1) or dark bronze anodized (EV-5) aluminum.

External guides and tracks are clear anodized (EV-1) or dark bronze anodized (EV-5) aluminum).

Escutcheons / Lever Handles

Escutcheons and lever handles are available in a variety of styles and configurations from various manufacturers.

Configurations include levers inside and outside; lever inside, finger pull outside; thumb turn lock inside, profile cylinder outside; profile cylinder inside and outside.

Finishes: A variety of finishes are available from various manufacturers.

Flush Sill / FASTrack Assembly

Flush sill detailing available for pocketing door assemblies. Track system includes stainless steel track blades and solid brass track bridge assemblies. As all flush systems are custom, contact factory for detailing.

Optional Hardware

Screen doors, bronze tracks, aluminum thresholds, removable handles.

Standard Configurations

X = Operable panel, O = Fixed panel, P = Pocket

PX PXXP PXX PXXXXP PXOXP

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from 1/8" single glazed to a maximum of 1" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder.

Clear glass opening: Unit height minus 14 1/8". For clear glass width, contact factory.

Weather-Stripping

Doubled, continuous extruded silicone flap gasket set in rebate around the perimeter of the door leaf. Rotating the multi-latchpoint lever handle lowers the door and compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum: 48"
for PX configuration.
Maximum varies per
configuration

HEIGHT: Minimum: 74"
Maximum: 120"

ADA Compliance

Clear-opening sizing assumes a single panel PX configuration and is based on 32" clear width requirement.

Minimum overall unit width: 70"
(includes pocket)

NOTE: Standard wood threshold may not meet ADA maximum height requirements.

Consult factory with specific clearance questions

Frame Depths Leaf Thickness

Standard primary door
leaf thickness: 2 1/2"

Standard screen door
leaf thickness: 1 3/8"

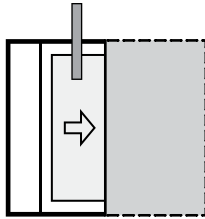
Minimum frame depth*: 6 1/4"
(PX configuration without screen door)

Maximum frame depth varies by configuration.

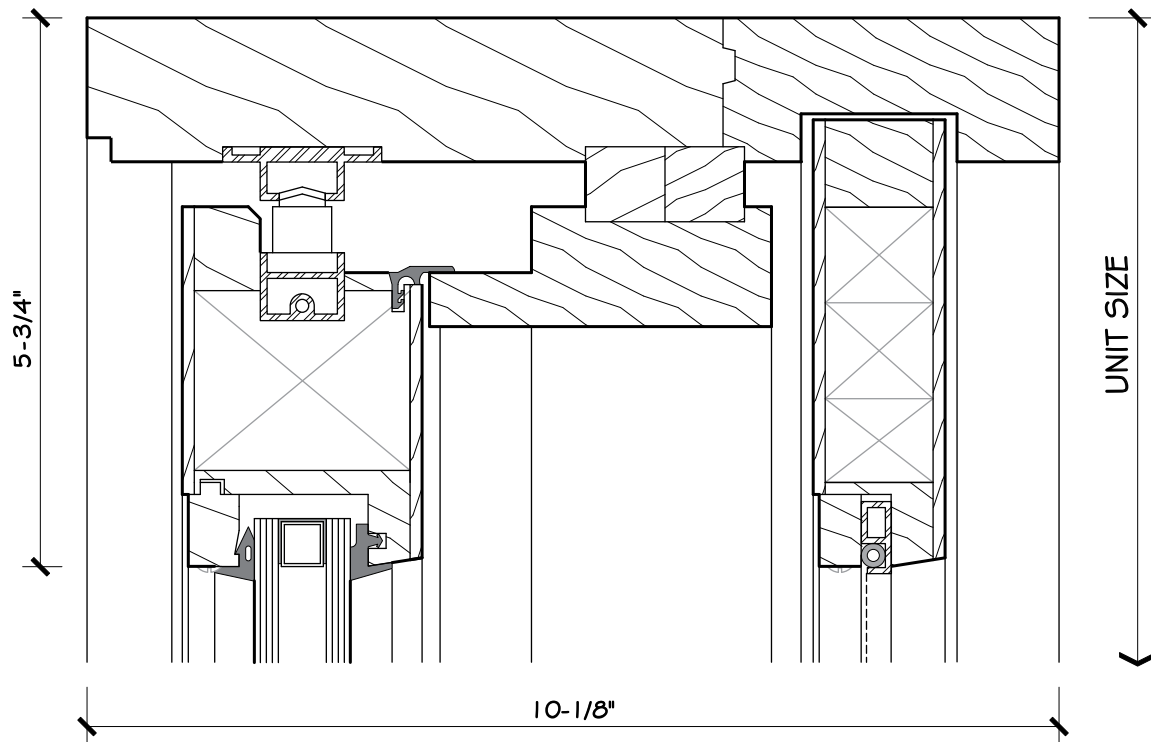
* Contact factory for frame depths less than 6 1/4".



LIFT/ROLL POCKET DOOR – OPERABLE HEAD



These details show a one-panel pocket configuration. We build multiple-panel pockets as the application requires.

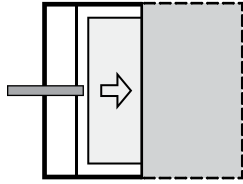


Operable Head

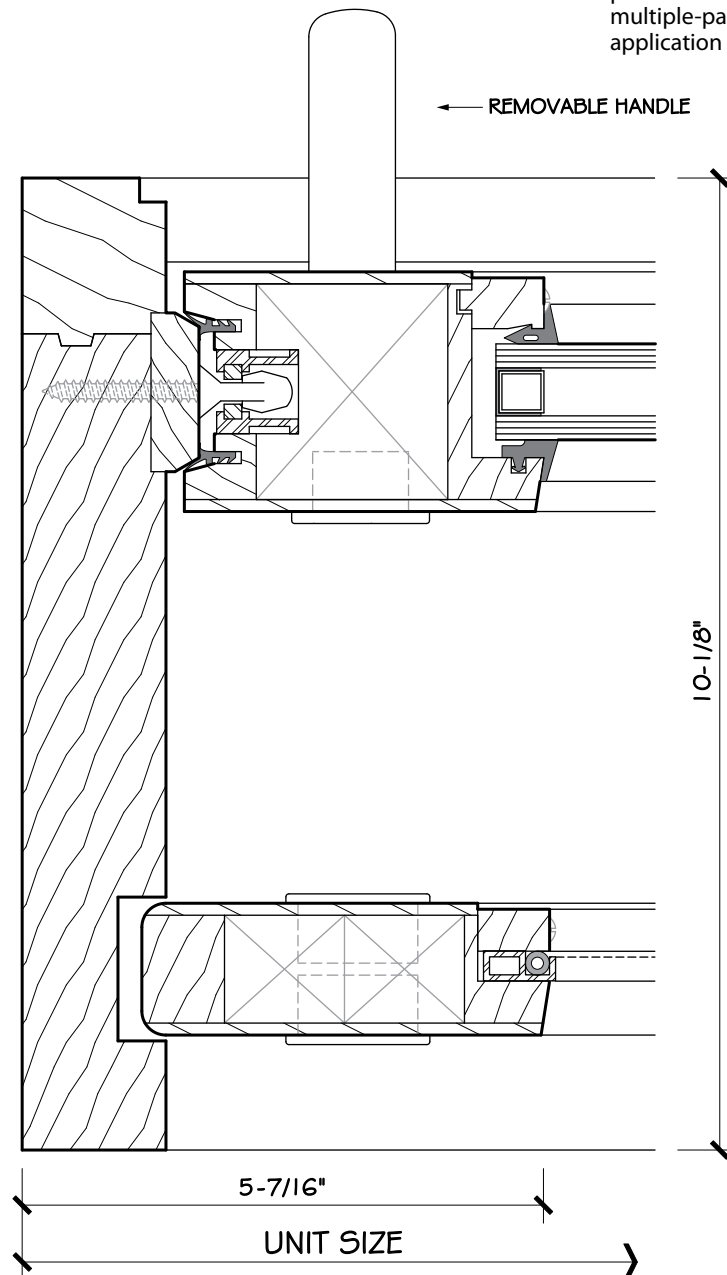
½ Full Size



LIFT/ROLL POCKET DOOR – OPERABLE JAMB



These details show a one-panel pocket configuration. We build multiple-panel pockets as the application requires.

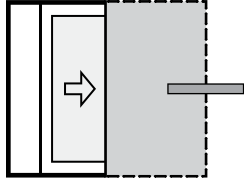


Operable Jamb

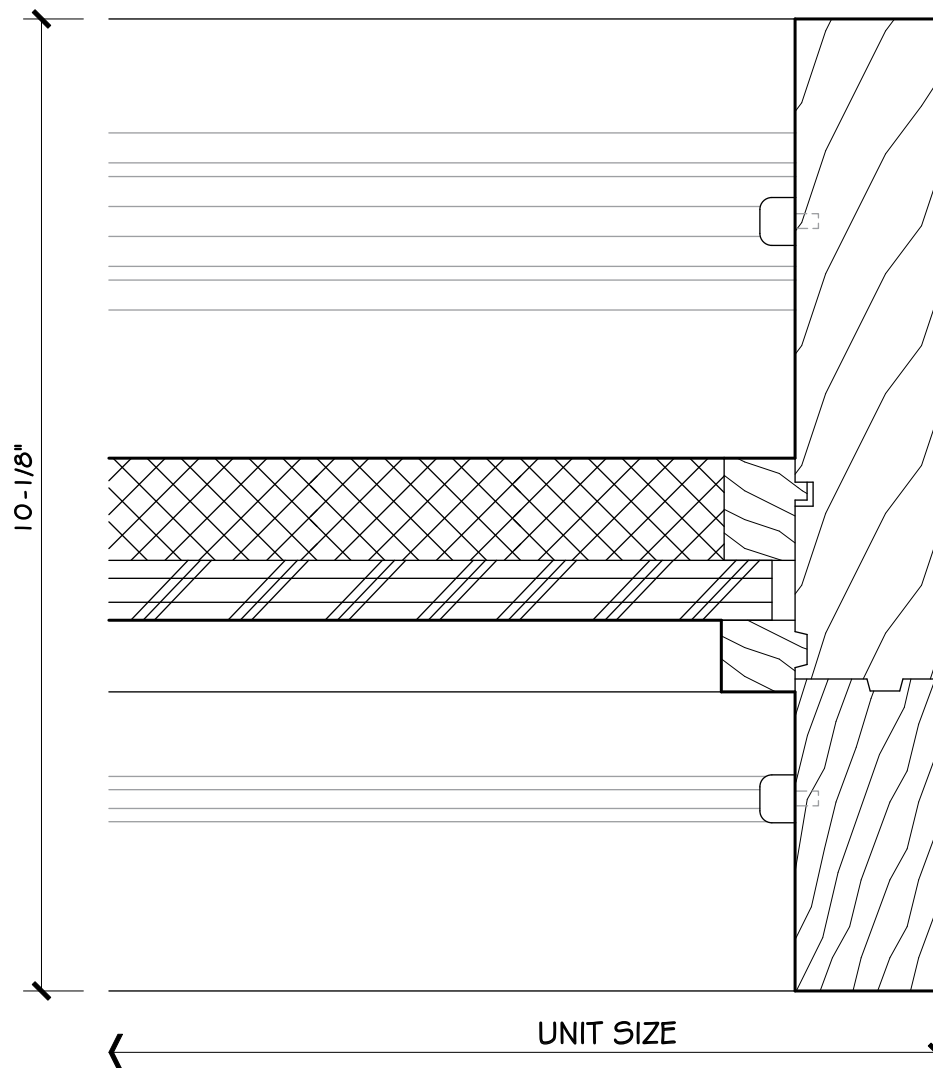
1/2 Full Size



LIFT/ROLL POCKET DOOR – FIXED JAMB



These details show a one-panel pocket configuration. We build multiple-panel pockets as the application requires.

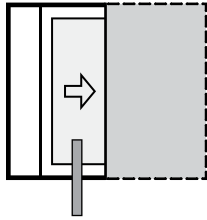


Fixed Jamb

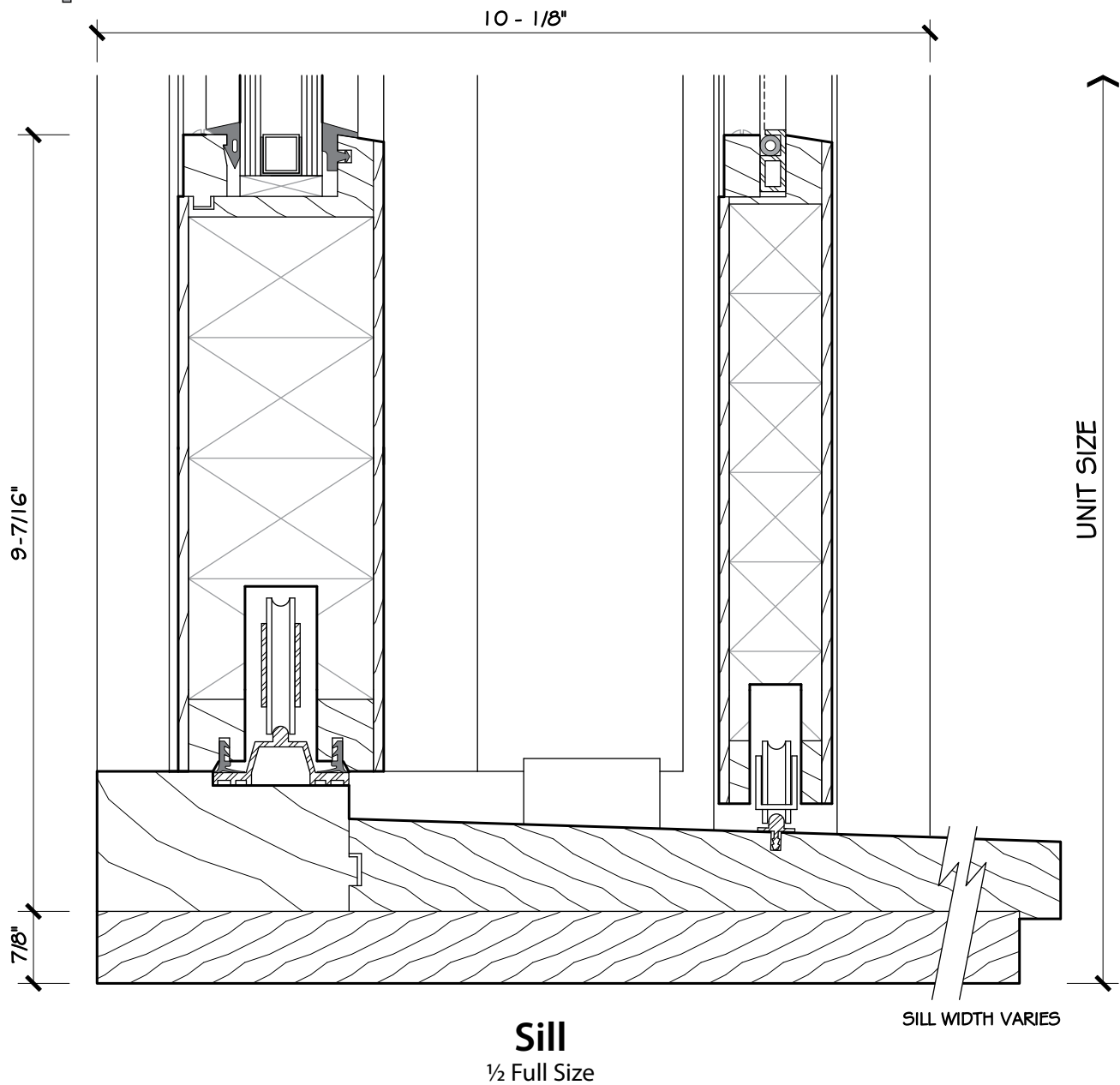
½ Full Size



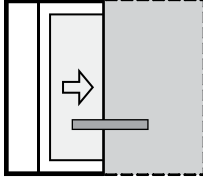
LIFT/ROLL POCKET DOOR – SILL



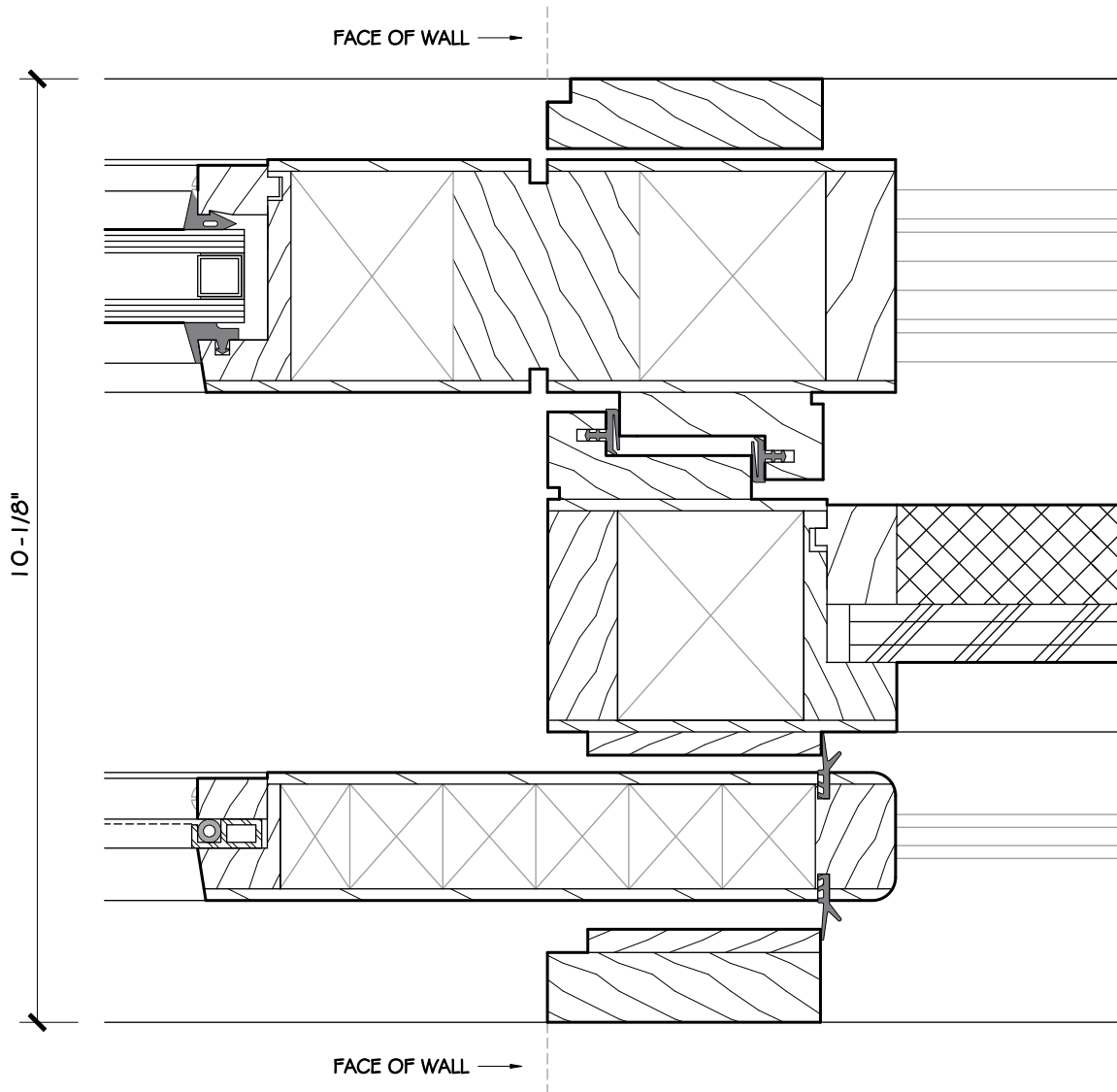
These details show a one-panel pocket configuration. We build multiple-panel pockets as the application requires.



LIFT/ROLL POCKET DOOR – MEETING STILE DOORS CLOSED



These details show a one-panel pocket configuration. We build multiple-panel pockets as the application requires.

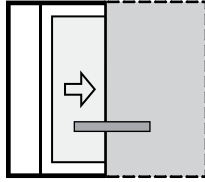


Meeting Stile – Doors Closed

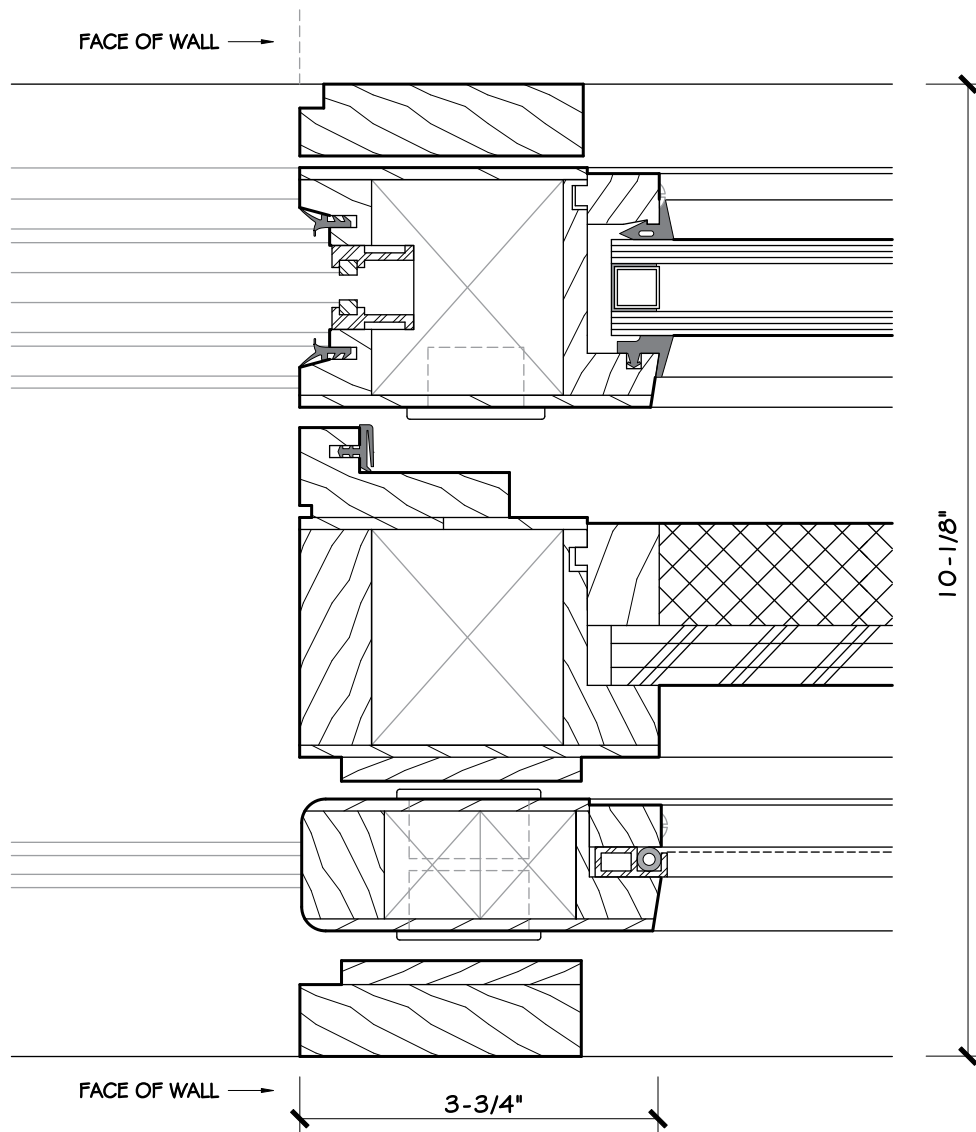
½ Full Size



LIFT/ROLL POCKET DOOR – MEETING STILE DOORS OPEN



These details show a one-panel pocket configuration. We build multiple-panel pockets as the application requires.



Meeting Stile – Doors Open
½ Full Size



DATA AND DETAILS – STANDARD

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SLIDE/FOLD DOOR

Hardware

Operating Assembly

Centor E3 sliding/folding hardware system. Doors are top hung, with carrier assemblies mounted at head of each moving panel. Three-knuckle ball-bearing butt hinges, D ring handle/pulls, top and bottom flush-mount shoot bolts mortised into face of stiles to provide 2-point latching for folding panels. Swing pass door (where applicable) of heavy duty doweled joinery includes GU Eagle multi-latchpoint operating hardware, FSB1035 lever handle and 1410-9005/9006 escutcheons.

Finishes: Centor handles, hinges, carriers, and drop bolts in brushed stainless steel or oil-rubbed bronze powder coat.

Head tracks, sills, and floor guide channels in extruded aluminum in bronze or satin anodized finish.

Escutcheons / Lever Handles – Swing Door

FSB escutcheons and lever handles on swing pass door in oil patina bronze or satin stainless steel.

Finishes: Brushed chrome or oil-rubbed bronze.

Hinges

Stainless steel or oil-rubbed bronze powder coat.

Standard Configurations

Configuration designations (as viewed from exterior):

First digit / letter combination: number of panels and direction panels stack (L = left).

Second digit / letter combination: number of panels and direction panels stack (R = right).

Example: 3L4R = 3 panels stacking to left, 4 panels stacking to right.

2L 2L1R 3L 3L1R 4L 4L1R 3L2R 5L 3L3R 7L 4L3R 5L2R 5L3R 2R 1L2R 3R 1L3R 2L2R 1L4R 4R

2L3R 5R 3L4R 7R 2L5R 8R

Maximum panel weight: 176lbs

Maximum number of doors: Eight in each direction (52'-0")

All configurations are exterior stacking – consult factory for availability of interior stacking.

Glazing

All glazing is per project specifications. Duratherm can accommodate most configurations and make-ups from 1/8" single glazed to a maximum of 1" security glass. Refer to the Glass and Glazing Guide in the Introduction section of this binder. Contact the factory for customized glazing and glass stop configurations.

Clear glass opening: Unit height minus 15%. For clear glass width, contact factory.

Weather-Stripping

Double extruded silicone flap gasket set in rebate in doorframe at head, jambs, meeting stiles, and bottom rails of door panels. Engaging the shoot bolts on sliding panels and the multi-latchpoint lever espagnolettes on swing panel compresses the weather-strip to ensure a tight seal.

Sizing

The minimums and maximums shown are intended as guidelines. For applications that exceed these ranges, please contact the factory for assistance.

General

WIDTH: Minimum panel: 16"
Maximum panel: 39"
HEIGHT: Minimum: 34"
Maximum: 118"

ADA Compliance

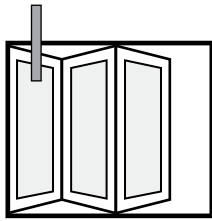
Clear-opening sizing based on 32" clear width requirement.
Minimum unit width: 35½"
NOTE: Standard threshold may not meet ADA maximum height requirements.
Flush floor channel sill detailing available for ADA compliant installations.
Consult factory with specific clearance questions

Frame Depths Leaf Thickness

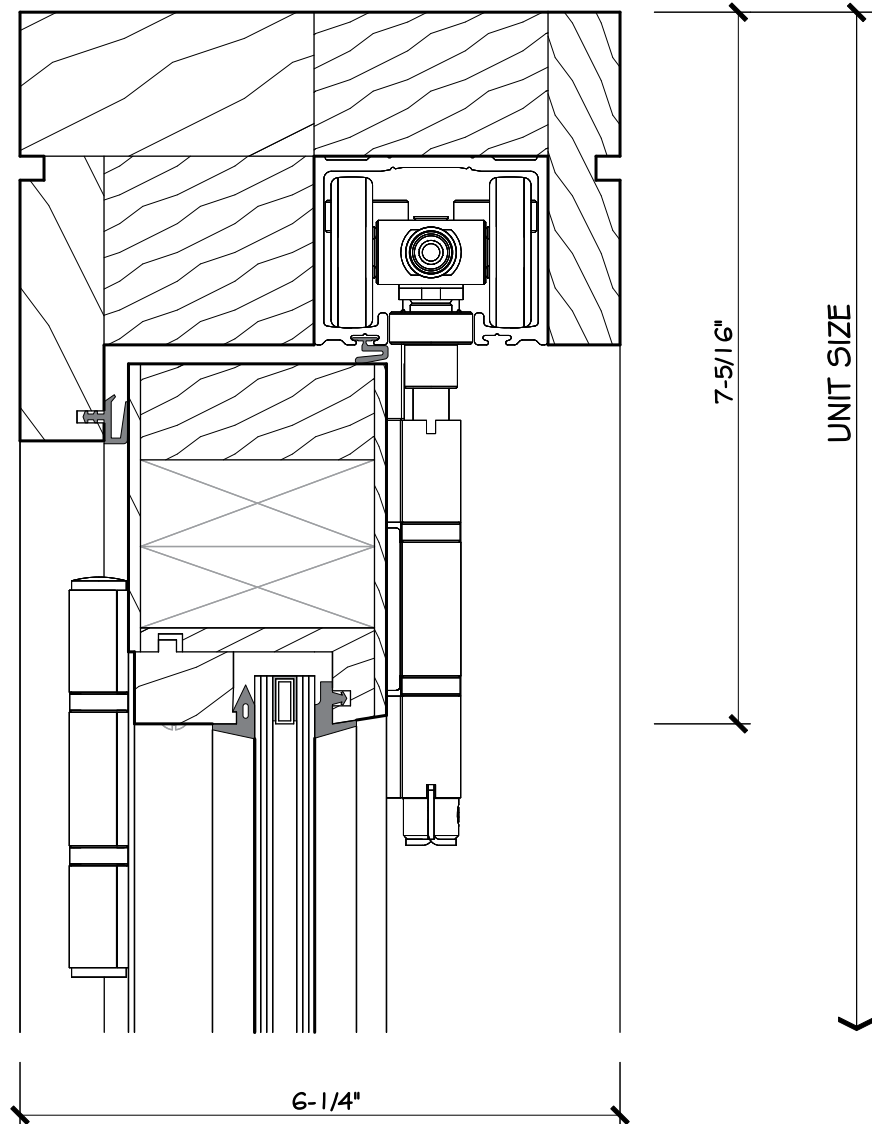
Leaf thickness: 2 1/16"
Frame depth: 6 1/4"
Minimum frame depth *: 5 3/8"
Maximum frame depth: 10"
* Contact factory for frame depths less than 6 1/4".



SLIDE/FOLD DOOR – HEAD SLIDING PANEL



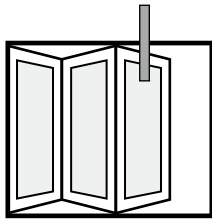
3L CONFIGURATION



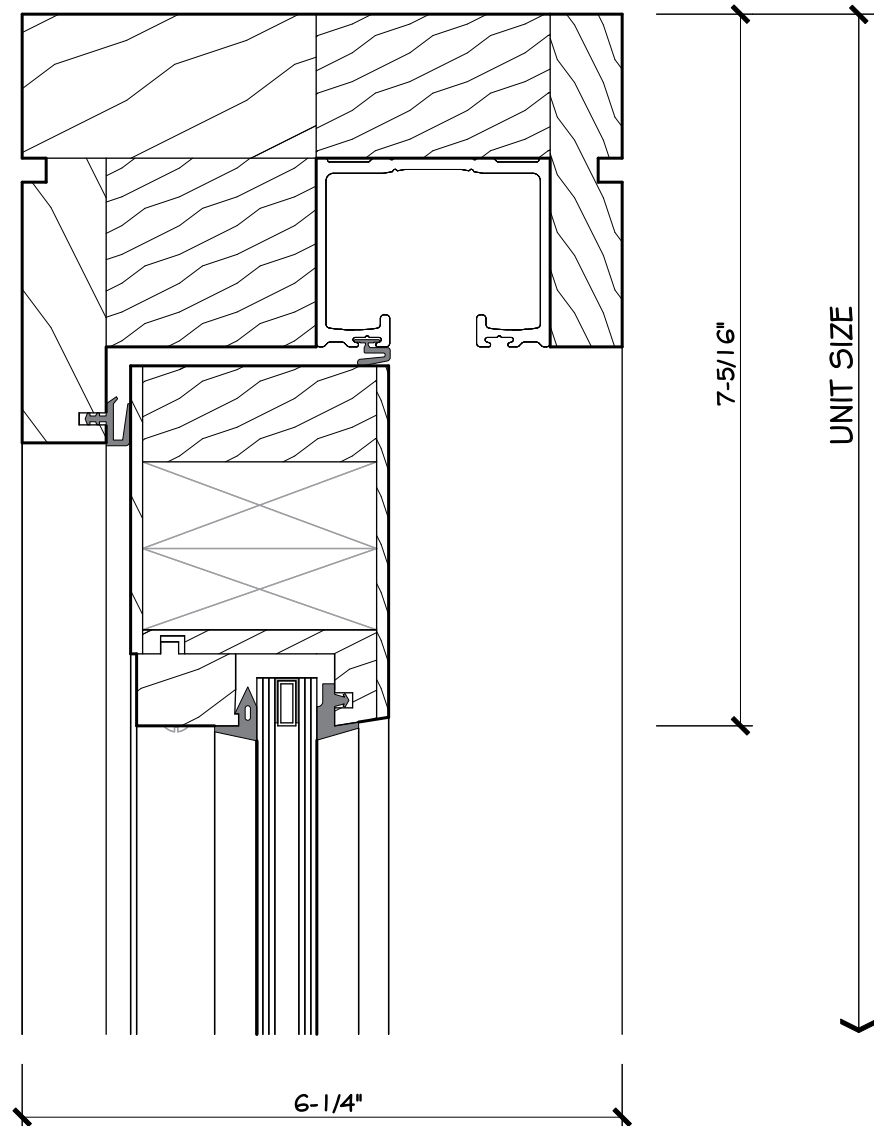
Head Sliding Panel
½ Full Size



SLIDE/FOLD DOOR – HEAD SWING PANEL



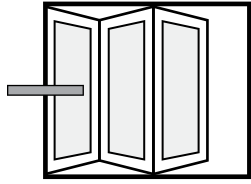
3L CONFIGURATION



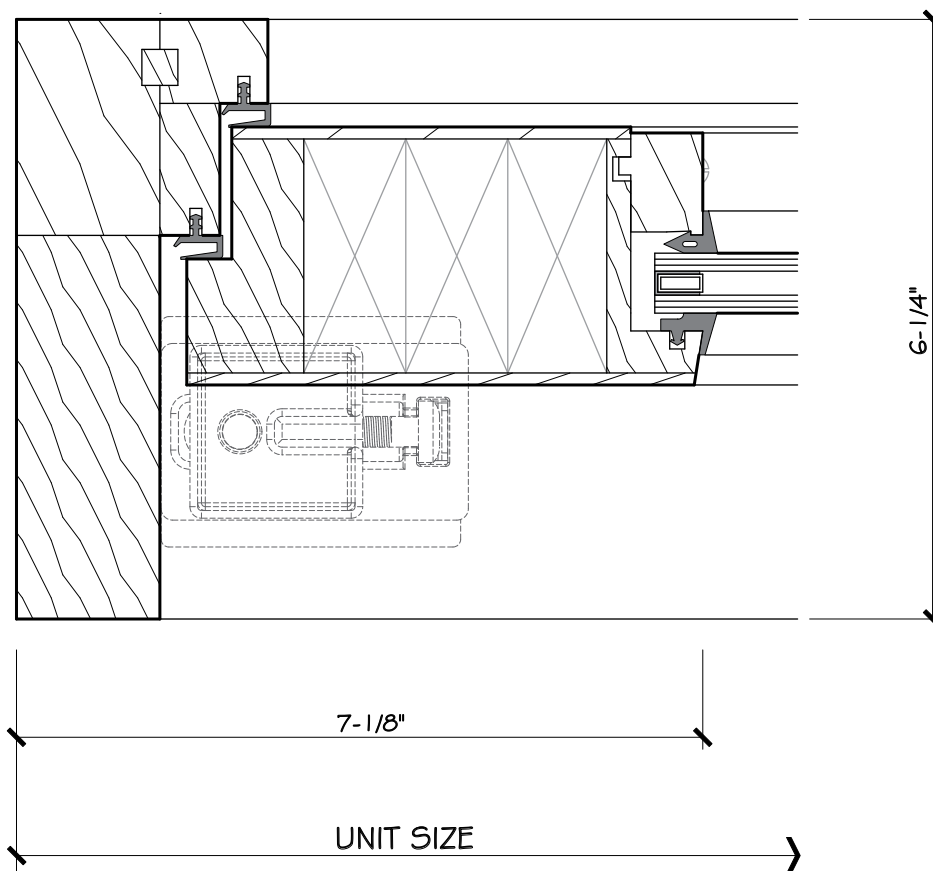
Head Swing Panel
½ Full Size



SLIDE/FOLD DOOR – JAMB HINGE



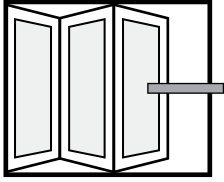
3L CONFIGURATION



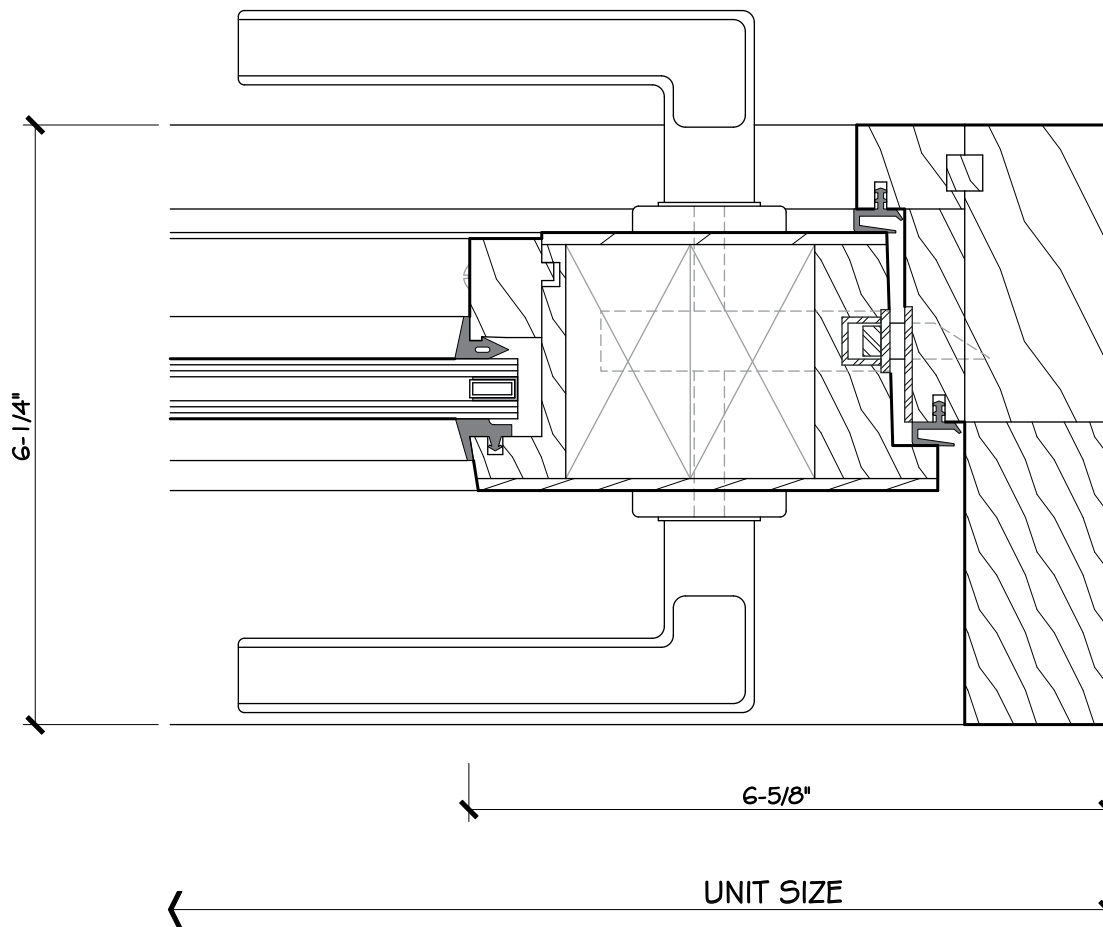
Jamb Hinge
½ Full Size



SLIDE/FOLD DOOR – JAMB SWING PANEL



3L CONFIGURATION

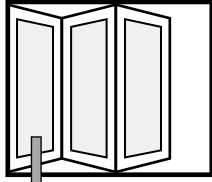


Jamb Swing Panel

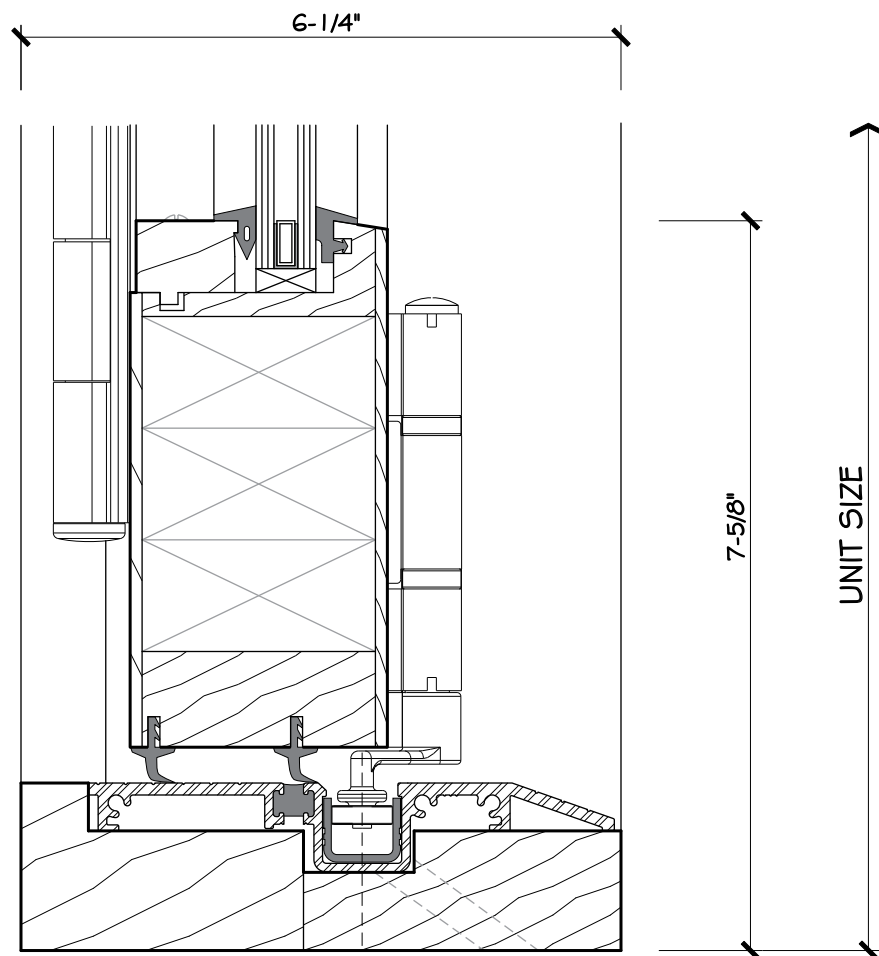
½ Full Size



SLIDE/FOLD DOOR – SILL SLIDING PANEL



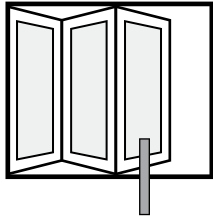
3L CONFIGURATION



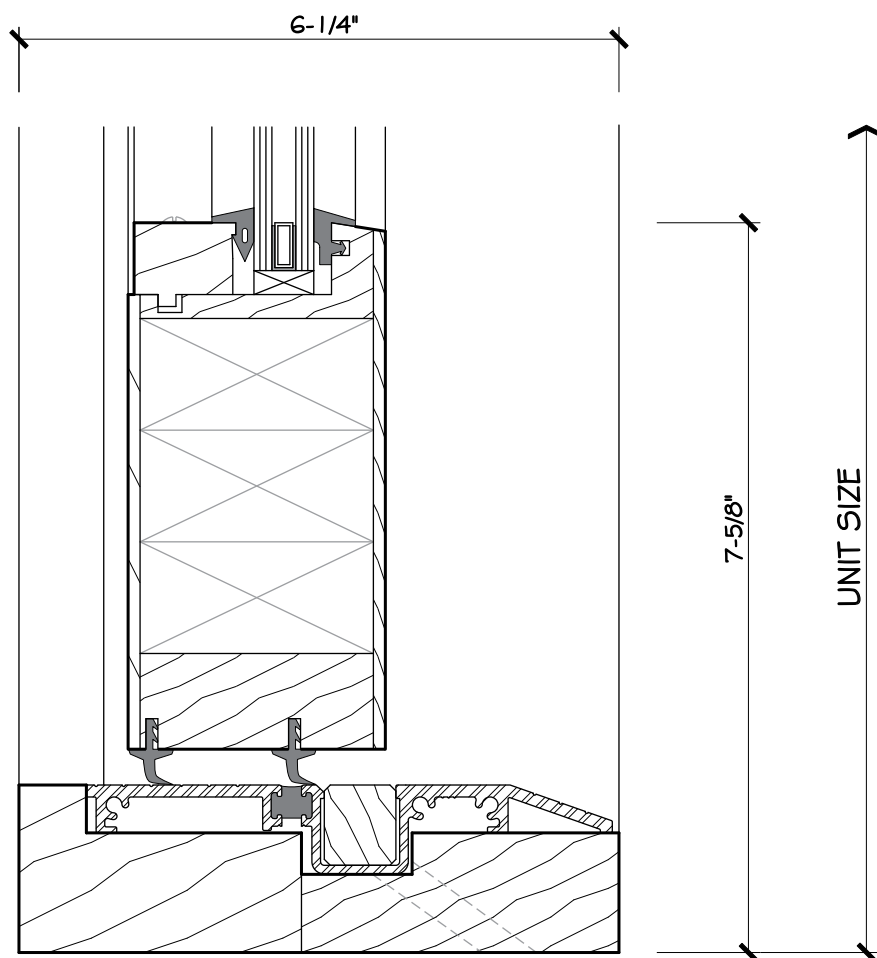
Sill Sliding Panel
½ Full Size



SLIDE/FOLD DOOR – SILL SWING PANEL



3L CONFIGURATION

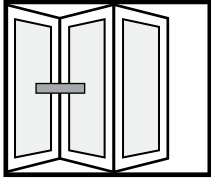


Sill Swing Panel

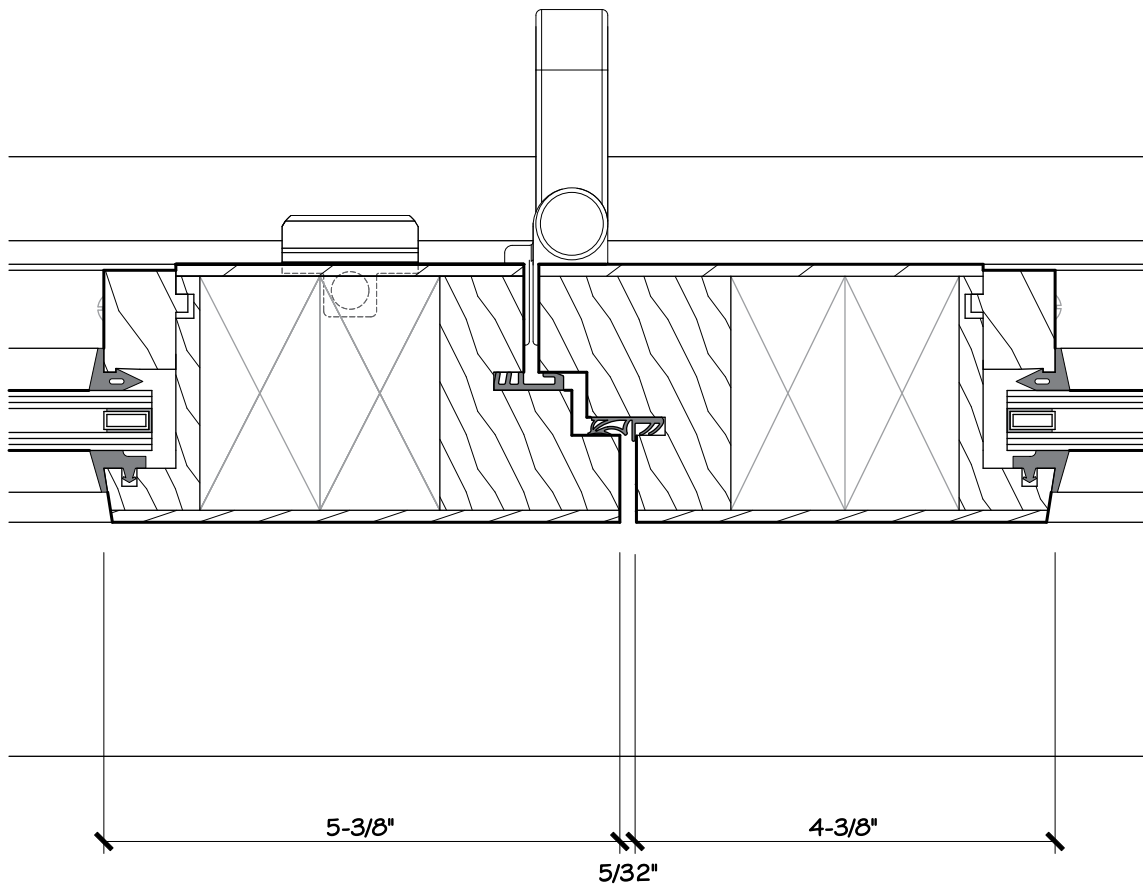
½ Full Size



SLIDE/FOLD DOOR – MEETING STILE INTERIOR HINGED



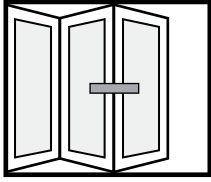
3L CONFIGURATION



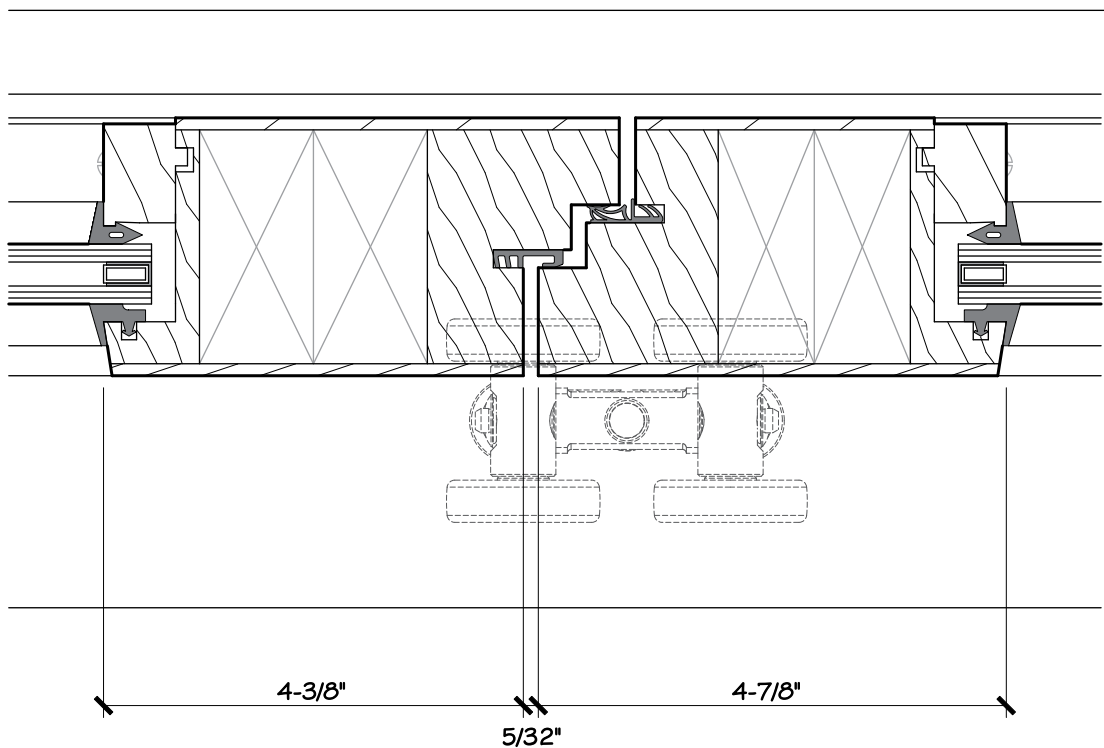
Meeting Stile – Interior Hinged
½ Full Size



SLIDE/FOLD DOOR – MEETING STILE EXTERIOR HINGED



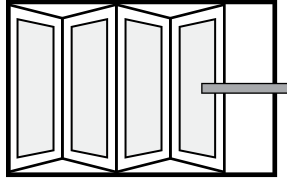
3L CONFIGURATION



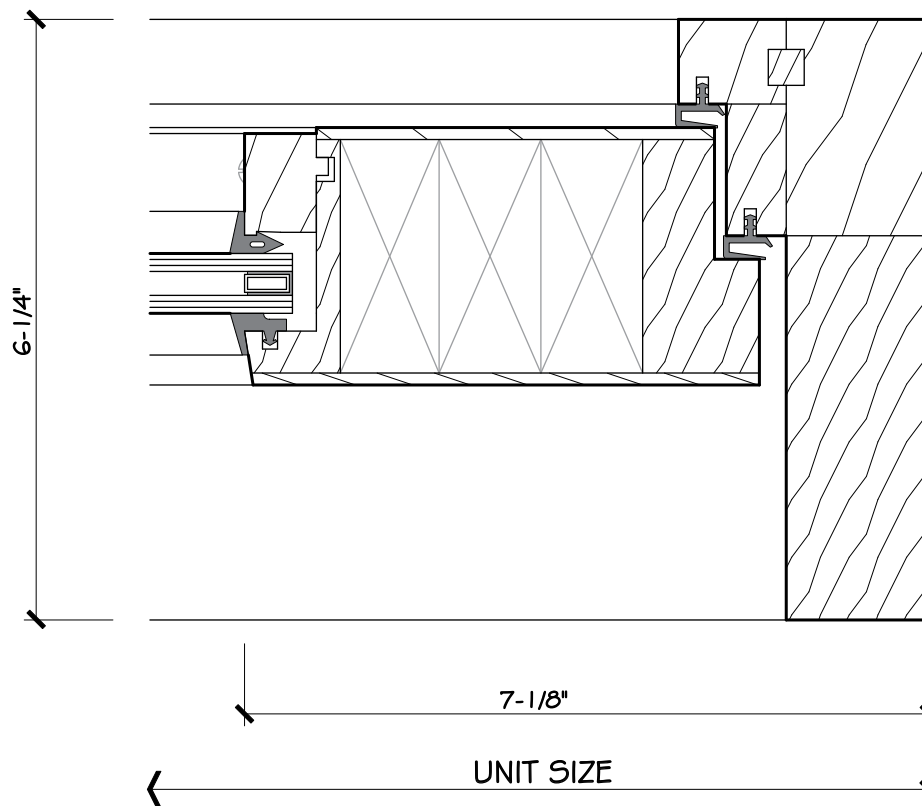
Meeting Stile – Exterior Hinged ½ Full Size



SLIDE/FOLD DOOR – JAMB SLIDING PANEL



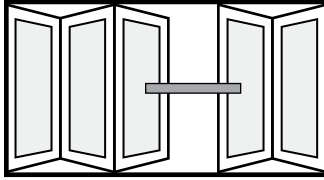
4L CONFIGURATION



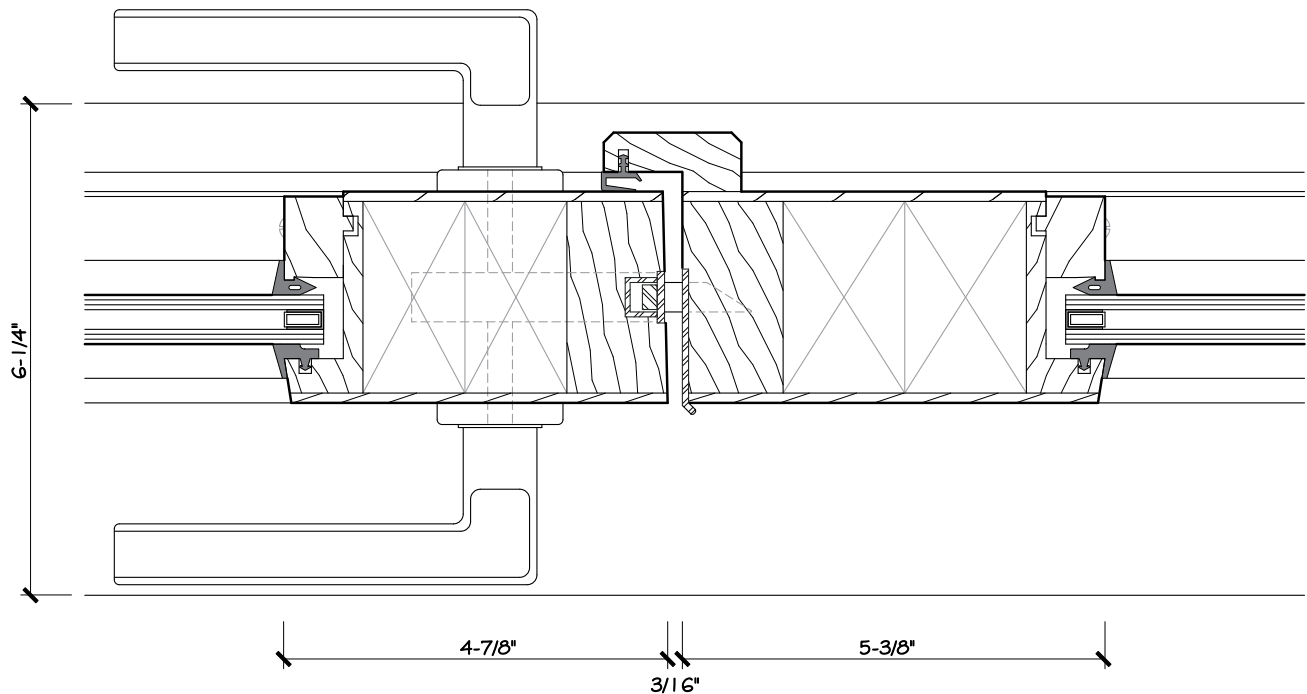
Jamb Sliding Panel
½ Full Size



SLIDE/FOLD DOOR – OPERABLE MEETING STILE



3L2R CONFIGURATION

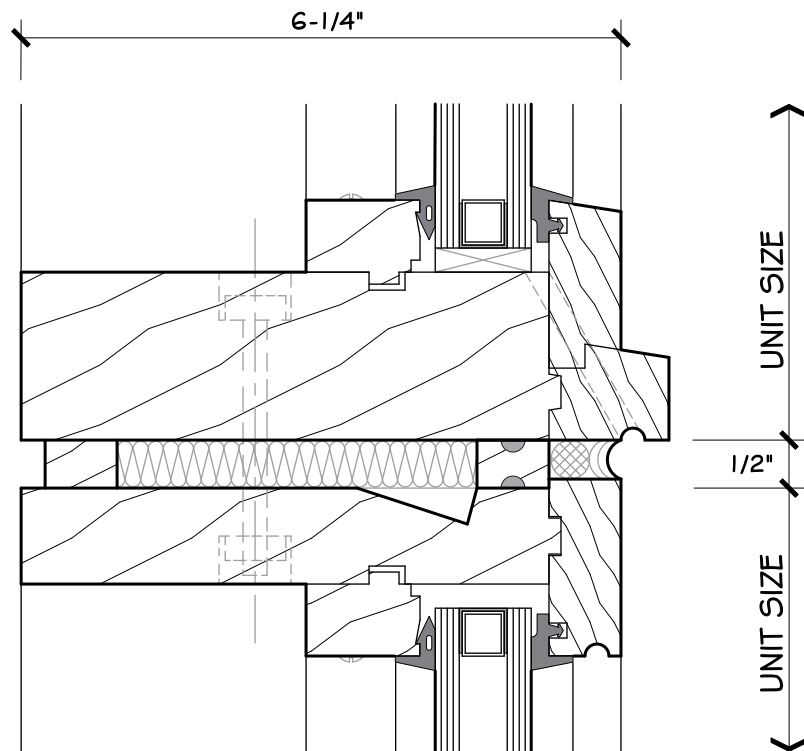


Operable Meeting Stile

Not to scale



HORIZONTAL CLOSE MULLION

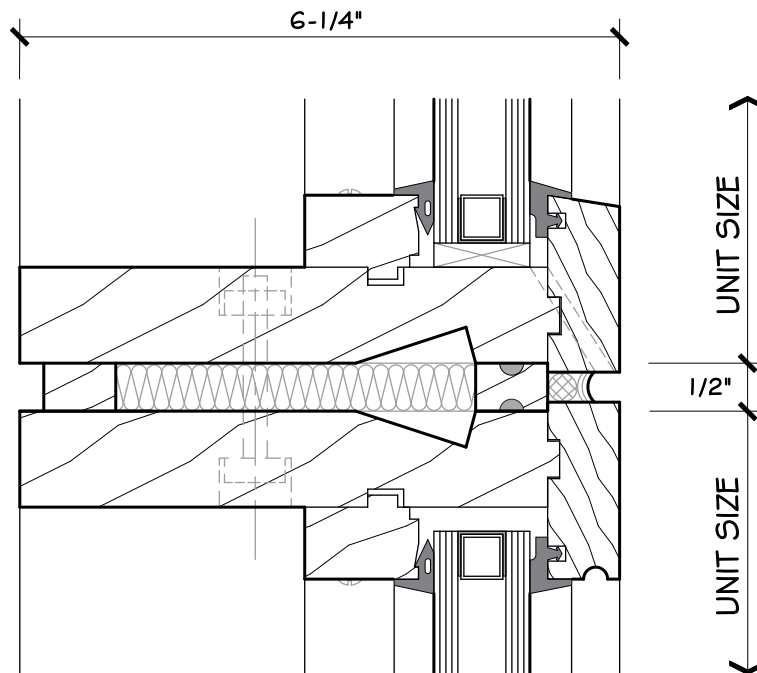


Fixed Frame Over Fixed Frame

½ Full Size



HORIZONTAL CLOSE MULLION

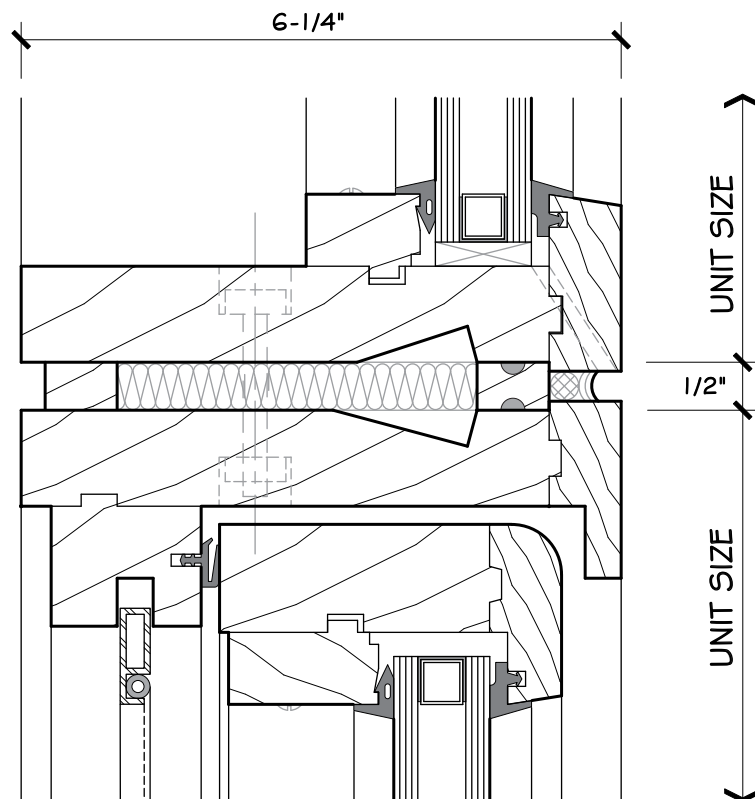


Storefront Over Storefront

½ Full Size



HORIZONTAL CLOSE MULLION

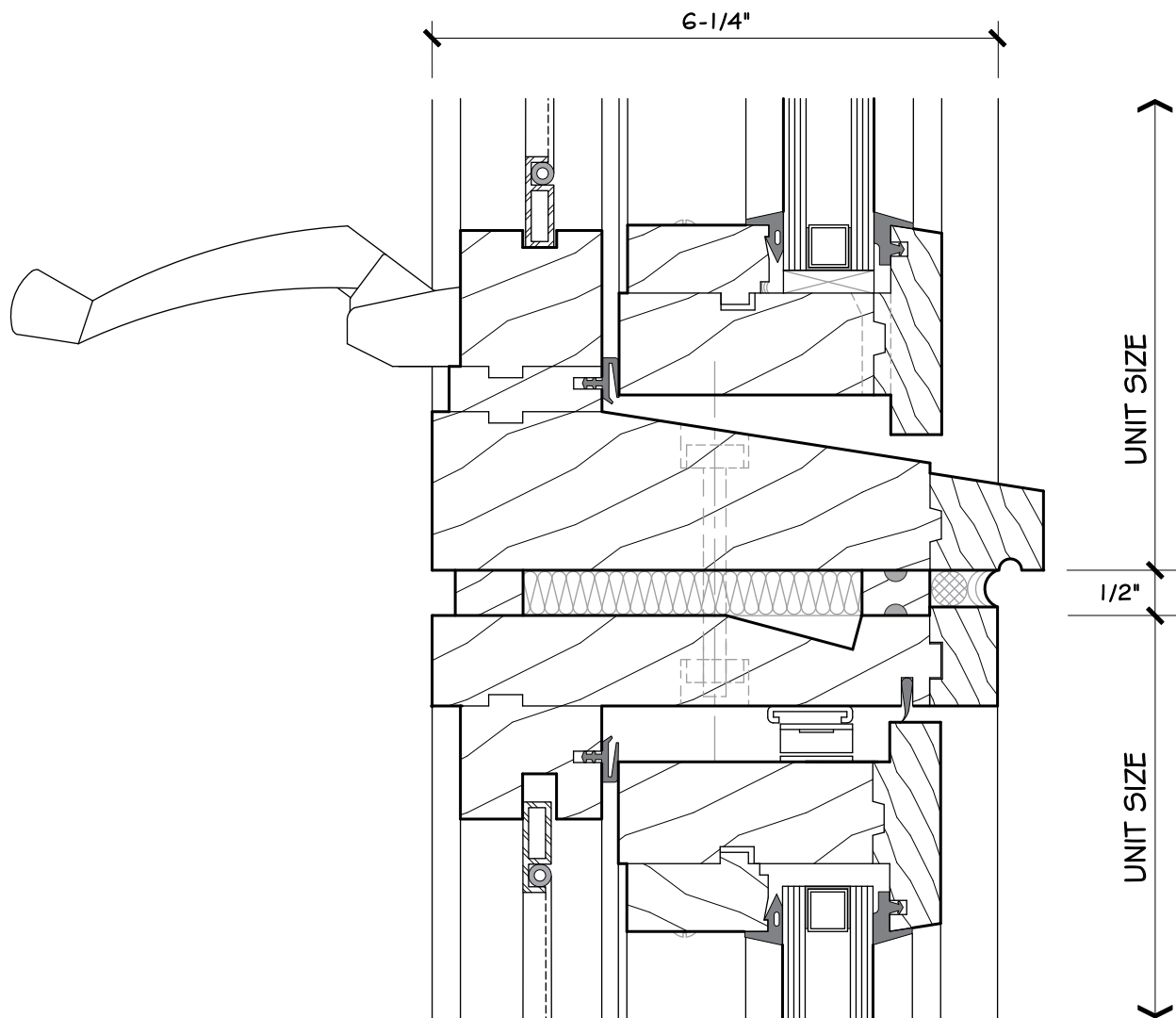


Storefront Over Awning

½ Full Size



HORIZONTAL CLOSE MULLION



Awning Over Casement

1/2 Full Size



Technical cross-section drawing of a window unit. The drawing shows the internal structure, including the frame, sash, and various seals and hardware. Key dimensions are indicated:

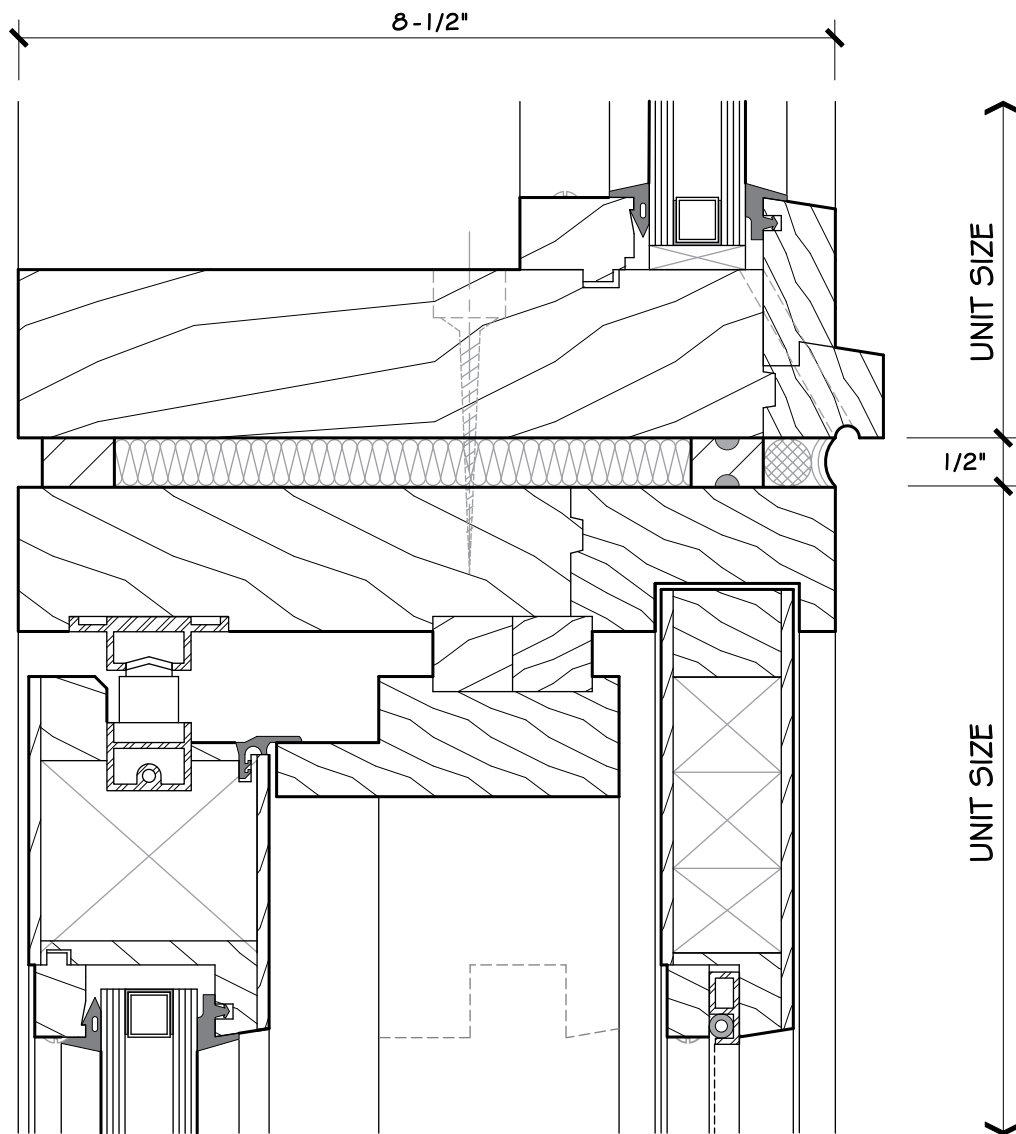
- Overall width: $6\text{--}1/4"$
- Unit size (height): $1/2"$
- Unit size (width): $1/2"$

The drawing includes various hatching patterns to represent different materials and components, such as the frame, sash, and seals. A dashed line indicates the center of the unit.

Storefront Over Out-Swing Door



HORIZONTAL CLOSE MULLION

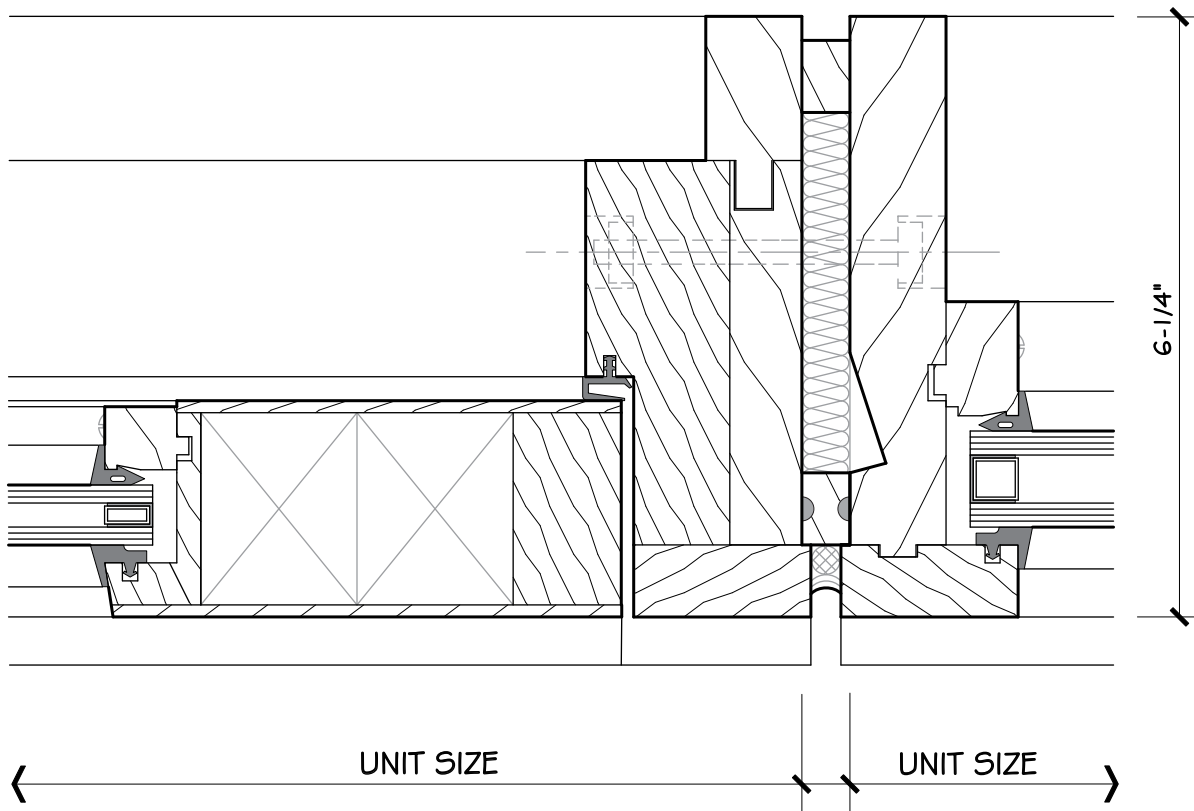


Fixed Frame Over Lift/Roll Door

½ Full Size



VERTICAL CLOSE MULLION

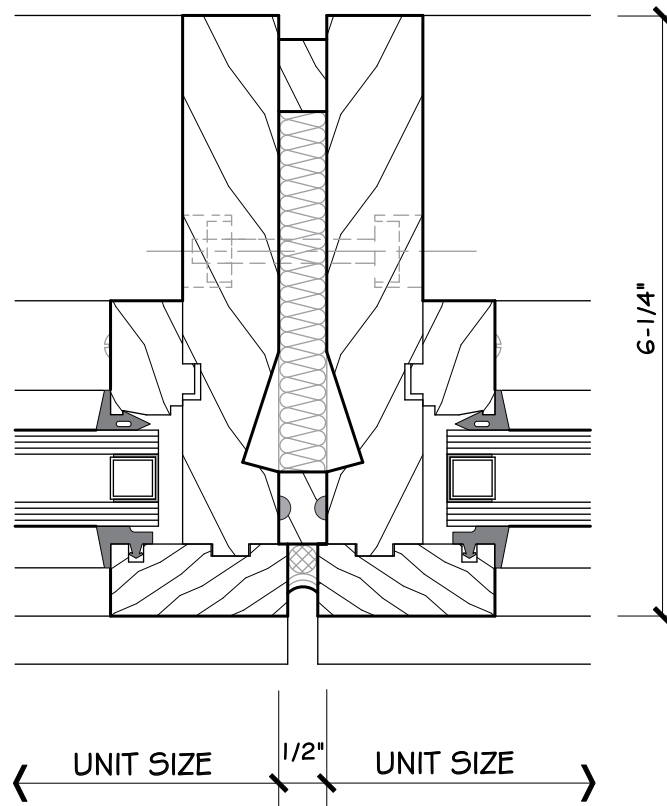


Out-Swing Door – Fixed Frame

½ Full Size



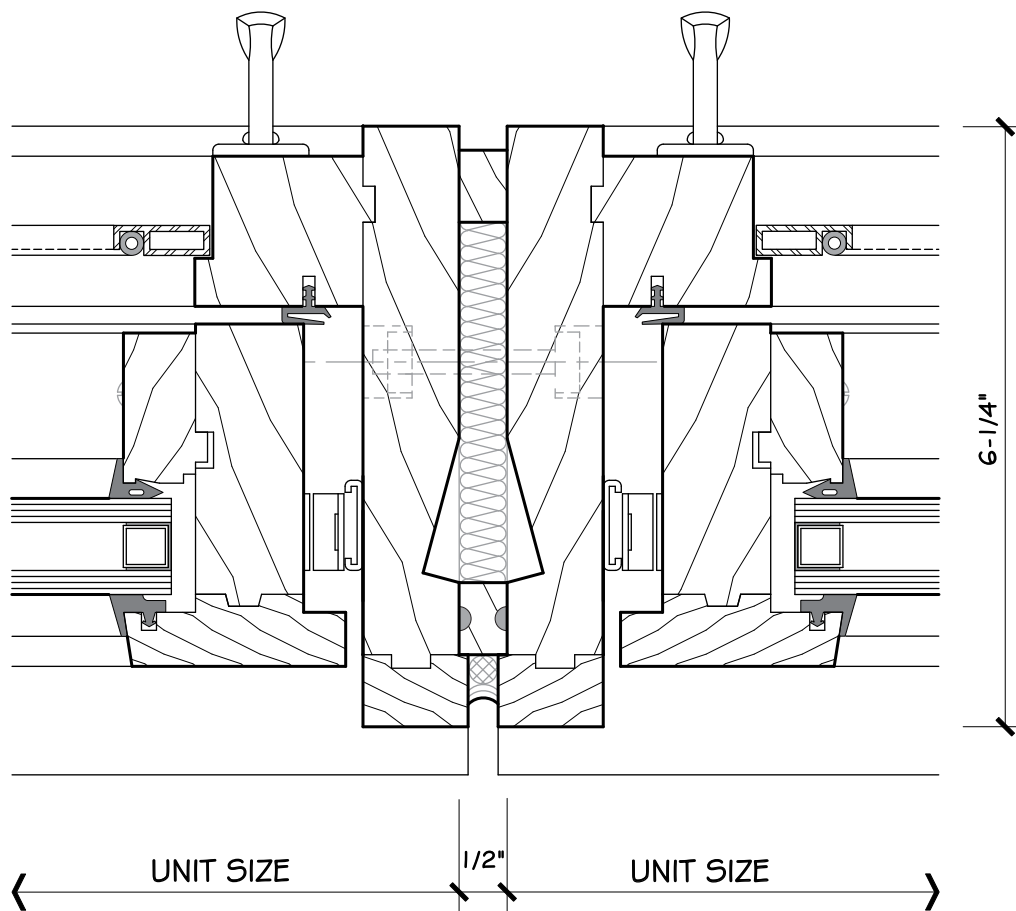
VERTICAL CLOSE MULLION



Fixed Frame – Fixed Frame
 1/2 Full Size



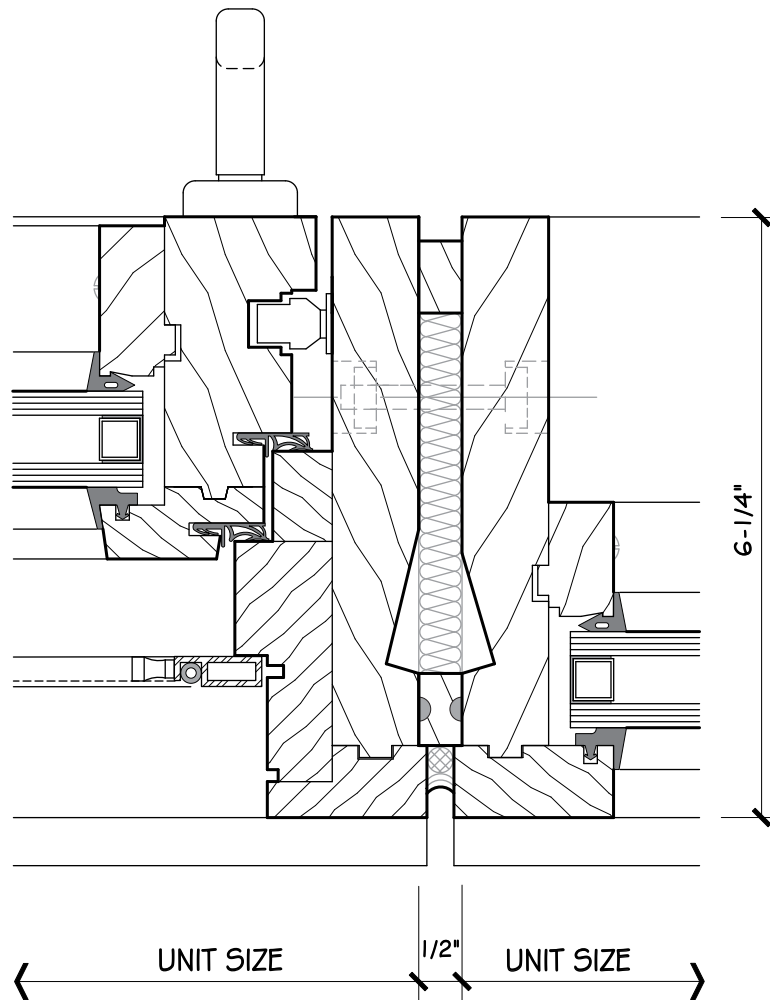
VERTICAL CLOSE MULLION



Awning – Awning
1/2 Full Size



VERTICAL CLOSE MULLION

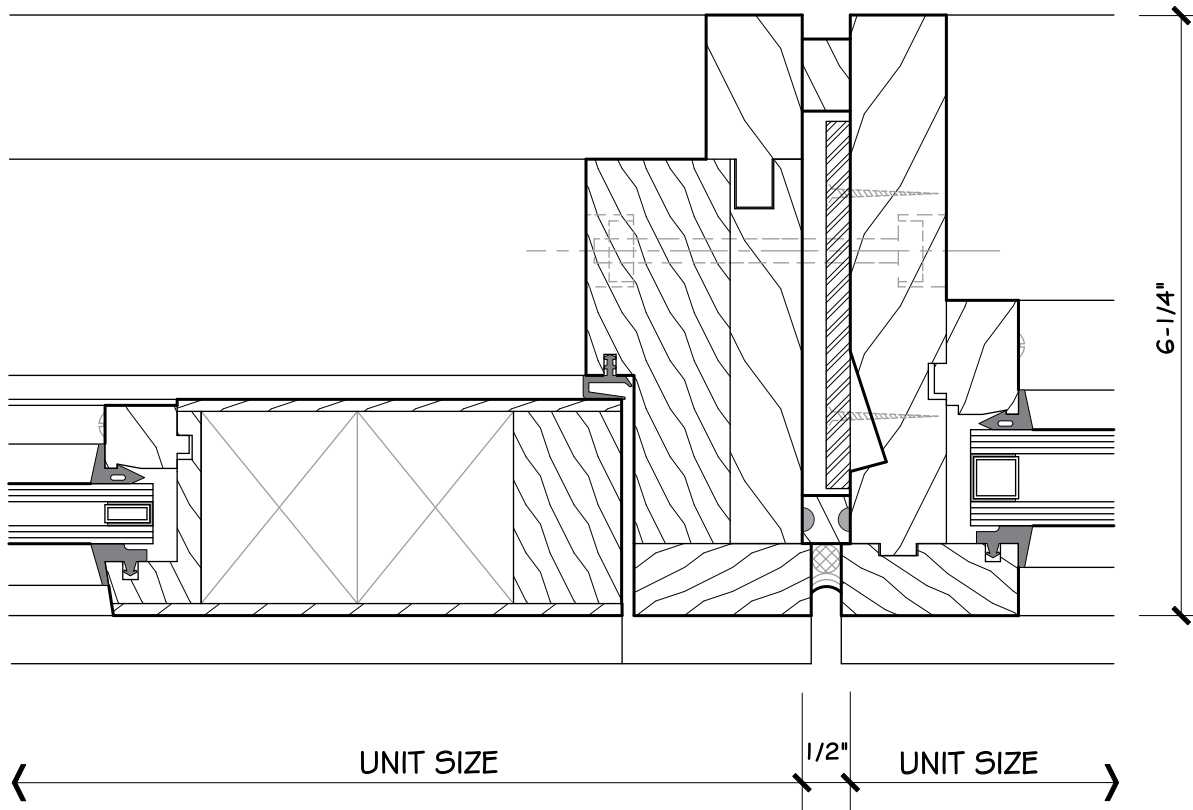


Tilt/Turn – Fixed Frame

½ Full Size



VERTICAL CLOSE MULLION WITH STEEL STIFFENER

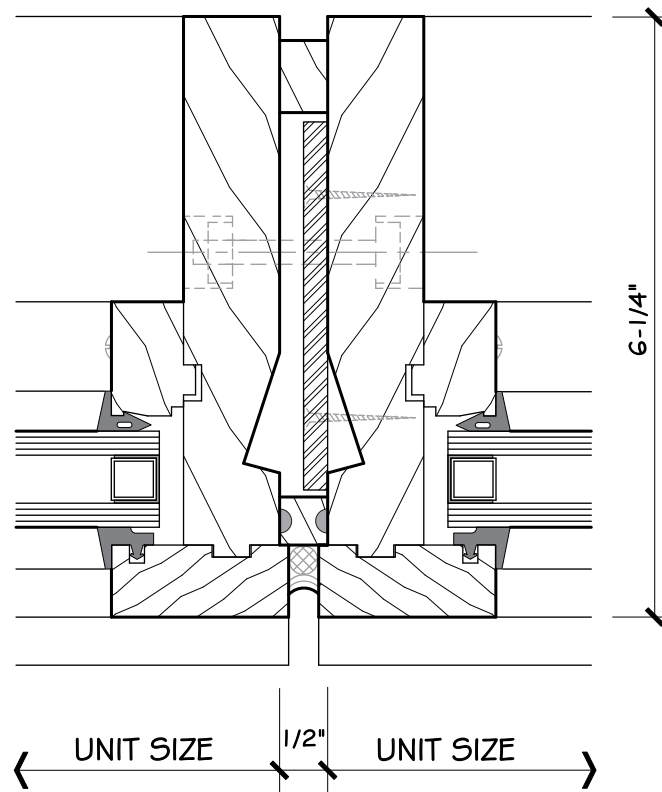


Out-Swing Door – Fixed Frame

½ Full Size



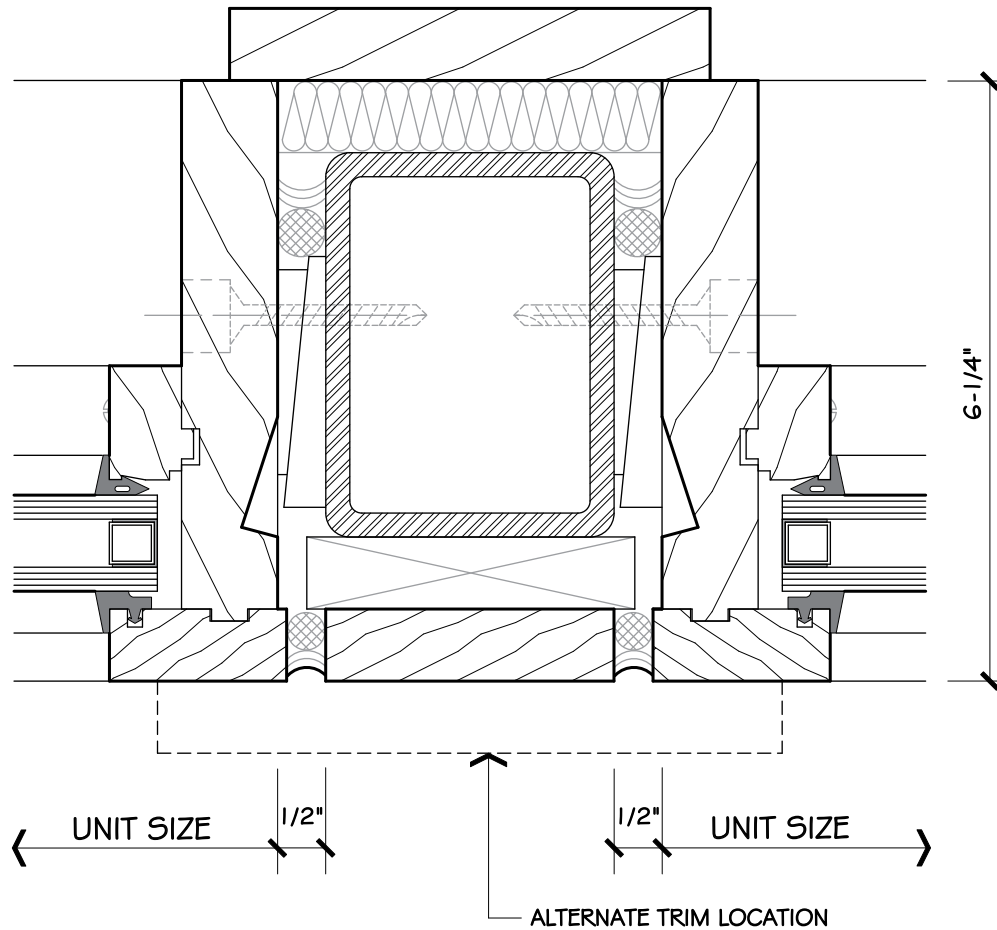
VERTICAL CLOSE MULLION WITH STEEL STIFFENER



Fixed Frame – Fixed Frame
 $\frac{1}{2}$ Full Size



VERTICAL STRUCTURAL MULLION

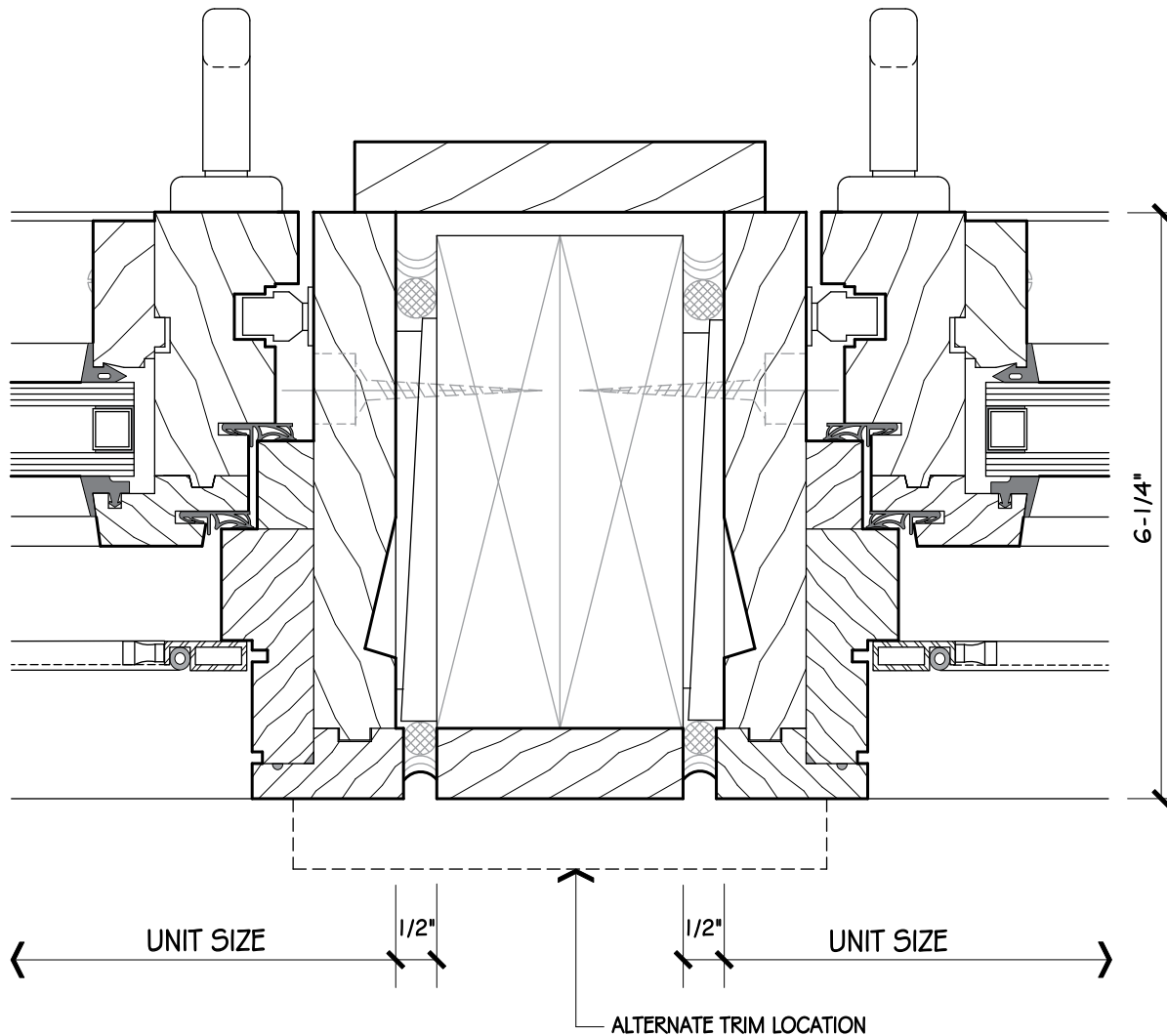


Fixed Frame – Fixed Frame

1/2 Full Size



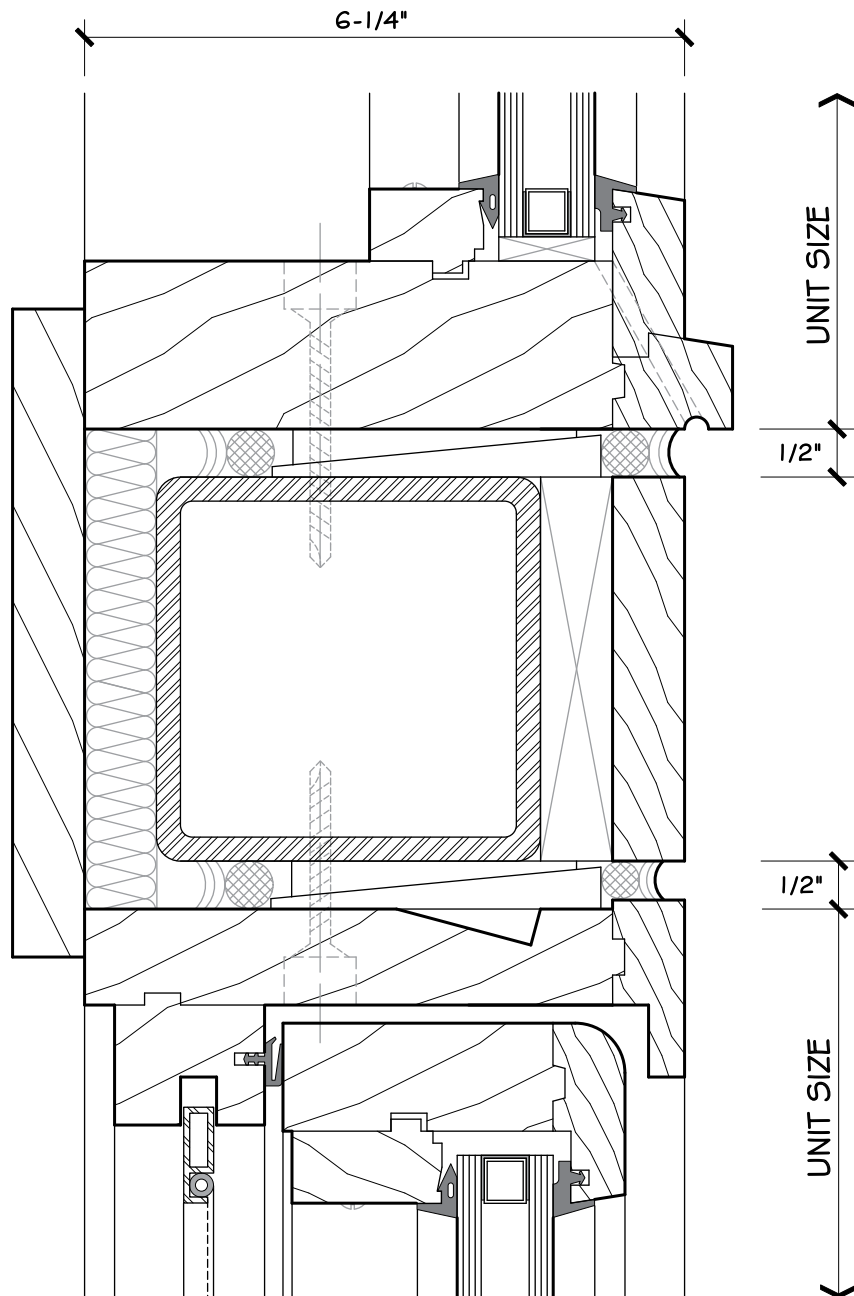
VERTICAL STRUCTURAL MULLION



Tilt/Turn – Tilt/Turn
 1/2 Full Size



HORIZONTAL STRUCTURAL MULLION

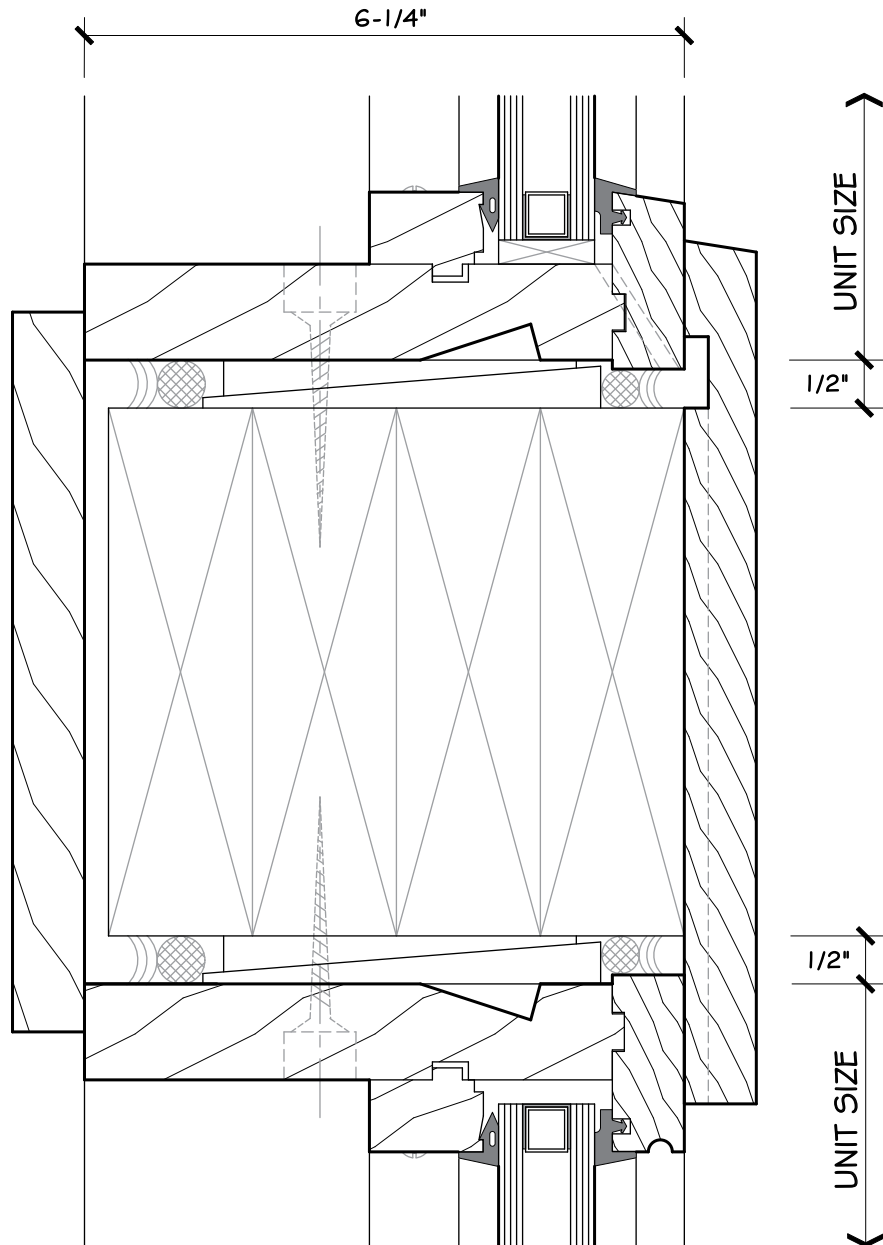


Fixed Frame Over Awning

1/2 Full Size



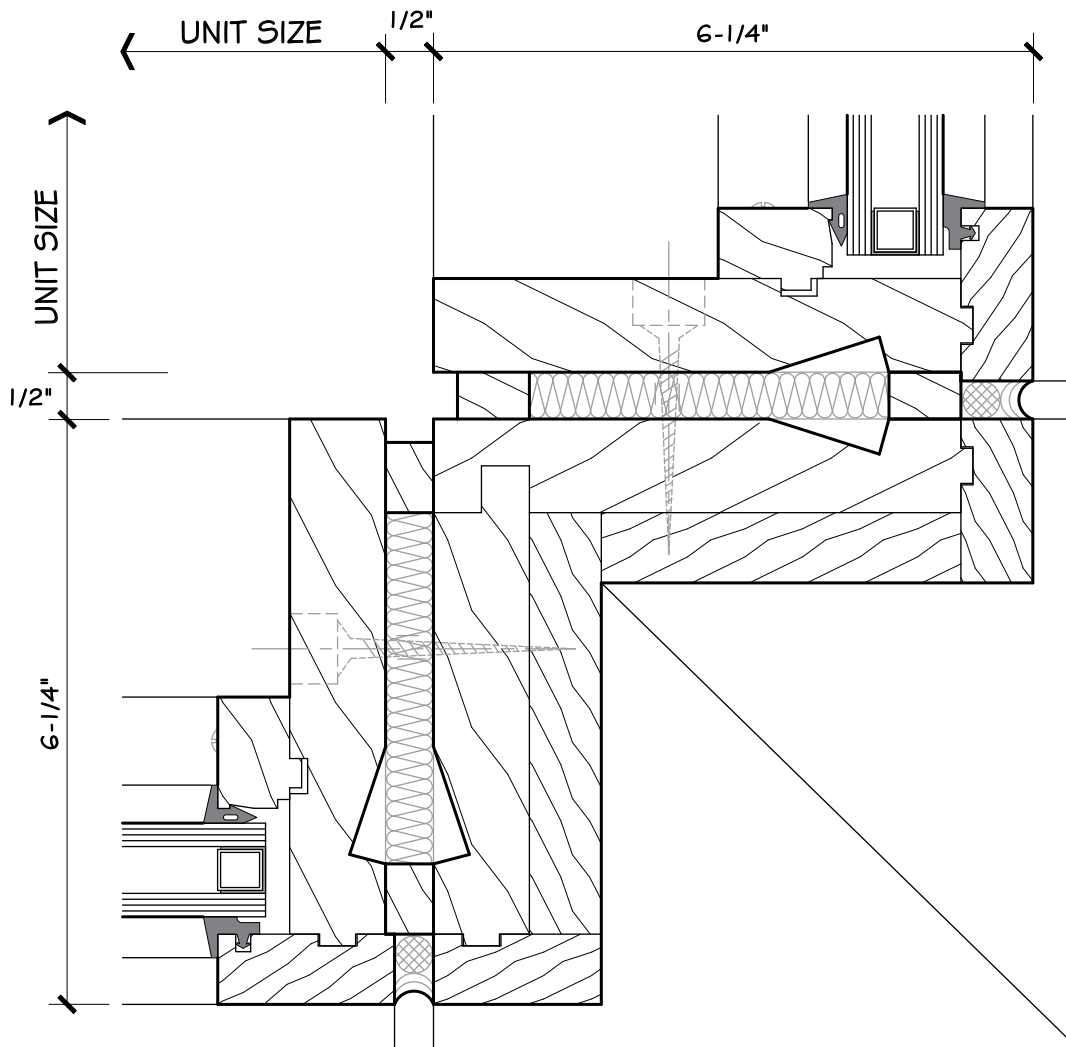
HORIZONTAL STRUCTURAL MULLION



Storefront Over Storefront
1/2 Full Size



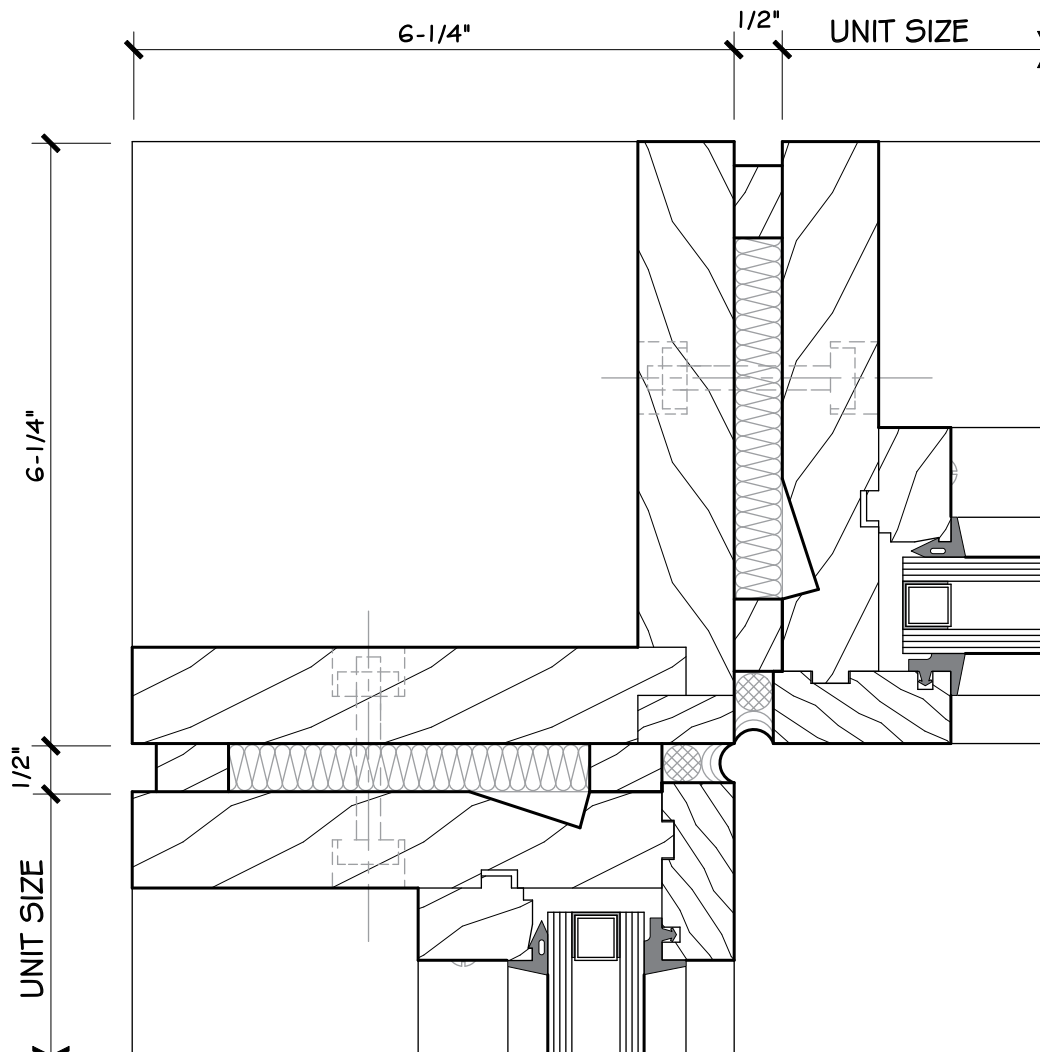
OUTSIDE CORNER VERTICAL MULLION



Fixed Frame – Fixed Frame
 $\frac{1}{2}$ Full Size



INSIDE CORNER VERTICAL MULLION

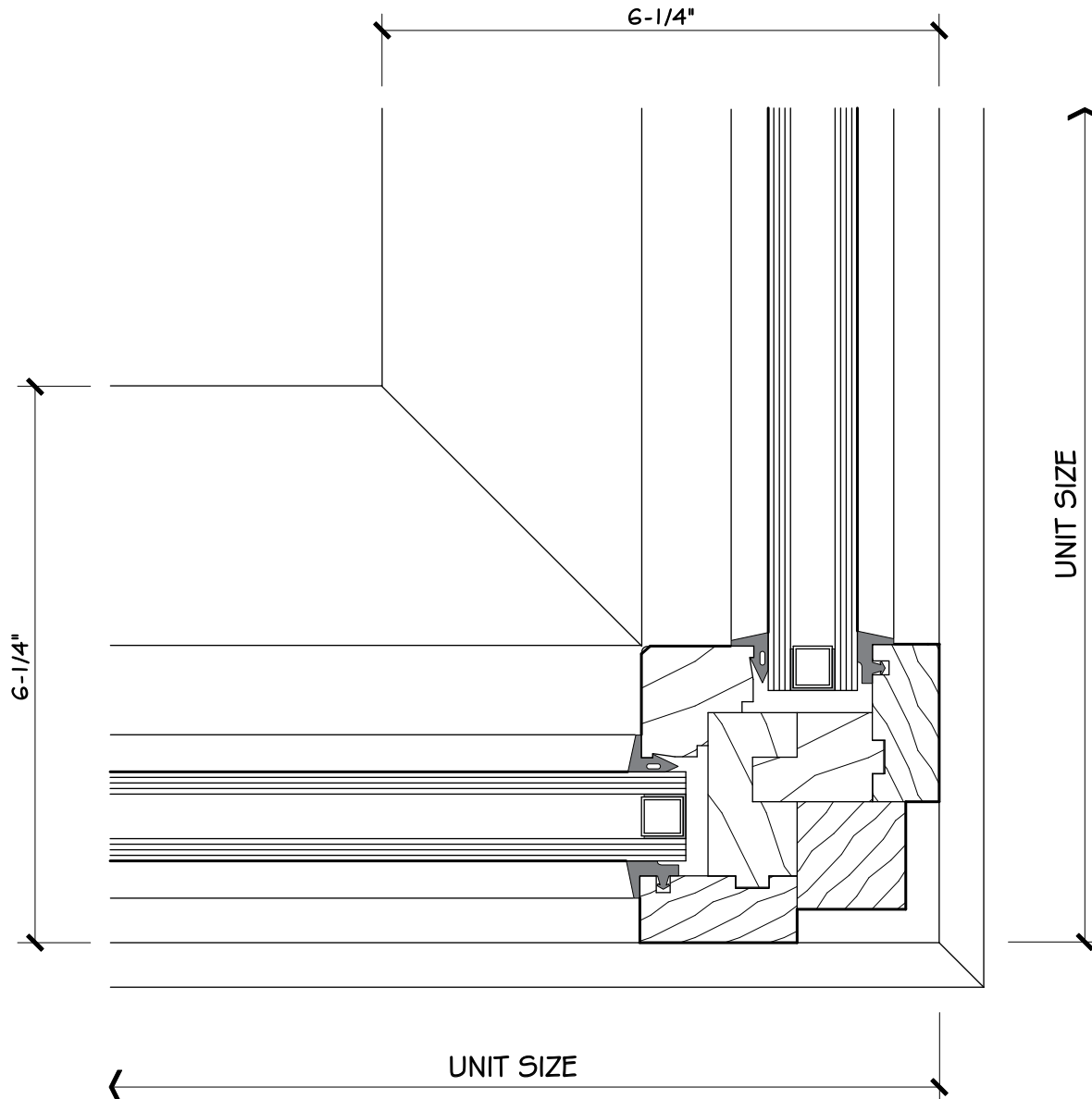


Fixed Frame – Fixed Frame

½ Full Size



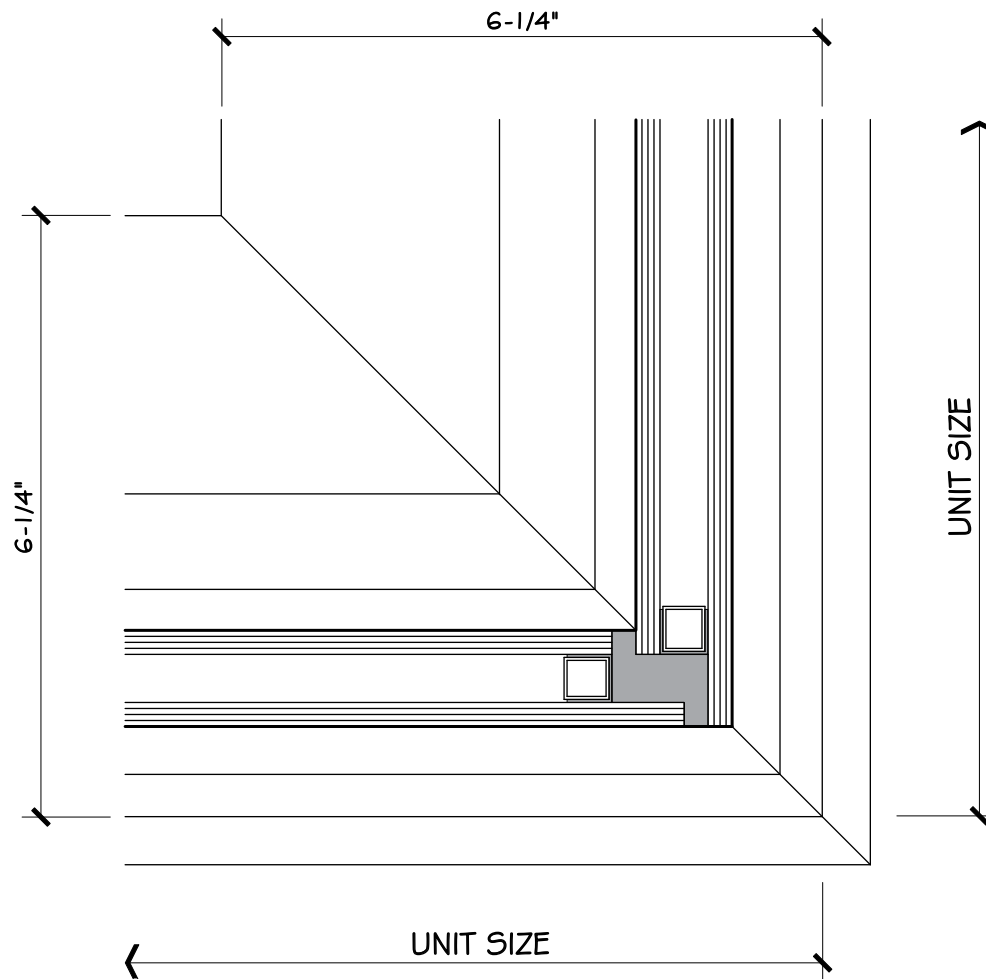
OUTSIDE CORNER VERTICAL MUNTIN



Fixed Frame
½ Full Size



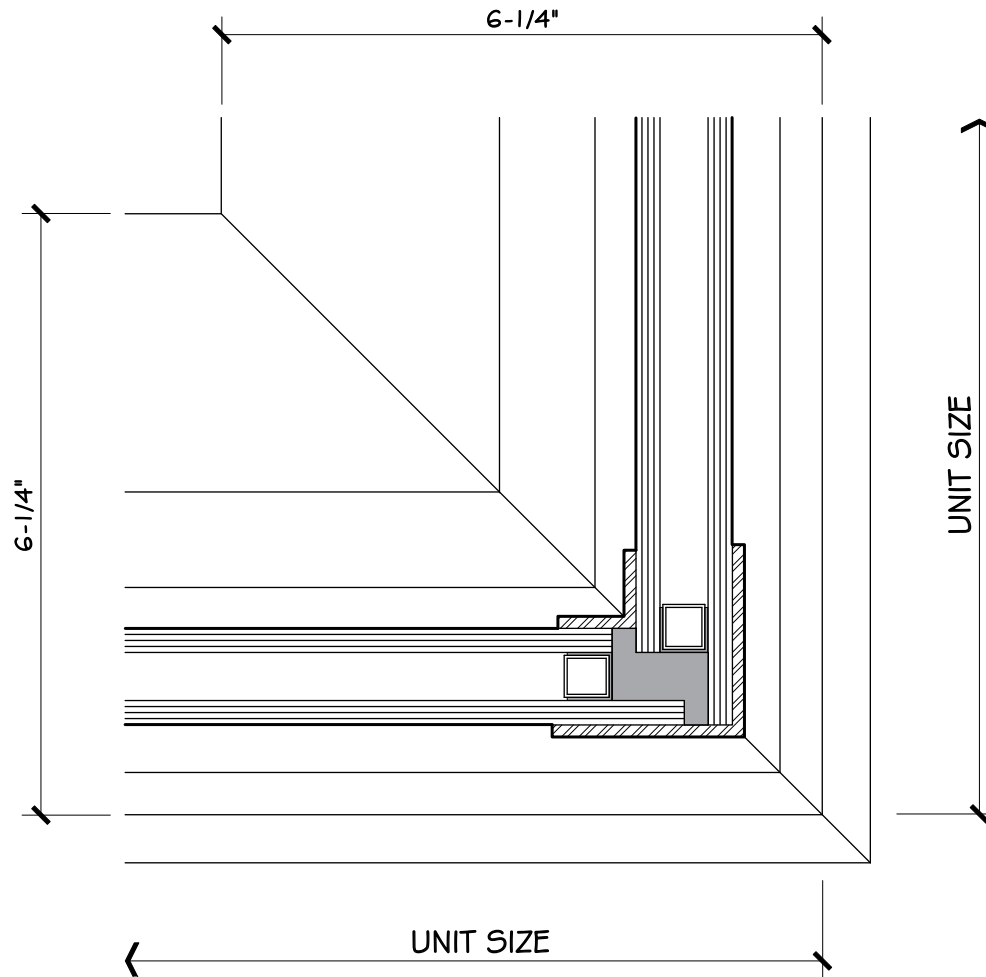
BUTT GLAZED VERTICAL MUNTIN



Glazed Corner With Offset Glass
 $\frac{1}{2}$ Full Size



BUTT GLAZED VERTICAL MUNTIN



Glazed Corner With Metal Corner Covers

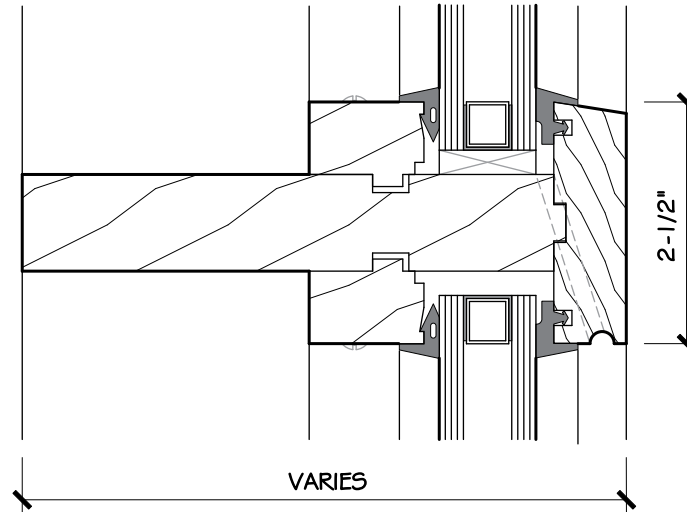
½ Full Size



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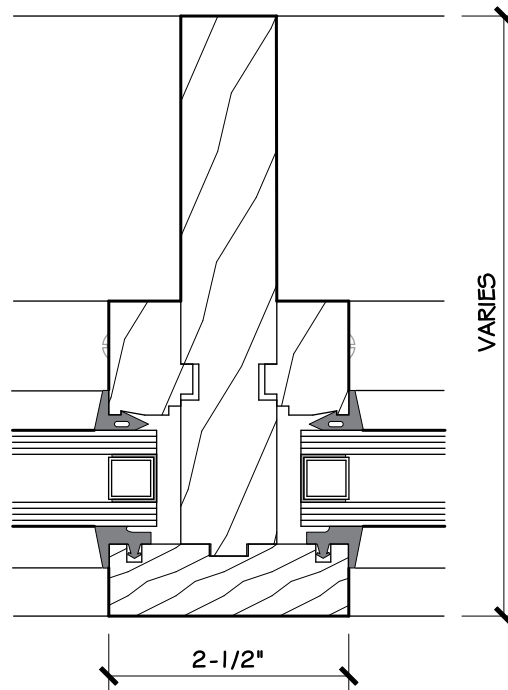


FIXED FRAME STANDARD MUNTINS



Horizontal Muntin

½ Full Size

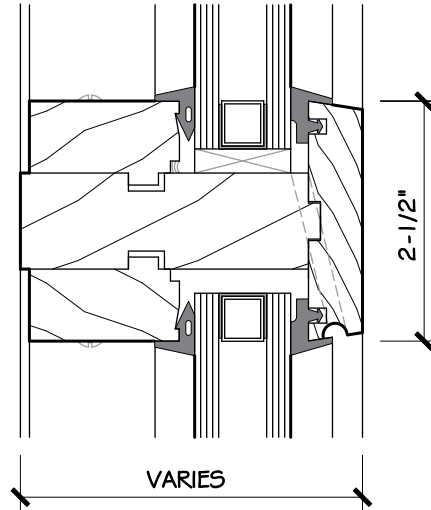


Vertical Muntin

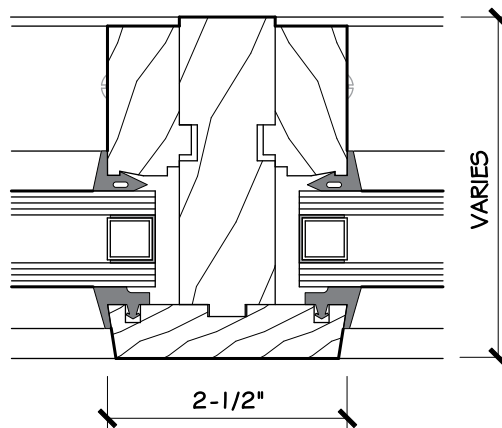
½ Full Size



OPERABLE SASH STANDARD MUNTINS



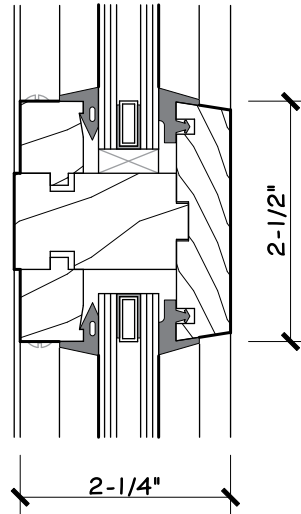
Horizontal Muntin
½ Full Size



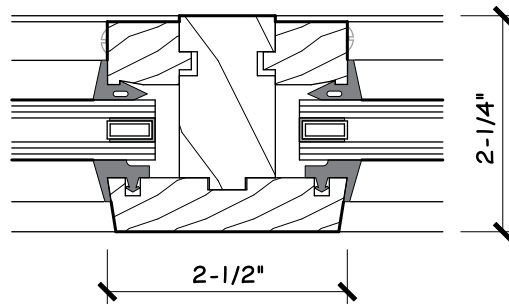
Vertical Muntin
½ Full Size



SWING DOOR STANDARD MUNTINS



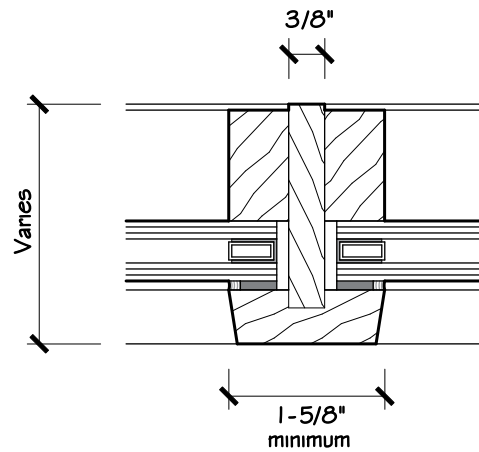
Horizontal Muntin
½ Full Size



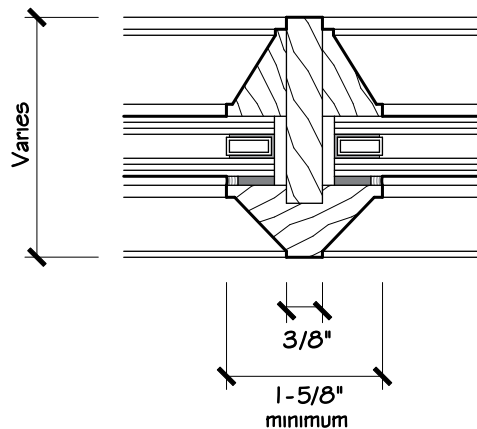
Vertical Muntin
½ Full Size



AUTHENTIC DIVIDED LIGHT (ADL) MUNTINS



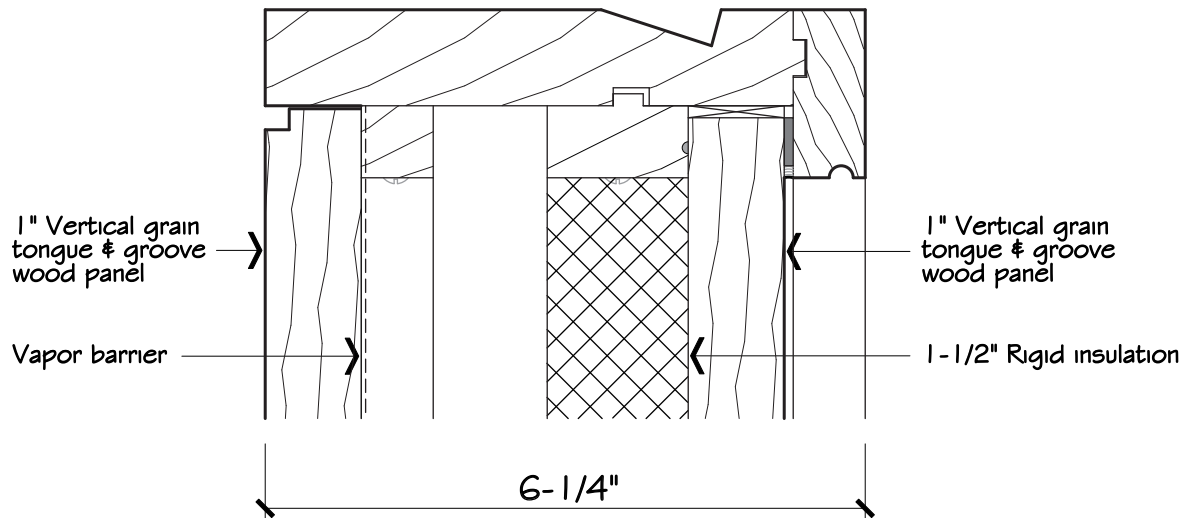
Contemporary ADL ½ Full Size



Traditional ADL ½ Full Size

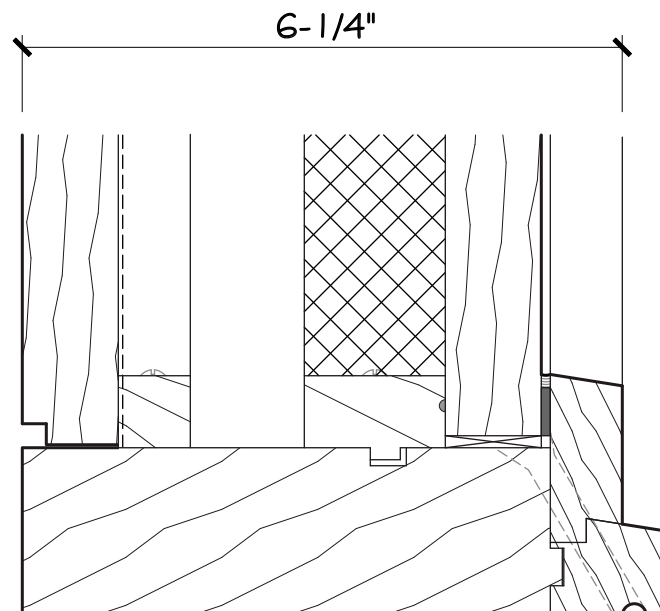


WOOD SPANDREL PANEL



Head

½ Full Size

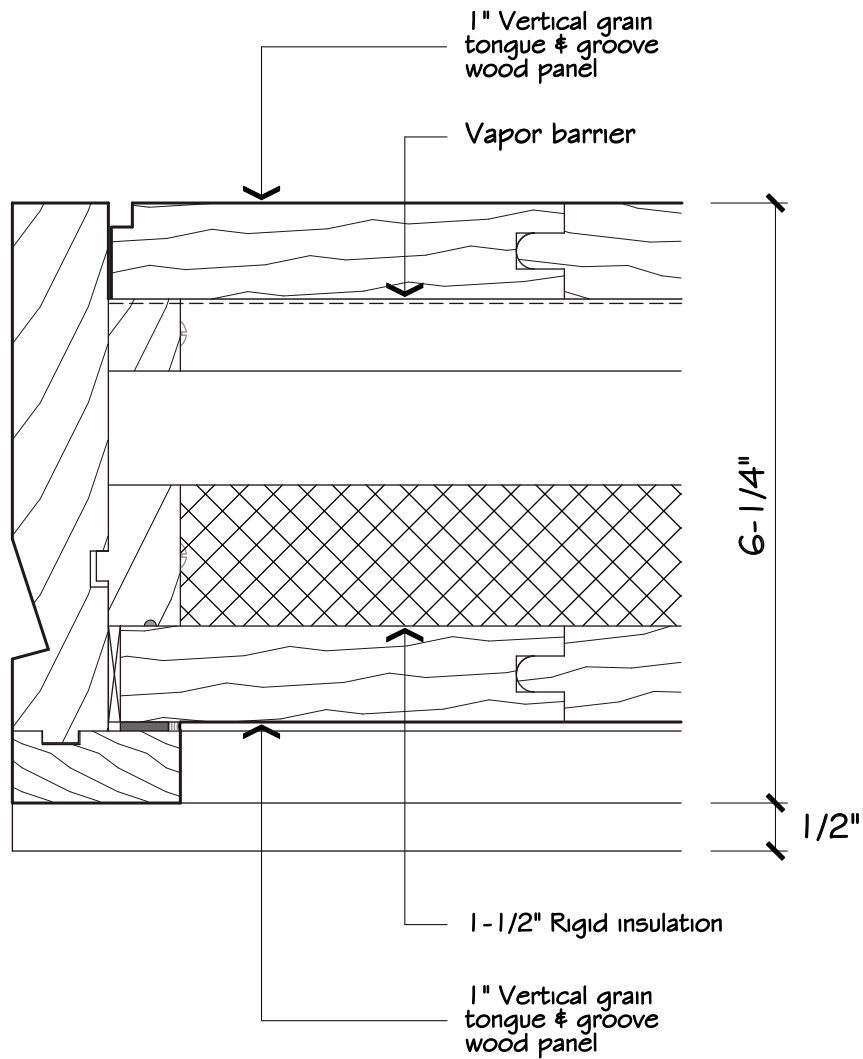


Sill

½ Full Size



WOOD SPANDREL PANEL



Jamb
1/2 Full Size



ATLANTIC CENTER FOR THE ARTS, Florida

“Duratherm windows are a statement of quality. They look as substantial and as well-crafted as they are.”

Charles Rose, AIA

Architect Charles Rose Architects
Somerville, Massachusetts

Challenges

- Construct monumental windows and doors, with large expanses of glass, that meet stringent performance requirements.
- Design windows to conform to unusual angles in the building design.



© Chuck Choi

THE CRAFT OF BUILDING

Charles Rose explains that his firm’s designs “celebrate the craft of building.” It was this philosophy that drove their decision to choose Duratherm. Windows and doors were designed to meet the triple challenges of the architect’s vision, the scale, and the Florida climate.

It was a five-phase project. The first phase required a butt-glazed window-wall, sloping on two planes, with no vertical muntins. Other window units had shapes and angles requiring muntins to be joined along two planes. Yet, remarks Rose, “Duratherm is an easy company to work with during the shop drawing stage. They’re very thorough, and tech support helps a lot with structural reinforcement. We’ve found other window companies more difficult to communicate with.” Later phases included monumental windows and sliding doors with large muntin-free expanses of glass.



CONNECT TO THE LANDSCAPE

“Our intent was to create a powerful connection between the interior spaces and the surrounding landscape,” explains Rose. “The monumental scale and uninterrupted glass of Duratherm’s windows and doors let us do that.” The result: an AIA award-winning project.

Rose elaborates on the aesthetic qualities of Duratherm windows: “Duratherm windows are a statement of quality. They look as substantial and as well-crafted as they are. And we really like the way the wood’s minimal dimensions maximize the glass.” He adds that after six years, the windows “still look incredible. Every time we go to Florida, visitors to the Center comment on the windows and ask us where we got them.”



2017

MONTICELLO VISITOR CENTER AND SMITH HISTORY CENTER, Charlottesville, VA



© Alan Karchmer

“The high-style architectural look that Duratherm has developed is fairly unique in the marketplace.”

Robert Claiborne, AIA

Architect

Ayers/Saint/Gross, Baltimore, Maryland

Challenges

- Support the architects’ vision for a visitor center as a gateway to Monticello that would highlight the main attraction without stealing the spotlight.
- Meet a variety of glazing requirements to address the multiple needs of galleries and other areas as well as conserve energy.



MONTICELLO VISITOR CENTER AND SMITH HISTORY CENTER, Charlottesville, VA

Intentionally blurring the lines between indoors and out, the visitor center features wood, stone, and copper design elements. Architect Robert Claiborne praises the way Duratherm's unique "high-style architectural look" fits the design of the visitor center, which is reminiscent of Monticello's traditional style, yet reinterpreted for a modern aesthetic. Claiborne also notes Duratherm's assistance

with certain design challenges, such as the ticketing pavilion window-wall. In response to concerns about avoiding weather-related water damage, the system is installed with a wood-finished raised sill to hold the windows off the floor. High-performance glazing was used throughout to protect items in the galleries and conserve energy; laminated glass was used in the theater to preserve acoustics.



© Alan Karchmer

Aesthetically, states Claiborne, "everybody is pleased; we've only heard positive comments." Duratherm sees aesthetics, however, as just one measure of success; another is the quality of its working relationships. Senior project superintendent Cliff Smith of Barton Malow Company states that Duratherm delivered high quality, beautiful windows on schedule, "all perfectly sequenced." He also notes that Duratherm stood by its warranty when called upon. Success by yet a third measure—low carbon footprint—was realized when the building earned LEED Gold Certification.



© Alan Karchmer



PRIVATE RESIDENCE, Michigan



© Christopher Barrett

“It’s been a nice dialogue with respect to marrying their products to our projects.”

Mark Weber, AIA

Architect Wheeler Kearns Architects

- Challenges**
- Weather-seal enormous exterior pivot doors.
 - Push the size limits of operable windows with no sacrifice to quality.

For this project, the architects’ past experience with Duratherm told them that they would once again be able to push the limits. “There’s great communication with Duratherm as far as detailing projects in such a way that we’re both comfortable,” says architect Mark Weber. The architects were confident that Duratherm would meet thorny challenges such as weather-sealing the large exterior pivot doors. “They kept working until they figured out how to handle it,” says Weber.

As a result of their collaborative relationship, Duratherm’s huge-pane window and door systems enable this environmentally conscientious home to effectively mediate between two very different views: toward Lake Michigan in one direction, and into dense woodland in the opposite direction.



PRIVATE RESIDENCE, Michigan

"The clients love the house. They embraced the whole project, and the windows and doors are a huge part of that," states Weber. "We've always liked that we could push Duratherm's limits, such as having large expanses of glass or requesting non-typical operations that other companies haven't really developed. It's been a nice dialogue with respect to marrying their products to our projects."



© Christopher Barrett



© Christopher Barrett



THE ALDRICH CONTEMPORARY ART MUSEUM, Ridgefield, CT



© Peter Aaron/Esto

**“You’ve really got to go for the best
with the things people look at.”**

Harry Philbrick, Museum Director

Architect

Tappé Associates, Boston, Massachusetts

Challenges

- Support the architects’ challenge to build a contemporary art museum at the site of a 1783 home in the historic district of a New England town.
- Facilitate movement of oversized objets d’art (including the occasional automobile) in and out of the museum.
- Enable the museum to handle large social events such as exhibit openings.



2017

THE ALDRICH CONTEMPORARY ART MUSEUM, Ridgefield, CT

Duratherm products blended the warmth of mahogany, Yankee sturdiness, and contemporary scale to help the architects solve the thorny challenge of building a contemporary art museum in the middle of traditional New England surroundings. "The project was of a residential scale, but we felt it needed the monumental quality of Duratherm, and the level of craftsmanship and fine detailing was so suitable," says Meliti Dikeos, project architect. The architects and client reviewed other options, but kept coming back to Duratherm. Dikeos recalls thinking, "This is what's going to make the lobby, the special gallery, and the connection between these two spaces really have an identity."



© Peter Aaron/Esto



© Peter Aaron/Esto

"The Duratherm product struck us as ideal, because the materials and craftsmanship speak to tradition, but the proportions speak to the contemporary nature of the museum," says Harry Philbrick, museum director. "A number of people have said that the solidity and craftsmanship in the doors and windows remind them of a wooden ship. Despite a very tight budget, you've really got to go for the best with the things people look at."



BOSTON PUBLIC LIBRARY, Allston Branch



© Michael Moran

“Projects involve lots of problem solving, and Duratherm always seems excited about helping us work them out.”

Matthew Oudens, AIA

Architect Machado and Silvetti Associates, Boston, Massachusetts

- Challenges**
- Complement both exterior cladding and interior finishes.
 - Create reading rooms with floor-to-ceiling views of interior gardens.
 - Ensure operable window safety for library users.
 - Choose wood that ages gracefully and weathers well.

A distinguished yet welcoming presence is what Machado and Silvetti sought to convey with the library, a 20,000-square foot, single-story structure in an urban neighborhood. To do this, they chose a slate and wood exterior, and recommended wood windows. Boston city planners, having experienced both deterioration and safety issues with aluminum, agreed that wood window systems would enhance the warm look, operate safely, and sustain their beauty with little or no maintenance. Peabody Construction Company project manager Jim Tracey had never worked with Duratherm before. But architect Matthew Oudens convinced him that Duratherm’s quality and level of support would eliminate headaches down the line.

Oudens chose Jarrah, a high-quality Australian ironwood, to complement the exterior cladding and retain its beauty over time. African mahogany was his choice for the interior. To control costs, he says, “We mostly used standard shapes and size limits, mixing three different sizes in informal groupings.” In the pavilion-like reading rooms, the interior garden view comes from alternate fixed and awning units above monumental fixed units. Non-standard trapezoids and corner-glazed units were installed under the sloped roof.



2017

BOSTON PUBLIC LIBRARY, Allston Branch

Oudens acknowledges he “went out on a limb” specifying Jarrah—seldom used for windows—and is delighted his choice paid off. Duratherm’s collaboration, he says, “was terrific. Projects involve lots of problem solving, and Duratherm always seems excited about helping us work them out.” Tracey echoes Oudens’ praise for Duratherm’s attention and support: “It was a great experience working with them on such a high-profile job, with challenges that left no room for error.”

High profile indeed: The library won a 2003 AIA National Honor Award, Honor Awards from AIA New England and the Boston Society of Architects (BSA), and the BSA’s annual Harleston Parker Award, for the most beautiful piece of architecture within city limits. It is also featured in the January 2002 issue of *Architectural Record*.



© Michael Moran



© Michael Moran



MOLLIE DODD ANDERSON LIBRARY GEORGE SCHOOL, Newtown, Pennsylvania



© David Lamb

**“It’s the look they were going for –
the look we were going for.”**

Elise Robinson, AIA

Architect

Bowie Gridley Architects, Washington, DC

Challenges

- Help create a warm, reflective ambience in a sustainably designed building that would fit in with the natural surroundings.
- Realize the architects’ design, which featured a “glass box” extending beyond the brick structure on two sides, allowing more natural light and affording sweeping views of nature.
- Provide support to the building structure at butt-glazed corners.



MOLLIE DODD ANDERSON LIBRARY GEORGE SCHOOL, Newtown, Pennsylvania

Despite budget constraints, the client chose wood over aluminum because of its warm, comfortable look and feel. That warmth extends beyond the window frames themselves to the wood trim covering the mullions between the frames, which had to be attached to the building with structural steel. Project architect Elise Robinson praises the backup Duratherm provided to help the firm work out its challenges with their structural engineer. "Duratherm was really helpful in getting the loads

embedded into the system and hidden within the wood," she states. "That was really important."

"It's so uncommon these days to have true wood curtain-wall," says Robinson. "It 'reads' really well, inside and out. The building glows at night; it's really warm. It's the look they were going for—the look we were going for." In addition, the building has earned LEED Gold Certification.



© David Lamb



PRIVATE RESIDENCE, Austin, Texas



© White Construction

“Duratherm gave us mind-boggling flexibility in what you could do with a window-wall.”

David Heymann

Architect David Heymann Architect

- Challenges**
- Help fulfill the owner’s wish for a secluded home with a 360 ° view enabling him to have a respite from Austin without losing sight of it.
 - Use windows as a way to deflect attention outward and away from the house while complementing the warm material palette of wood and local stone.
 - Conform to arching curves that generate complex spaces inside and out.

“Massive jambs, massive pieces of glass” as described by White Construction project manager Pat Ferguson, resulted in a visit to the Duratherm factory early on to review shop drawings and address concerns. All agreed that ganged windows would be factory assembled when possible. Duratherm also addressed concerns about uniform matching of grain and finish selection, reassuring Ferguson’s team that this complex job was in capable hands.

The sections made it possible for the architects to configure elevations as three-dimensional sketches, so that outside and inside views, as well as views beyond, could be worked on simultaneously. This allowed them to tailor the window-walls to specific indoor and outdoor uses of the spaces. “Duratherm gave us mind-boggling flexibility in what you could do with a window-wall,” says project architect David Heymann.



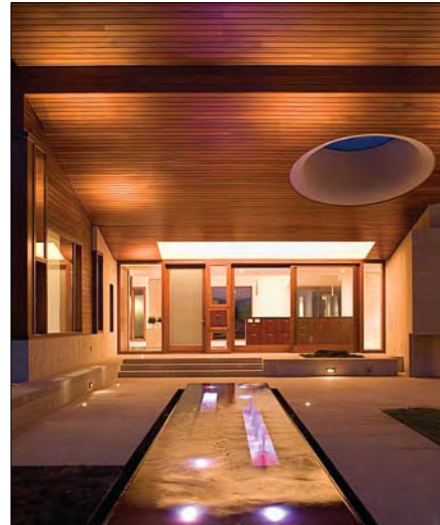
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PRIVATE RESIDENCE, Austin, Texas



© White Construction

"The client loves the house, the views, the windows, and the way they operate," reports Heymann. Duratherm also receives high marks for its client relations. When a problem arose with the desiccant in the windows, says White Construction vice president Dan Felps, "it was the mark of a competent, stalwart company to address it."



© White Construction



© White Construction



BAKER HOUSE RESTORATION, MIT, Cambridge, MA



© Peter Harris

“The building visually came to life again. To this day I get a chill every time I walk by and look at the windows.”

Susan Personette, AIA
Restoration Project
Manager for MIT

Architect

Original:

Alvar Aalto
Helsinki, Finland

Restoration:

Perry Dean Rogers
Boston, Massachusetts

Challenge

- Respect Alvar Aalto’s original 1949 design while restoring the building for the next 50 years of active student use.

ONE OF TWO

Baker House is one of only two Alvar Aalto buildings in North America. So the restoration team knew going in that its choices—including the windows—would be scrutinized in the architectural community. The originals, pine painted light gray, demanded frequent maintenance and were replaced with aluminum in the 1970s. While upkeep was an important factor, the team maintained the building deserved a wood window. An obvious solution was plantation-grown teak exteriors. Teak required no maintenance, yet honored “Aalto’s belief in letting the aging and patina of natural materials give life and depth to a building,” says Perry Dean Rogers project manager David Fixler.

FORM AND FUNCTION

During a rigorous vendor selection process, MIT evaluated wood windows by Duratherm and another manufacturer. They also evaluated aluminum windows—far less costly than teak and light gray like the originals. “We ordered mockups of each window type so we could ‘kick the tires,’” recalls Susan Personette, who led the restoration for MIT. “As we operated the windows, there was no question in our minds that Duratherm was infinitely superior.” Unlike aluminum, Duratherm windows replicated the slender profile of Aalto’s originals. And over time, the restoration team discovered yet another bonus: Duratherm’s weathered teak yielded a gray nearly identical to the original painted pine.



BAKER HOUSE RESTORATION, MIT, Cambridge, MA

COST – THE BIG PICTURE

Despite the windows' beauty and historical correctness, cost justification remained an issue. So Personette used her first-hand experience to convince the administration that the investment was sound. She had personally inspected the nearly 800 Duratherm teak and mahogany windows installed 25 years earlier on campus. One window, installed improperly, had a problem. The rest "were solid as the day they went in—with no maintenance." She also knew that Cambridge's urban salt air would ruin the baked enamel finish of aluminum in 20 or so years, requiring MIT to remove and refinish, or to replace, each window. Comparing the cost over five-plus decades—buying Duratherm once or aluminum twice—convinced MIT to choose Duratherm.

DESIGN & INSTALLATION

Window design precisely followed Aalto's original drawings. The main construction challenge, presented by the undulating wall facing the Charles River, was varying the trim widths to accommodate a wide range of jamb conditions. Citing "a bit of a learning curve" when the first batch of windows was installed, Fixler credits Duratherm's responsiveness in ironing out the glitches: "From the very beginning, they understood the level of quality needed."



© Peter Harris

© Mary Ann Sullivan



Campus side, circa 1950

Photo courtesy Artek,
Helsinki, Finland



PRIVATE RESIDENCE, Long Island, New York

“Duratherm not only made our concept work, but also made the project as pleasurable as possible.”

Tod Williams, FAIA

Architect Tod Williams Billie Tsien and Associates
New York, New York

Challenges

- Design casement windows that are unusually tall and narrow, yet easily operable.
- Make butt-glazed corners look seamless by concealing the strip of sealant where the edges meet.
- Construct windows that protect against ocean elements, but keep profiles thin and elegant.



© Michael Moran

To pull in the top corner of the ultra-tall casement windows would require more than the standard bottom operators. Needed was a top latch, but it would be out of reach. So Duratherm designed customized hardware, operable with a pole hook.



© Michael Moran

To make the butt-glazed corners blend seamlessly with the reflective glass on either side, Duratherm installed stainless steel corner covers. The exterior and interior pieces are just wide enough to hide the strip of butyl and silicone that seals the edges. The covers also add structural support to the corner.

“Windows play a crucial role in every surface of this house,” notes architect Tod Williams. “Duratherm changed the profiles and assembly of the wooden frames to our design while making sure the windows function within weather constraints in the way Duratherm does best.” Commenting on the design process, he adds, “Duratherm not only made our concept work, but also made the project as pleasurable as possible. They were very patient as they took us through the logic of the windows. This allowed us to maximize the qualities we wanted.”

The result? “Highly detailed, articulated, elegant windows of superior quality.”



PRIVATE RESIDENCE, Minneapolis, Minnesota



© Don F. Wong

“We turned to Duratherm, and they did what they needed to do to make our design work.”

Paul Yaggie, AIA

Architect Vincent James Associates, Minneapolis, Minnesota

- Challenges**
- Support the architects’ concept for a part pavilion, part belvedere residence.
 - Realize the artistic vision of sculptor James Carpenter.
 - Design a commercial-style curtain wall system, but make it aesthetically appropriate to a residence.
 - Construct systems for exceptionally large triple-glazed units that protect against the harsh Minnesota climate.

With Duratherm’s help, the architects created a curtain wall design on both the ground floor and second story. Duratherm’s “hidden frame” detailing complements large expanses of ultra-clear glass to minimize vertical mullions, creating the pavilion effect.

© Don F. Wong



On the Lift/Roll doors, specialized lever handles rotate to lift the heavy glass doors out of their pockets, roll them, and with another half-turn, create a tight drop seal against the frigid Minnesota winters.



The greatest challenge? Installing a 7' x 10' fixed unit above a row of operable units in a 10' x 10' opening at the top of the stairs. The fixed window is both monumental and mullion-free to complement a glass sculpture by James Carpenter. Mounted just inside the window, the sculpture uses mirrors and etched glass to create multiple images of a single tree outside.

Vincent James Associates has used Duratherm’s expertise to achieve custom results before. As one of the firm’s architects explains, “Jamb, sill and head depths and profiles are all altered by conditions within a house. So we can’t just take a standard frame and live with it.” However, as they do with every project, the firm worked early on with potential vendors. “We began with another window manufacturer who felt they could provide the type of custom work we needed,” recalls a member of the design team. “But in the end, it became difficult for them to achieve many of our custom requirements. So we turned to Duratherm, and they did what they needed to do to make our design work.”

MUNICIPAL BUILDINGS, Wayzata, Minnesota



© Don F. Wong

“Duratherm works hand-in-glove with the architecture.”

Dennis McGrath

Architect Collins Hansen Architects
Minneapolis, Minnesota

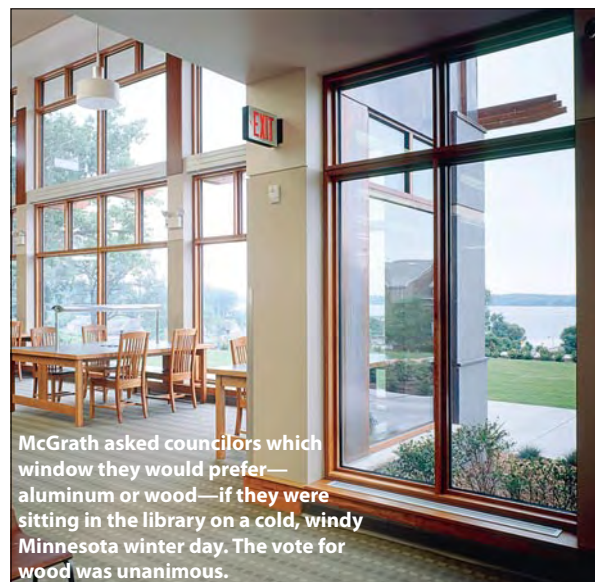
Challenges

- Capture one of the last public views of Lake Minnetonka while reflecting the “porch look” of the surrounding residential area.
- Vertically break the long, linear design.
- Complement the exterior and interior materials with quality natural products that would stand up to the elements over time, yet meet budget requirements.

Budget issues forced early consideration of aluminum window systems, recalls lead architect Dennis McGrath. Discussions with city council emphasized quality and long-range economy of wood windows. Then McGrath asked councilors which window they would prefer—aluminum or wood—if they were sitting in the library on a cold, windy Minnesota winter day. The vote for wood was unanimous. With Duratherm, the firm was able to simplify the profile and “lock in on a standard of detailing we could apply to both buildings,” comments McGrath. He adds, “Duratherm works hand-in-glove with the architecture—more so than standard window manufacturers. Any time there was a challenge, they went the extra distance.”



An 18' by 40' wall of glass consisting of five window units with minimal mullions and narrow profiles looks out onto the lake. Other features of this design include a wall of windows in the council chamber with an integrated slate, brick and granite fireplace; curtainwall units extending to the parapet of the low-pitched copper roof; and copper-clad butt-glazed corner windows harmonizing with the roof and panels. Windows, doors and entry systems—with mahogany exteriors and cherry interiors—offer a consistent, unifying thread throughout the complex.



McGrath asked councilors which window they would prefer—aluminum or wood—if they were sitting in the library on a cold, windy Minnesota winter day. The vote for wood was unanimous.

© Don F. Wong

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GILDER BOATHOUSE, Yale University



© Richard Cadan

"One feels well tended to by Duratherm."

Turner Brooks

Architect Turner Brooks, New Haven, Connecticut

Challenges

- Design doors and windows to take full advantage of the site—a steep, narrow strip of land along the Housatonic River.
- Construct massive yet easily operable sliding glass doors that conform to the structure's contemporary exposed wood aesthetic.

Ten-foot screened sliding doors, made easily operable with heavy-duty hardware, open to a deck from the viewing room (see photo, over). Together with a series of fixed and operable windows, they give spectators a front-row seat on the finish line of the race course. "This is the only boathouse I know of with such a connection to the finish line of a race," comments Brooks. "The viewing room, the decks and the porches add a lot to the fun of the design."

The all-mahogany construction of the doors and windows lends substance to the design and complements the exterior cedar cladding.

Brooks praises duratherm's help in achieving such physical and visual access. "It's great to have a window company that does complete shop drawings," he comments. "And it's a treat to work directly with them to customize a solution. One feels well tended to by Duratherm."



© Turner Brooks



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