

## **CHAPTER 2: WINDOW REPLACEMENT**

The purpose of these specifications is to guide the selection and installation of replacement windows. Improper window installation can cause air leakage, sound leakage, and water leakage. Water leakage is a serious concern because it deteriorates building components around the window. Existing window openings may have moisture damage and air leakage, needing repair during the window replacement process.

Included here are specifications for two special window-safety considerations. Windows in high-risk areas, such as around doors and walkways, must have safety glass. Windows are part of fire escape planning for homes, so this egress function must be recognized and observed.

### **2.1 WINDOW-REPLACEMENT DECISIONS**

For both weatherization and home performance jobs, window replacement is a low priority from the perspective of cost-effectiveness. Window replacement should be delayed, unless the following conditions exist.

1. Windows are damaged or weathered beyond repair or rehabilitation.
2. Existing windows are a severe energy or comfort problem, such as single-pane aluminum windows in a cold climate.
3. The home is energy-efficient except for the windows.
4. The siding is being replaced, which offers an ideal opportunity for window replacement

The above conditions don't prohibit home-performance contractors from replacing windows because their clients want new windows. However, the higher priorities of home-performance contracting shouldn't be neglected because the high cost of the

window replacement consumes the entire home-performance budget.

## 2.1.1 Window Replacement Options

Consider the following options for replacing windows in homes with membrane-drainage systems, which utilize a weather-resistant barrier behind the siding. The existing condition of the window and siding are the most important consideration for selecting one of the three options below. The option, chosen for replacement-window installation, also depends on the annual rainfall, window orientation with reference to wind, rain, and sun, the distance of the window's head jamb from a horizontal protective roof overhang.

1. Ideally, windows should be replaced during siding replacement so that the flashing can be integrated perfectly with the wall's weather-resistant barrier.
  - a. Use this method when moisture damage to both siding and window is evident.
  - b. Replace all moisture-damaged components during window replacement, including framing members if necessary.
2. If the existing window is moisture-damaged or has other problems, the existing window should be completely removed to expose the rough opening.
  - a. Use this method whenever moisture damage is observed to the existing window sill, jambs, or exterior trim.
  - b. Flash the rough opening and integrate this flashing with the weather-resistant barrier of the home.
  - c. Replace all moisture-damaged components during window replacement, including framing and siding.
3. A replacement window may be installed within the existing window jambs and sill, when the existing win-

dow is undamaged by moisture and well integrated into the building exterior.

- a. The manufacturer of the window should approve this replacement process; the manufacturer's instructions should be carefully observed.
- b. Window jambs and sill must show no signs of deterioration from moisture.

## 2.1.2 Window Specifications

New windows, installed by weatherization and home-performance contractors, must be energy-efficient.

1. Replacement windows must have a U-factor  $\leq 0.30$ .
2. Replacement windows, facing east or west in air-conditioned homes, should have a solar heat-gain coefficient of  $\leq 0.35$ .

### Window Accessory Specifications

Accessories are extra components used by installers to attach the window, seal the window into the home's weather-resistant barrier, and complete the window installation.

1. Windows must be shimmed as necessary using flat shims of the correct thickness to give the proper support at the sill and where fasteners are installed.
2. All fasteners used for window installation must be corrosion resistant, according to ASTM B 633, B 766 or B456.
3. Flashing for new windows must be reinforced, coated flexible flashing, designed for exterior water protection.
4. Sealants should be compatible with the materials they seal.
5. Backer rod must be used to control sealant depth and prevent three-sided adhesion by caulking.

6. All sides of exterior wood must be primed with exterior primer or other equivalent wood sealer.
7. Metal window components must be protected from dissimilar metals or corrosive materials.

### **2.1.3 Preparing for Installation**

If the existing window exterior is watertight and well integrated into the building exterior, the new window may be installed within the existing jambs and sill.

1. Installer must take whatever steps are necessary to relevel the jambs and sill level, square, and plumb.
2. Installer must use whatever accessories are necessary to insure the proper fit, drainage, leveling, fastening, and finish.

### **Window Removal**

Existing windows should be removed properly without damaging existing flashing, weather-resistant membrane, and interior window casing, and interior drapery hardware.

1. Installers must exercise care in removing windows to minimize damage to the home's weather-resistant barrier, which is installed between siding and sheathing.
2. Installers must repair moisture damage to the rough opening before installing the new window.
3. Installers must do whatever is necessary to render the rough opening square, plumb, and level.

### **2.1.4 Installing the New Window**

The most important considerations for installing a new window is that the window installation is weathertight and airtight.

## **Installing within the Existing Jambs and Sill**

When the contractor and homeowner are confident about the dryness of the window rough framing and existing window, replacement windows are often installed within the existing jambs and sill.

1. The existing sill must be equipped with whatever leveling devices are necessary to provide a continuous, level, solid surface to support the new window sill.
2. The existing sill should be protected with flashing if necessary for drainage and to protect the protruding wood sill.
3. The replacement window should be sealed to continuous blocking during installation.
4. Correctly sized shims must be used where the side jambs of the replacement window are fastened into the side jambs of the old window.
5. The space between the new window frame and old window frame should be sealed with caulking and backer rod on the sides and top.

## **Installing Replacement Windows Within the Rough Opening**

When the window jambs, sill, or exterior trim are weathered or moisture-damaged, the existing window should be removed and the new window installed in the rough opening.

1. Installer must use whatever shimming assembly is necessary to support the replacement window on a solid, level, and water-resistant sill surface.
2. The new window must be flashed around its perimeter with approved flashing, installed from bottom to top like shingles in a way that doesn't permit water, flowing downhill with gravity, to enter any joint.

3. The window flashing should fit between the siding and the home's weather-resistant barrier on the window's bottom and sides and underneath the home's weather-resistant barrier on top of the window.
4. Installer must install caulking or butyl putty tape on the window flange before installing the window. Follow the manufacturer's recommendations on sealant and its application.
5. When caulking is the window sealant, the window must be installed immediately after caulking application before the caulking becomes contaminated or forms a skin.
6. The heads of fasteners must be wide enough in diameter to span the holes or slots in the window flange.
7. Installers should avoid deforming the window flange during fastening, by over-driving the fasteners.
8. Installers must air-seal the space between the window frame and the rough opening or old window jambs and sill. One-part foam and foam backer rod with caulking are approved methods. Stuffing this gap with fiberglass insulation is not permitted.
9. Windows, exposed to wind-driven rain or without overhangs above them must have a rigid cap flashing to prevent rainwater from draining onto the window. The cap flashing must overlap the sides of the window enough to divert water away from all horizontal joints bordering window, exterior window trim, and siding.

## 2.2 SAFETY SPECIFICATIONS

Windows have special requirements for fire escape and breakage-resistance in areas that are statistically prone to glass breakage.

## 2.2.1 Safety Glass

Safety glass must be used for window or glass replacement when the danger of breakage is high. Safety glass must be either laminated glass or tempered glass bearing a permanent label identifying it as safety glass.

1. Glazed panels, greater than 9 sq. ft. when measured from the inside of the sashes, must be glazed with safety glass.
2. Windows within bathtub and shower enclosures must be glazed with safety glass.
3. Windows next to doors, in the same plane as the door, must be safety glass if the glazed panel is within 12 inches of the door and within 60 inches of the floor.
4. When glazing is installed within 18 inches from the floor and within a 36-inch horizontal distance from a walkway, such as a hallway or sidewalk, the glazing must be safety glass.

## 2.2.2 Fire Egress

Windows are the designated fire escape for many homes and should offer a minimum opening for a person's escape from a fire. The following specifications must be observed when replacing windows, regardless of the compliance of existing windows with fire-egress specifications.

1. Windows installed in bedrooms must observe the specifications for egress windows described here.
2. Each bedroom must have one egress window.
3. Egress windows must provide an opening that is at least 20 inches wide and at least 24 inches high.
4. Egress windows must provide an opening with a clear area of at least 5 square feet for ground-floor windows and 5.7 square feet for windows above ground floor.

5. The finished sill of the egress window must be no higher off the floor than 44 inches.