



3M Building Safety Solutions Windows Film
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This MANU-SPEC® utilizes the Construction Specifications Institute (CSI) *Project Resource Manual* (PRM), including *MasterFormat*™, *SectionFormat*™ and *PageFormat*™. A MANU-SPEC is a manufacturer-specific proprietary product specification using the proprietary method of specifying applicable to project specifications and master guide specifications. Optional text is indicated by brackets []; delete optional text in final copy of specification. Specifier Notes precede specification text; delete notes in final copy of specification. Trade/brand names with appropriate product model numbers, styles and types are used in Specifier Notes and in the specification text Article titled "Acceptable Material." Metric conversion, where used, is soft metric conversion.

This MANU-SPEC specifies safety and security film as manufactured by 3M Building Safety solutions Windows Film. Revise MANU-SPEC section number and title below to suit project requirements, specification practices and section content. Refer to CSI *MasterFormat* for other section numbers and titles.

SECTION 08 87 00
GLAZING SURFACE FILMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: This Section specifies safety and security film placed on glass surfaces [for increased security protection,] [to improve resistance to glass breakage].

Specifier Note: Revise Paragraph below to suit project requirements. Add section numbers and titles per CSI *MasterFormat* and specifier's practice.

- B. Related Requirements:

Specifier Note: Include in this Paragraph only those sections and documents that directly affect the work of this section. If a reader of this section could reasonably expect to find a product or component specified in this section, but it is actually specified elsewhere, then the related section number(s) should be listed in the Subparagraph below. Do not include Division 00 documents or Division 01 sections since it is assumed that all technical sections are related to all project Division 00 documents and Division 01 sections to some degree. Refer to other documents with caution since referencing them may cause them to be considered part of the Contract.

1. Section [08 50 00 - Windows].
2. Section [08 80 00 - Glazing].

1.02 REFERENCES

Specifier Note: Define terms that are unique to this Section and are not provided elsewhere in the contract documents. Do not include in this Article terms common to the work results specified.

- A. Definitions:
 1. Safety: Reduction of risk of injury, loss or death of persons due to accidental, natural or unintentional causes.
 2. Security: Reduction of risk of injury, loss or death of persons due to intentional actions of others.
 3. Visible Light Transmission: How much light comes in through a product expressed as a number between 0 and 1. The higher the number, the more light transmitted.
 4. Visible Reflection: Ratio of light reflected away from window surface to that impinging upon it; expressed as a percent.
 5. Luminous Efficacy: Ratio of total luminous flux to total radiant flux of an emitting source.
 6. Shading Coefficient: Ratio of solar energy entering through a window compared to that entering through a window of

clear 1/8" (3.2 mm) double strength sheet glass.

7. Total Solar Energy Rejected: Percentage of incident solar energy rejected.

Specifier Note: Paragraph below may be omitted when specifying manufacturer's proprietary products and recommended installation. Retain References Paragraph when specifying products and installation by an industry reference standard. List retained standard(s) referenced in this section alphabetically. Indicate issuing authority name, acronym, standard designation and title. Establish policy for indicating edition date of standard referenced. Contract Conditions Section 01 42 00 - References may establish the edition date of standards. This Paragraph does not require compliance with standard(s). It is a listing of all references used in this section. Only include here standards that are referenced in the body of the specification in PARTS 1, 2 and/or 3. Do not include references to building codes at any level.

B. Reference Standards:

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) - ASHRAE Handbook of Fundamentals.
2. ASTM International (ASTM):
 - a. ASTM D882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - b. ASTM D1004 Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
 - c. ASTM D2582 Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.
 - d. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - e. ASTM E308 Standard Practice for Computing the Colors of Objects by Using the CIE System.
 - f. ASTM E903 Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres (Withdrawn 2005).
3. International Window Film Association (IWFA) - IWFA Visual Quality Standard for Applied Window Film.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays. Comply with Section [01 31 00 - Project Management and Coordination].
- B. Preinstallation Meetings: Conduct preinstallation meeting [one week] prior to commencing [work of this Section] [and] [on-site installations] to verify project requirements, substrate conditions and coordination with other building subtrades, and to review manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section [01 31 19 - Project Meetings].
- C. Sequencing: Sequence work of this section in accordance with Section [01 12 16 - Work Sequence] [and manufacturer's written recommendations for sequencing construction operations].
- D. Scheduling: Schedule work of this Section in accordance with Section [01 32 13 - Scheduling of Work].

Specifier Note: Article below includes submittal of relevant data to be furnished by Contractor before, during or after construction. Coordinate this article with Architect's and Contractor's duties and responsibilities in Contract Conditions and Section 01 33 00 - Submittal Procedures.

1.04 ACTION SUBMITTALS

- A. General: Submit listed submittals in accordance with Contract Conditions and Section [01 33 00 - Submittal Procedures].
- B. Product Data: Submit specified products as follows:
 1. Manufacturer's product data, including manufacturer's SPEC-DATA product sheet.
 2. Manufacturer's installation instructions.
 3. Material Safety Data Sheets (MSDS).

Specifier Note: Samples are full-size actual products intended to illustrate the products to be incorporated into the project. Sample submittals are commonly necessary for such characteristics as colors, textures, and other appearance issues.

C. Samples: Submit as follows:

1. [Full size] [20 inches x 20 inches (508 x 508 mm)] samples of security film.

1.05 INFORMATION SUBMITTALS

Specifier Note: Specify submittal of test reports or evaluation service reports intended to document required tests without repeating the test requirements specified in Division 01.

- A. General: Submit listed submittals in accordance with Contract Conditions and Section [01 33 00 - Submittal Procedures].
- B. Test and Evaluation Reports:
 - 1. Certified test reports showing compliance with specified performance characteristics and physical properties.

Specifier Note: Specify submittals intended to document manufacturer installation, storage and other instructions.

- 2. Manufacturer's Instructions: Submit manufacturer's storage, handling and installation instructions.
- C. Source Quality Control: Submit documentation verifying that components and materials specified in this Section are from single manufacturer.

Specifier Note: Coordinate with Field Quality Control in PART 3. When manufacturer's services are specified during construction operations to verify installation, include following Paragraph for submittal of instructions and reports. If no field inspections are required, delete the following Paragraph.

- D. Manufacturer's Reports: Manufacturer's field reports specified.
- E. Qualification Statements:
 - 1. Submit letter of verification for Manufacturer's Qualifications.
 - 2. Submit letter of verification for Installer's Qualifications.

1.06 CLOSEOUT SUBMITTALS

- A. General: Submit listed submittals in accordance with Contract Conditions and Section [01 33 00 - Submittal Procedures].
- B. Operation and Maintenance Data:
 - 1. Submit operation and maintenance data for installed products in accordance with Section [01 78 23 - Operation and Maintenance Data]. Include:

Specifier Note: Edit or expand list of operation and maintenance data submittal inclusions to suit project requirements.

- a. Manufacturer's instructions detailing care and maintenance of security and safety film.
- C. Warranty Documentation: Submit warranty documents specified.

1.07 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer:
 - a. [5] years experience manufacturing components similar to or exceeding requirements of project.
 - b. Sufficient capacity to produce and deliver required materials without causing delay in work.
 - c. Capable of providing field service representation during construction.
 - 2. Installer: Acceptable to manufacturer, experienced in work of this section and has specialized in installation of work similar to that required for this project.

1.08 DELIVERY, STORAGE & HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver material in accordance with Section [01 61 00 - Common Product Requirements] and in accordance with manufacturer's written instructions.
 - 2. Deliver materials in manufacturer's original packaging with identification labels intact and in sizes to suit project.
- B. Storage and Handling Requirements:
 - 1. Store materials protected from exposure to harmful weather conditions and at temperatures recommended by manufacturer.

2. Store rolls of film flat on cross supports. Do not stand rolls of film on end.
3. Remove from storage, in quantities required for same day use.

C. Packaging Waste Management:

Specifier Note: The disposal of packaging waste into landfill sites demonstrates an inefficient use of natural resources and consumes valuable landfill space. Specifying appropriate packaging and construction waste management and disposal procedures may contribute to points required for USGBC's LEED® construction project certification.

Specifier Note: Include the following Subparagraphs to specify information that will provide direction to the Contractor for the disposal of construction waste materials using environmentally responsible methodology other than landfill resources.

1. Separate waste materials for [reuse] [and] [recycling] in accordance with Section [01 74 19 - Construction Waste Management and Disposal].

Specifier Note: USGBC's LEED® certification includes credits for the diversion of construction waste from landfill. Diversion can be tracked by either weight or volume but must be consistent for all materials. Manufacturer may reclaim packaging and delivery materials for recycling.

2. Remove packaging materials from site and dispose of at appropriate recycling facilities.
3. Collect and separate for disposal [paper] [plastic] [polystyrene] [corrugated cardboard] packaging material [in appropriate onsite bins] for recycling.
4. Fold metal and plastic banding, flatten and place in designated area for recycling.

Specifier Note: Add additional Subparagraphs to include pallets, crates, padding and other packing materials that are typically associated with the specified products.

5. Remove:
 - a. Pallets from site [and return to supplier or manufacturer].
 - b. [_____].

Specifier Note: Coordinate Article below with Contract Conditions and with Section 01 78 36 - Warranties.

1.09 WARRANTY

- A. Warranty: Refer to Contract Conditions and Section [01 78 36 - Warranties] for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and does not limit, other rights Owner may have under other Contract Documents.
 1. Warranty Term: 15 years commencing on date of substantial completion.
 2. Window Film materials and quality of work are warranted to maintain solar reflective properties without cracking, crazing, delaminating, peeling or discoloring.

PART 2 PRODUCTS

Specifier Note: Retain Article below for proprietary method specification. Add product attributes, performance characteristics, material standards and descriptions as applicable. Use of such phrases as "or equal," "or approved equal" or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining "or equal" products.

2.01 SAFETY AND SECURITY FILM

Specifier Note: Include in the following Paragraph manufacturer's name, address, phone number, fax number, e-mail address and website URL.

- A. Manufacturer: 3M Building Safety Solutions Windows Film.
 1. Contact: Michael Hassenauer, mjhassenauer@mmm.com, 3M Center, Bldg. 0223 02-5-24; St. Paul, MN 55144;

Telephone: 800 430-1704, 651 737-1053; Fax: 651 733-6642; website:
http://solutions.3m.com/wps/portal/3M/en_US/WF/3MWindowFilms.

Specifier Note: Substitution procedures must be either in Contract Conditions or in Section 01 25 00 - Substitution Procedures. Do not include substitution procedures here.

2. Single Source Responsibility: Provide components and materials specified in this section from a single manufacturer.
3. Substitution Limitations:
 - a. Substitutions: [In accordance with [Contract Conditions] [Section 01 25 00 - Substitution Procedures]] [No substitutions permitted].

Specifier Note: Include an overall description of the system, assembly, product or material. Include required properties or characteristics that do not obviously belong under other titles. Examples: Configuration, size and color.

B. Description:

Specifier Note: Paragraph below should list obligations for compliance with specific code requirements particular to this section. General statements to comply with a particular code are typically addressed in Contract Conditions and Section 01 41 00 - Regulatory Requirements. Repetitive statements should be avoided.

1. Regulatory Requirements:
 - a. In accordance with Section [01 41 00 - Regulatory Requirements].
2. Compatibility:
 - a. Ensure components and materials are compatible with specified accessories and adjacent materials.

C. Materials:

1. Security Film - General: 220 plus layers of optically clear polyester materials laminated together, abrasion resistant coating and release liner.
 - a. Roll Length: 100 feet (30 m) rolls.

Specifier Note: Specify roll width to suit project requirements.

- b. Roll Width: [40 inches (1016 mm)] [50 inches (1270 mm)] [72 inches (1829 mm)].
- c. Thickness: 6 mil (0.2 mm).
- d. Emissivity, ASHRAE: 0.78 when using a Devices & Services Emissometer Model AE at or near room temperature.
- e. U-Value, ASHRAE: 0.99.
- f. Ultraviolet Transmission, ASTM E903: Not more than 1%.
- g. Tear Resistance, ASTM D1004: Greater than 780 lb.
- h. Safety Rating: 400 ft-lb, Category II.
- i. Tensile Strength, ASTM D882: 30,000 psi.
- j. Infrared Light and Blocking: 99%.
- k. Break Strength: 120 lb per inch width.
- l. Puncture Propagation Tear (PPT), ASTM D2582: 7.5 lb.
- m. Young Modulus, ASTM D882: 500k psi, nominal.
- n. Fire Performance: Meets or exceeds Class A requirements for surface burning characteristics when tested in accordance with ASTM E84:
 - 1) Flamespread: 25 maximum.
 - 2) Smoke Developed: 450 maximum.

Specifier Note: Refer to the physical properties table in the 3M SPEC-DATA literature and consult with the 3M representative to select

the safety and security film best suited to meet project requirements. Edit the following Subparagraphs accordingly.

- o. Visible Light Transmission, ASTM E308: [67%] [49%].
- p. Visible Reflection, ASTM E903:
 - 1) Exterior: [10%] [8%].
 - 2) Interior: 10%.
- q. Luminous Efficacy, ASTM E903: [1.18] [0.96].
- r. Shading Coefficient at 90 Degrees (Normal Incidence), ASTM E903: [0.57] [0.51].
- s. Total Solar Energy Rejected (TSER), ASTM E903:
 - 1) 90 Degree Angle: [49%] [56%].
 - 2) 60 Degree Angle: [59%] [63%].
- 2. Acceptable Material: 3M Ultra Prestige Safety and Security Window Films [Ultra Prestige S70 - Clear film] [Ultra Prestige S50 - Clear film].

2.02 ACCESSORIES

- A. Film Slip: In accordance with film manufacturer's recommendations.
- B. Tools: Include polyplastic bladed squeegees, 5-way tools, cutting tools and blades in accordance with manufacturer's recommendations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify that conditions of substrates previously installed under other sections or contracts are acceptable for product installation in accordance with manufacturer's instructions prior to security film installation.
 - 1. Inform [Owner] [Architect] [Consultant] of unacceptable conditions immediately upon discovery.
 - 2. Examine glass surfaces to receive the new film and verify that they are free from defects and imperfections that will affect the final appearance.
 - 3. Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval from [Owner] [Architect] [Consultant]].

Specifier Note: Specify actions required to prepare the surface, area or site for incorporation of the section's primary products. Describe requirements for exposure or removal of existing assemblies, components, products or materials.

3.02 PREPARATION

Specifier Note: Specify preparatory work required prior to installation/application/erection of primary products.

- A. Surface Preparation: Prepare surface in accordance with manufacturer's written recommendations and coordinate with Section [01 71 00 - Examination and Preparation].
 - 1. Use protective tarpaulins or drop cloths to cover interior furnishings, floor, carpet, window ledges and walls near window(s) receiving film installation.
 - 2. Turn off or cover heating, air conditioning and ventilation ducts 24 hours before, during and 24 hours after installation, to reduce dirt and dust in air or on glass.
 - 3. Place toweling or other absorbent material on windowsill or sash to absorb moisture generated by cleaning and film application process.
 - 4. Clean window and window framing thoroughly with neutral cleaning solution. If window putty or seal is old and cracked, tape or seal it prior to washing glass.
 - 5. Clean glass using solution comprised of 90% water to 10% ammonia. Use blade scraper or industrial razor to ensure removal of contaminants from glass.
 - 6. Rinse glass from top to bottom with water from pressure spray tank. Squeegee entire glass surface.
 - 7. Dry glass edges and window frames using lint-free towel.

3.03 APPLICATION

- A. Coordinate application of security film products in accordance with Section [01 73 13 - Application].
1. Measure glass and cut film edges straight and squarely to fit, or cut film 1 inch (25.4 mm) wider and longer for trimming to size after positioning.

Specifier Note: For the best security performance, the film should be secured to the glass behind the window stops. Delete the following paragraph if film cannot be installed behind window stops.

2. Ensure film is installed behind window stops.

Specifier Note: In situations where glass size is wider than sheet width, film will have to be spliced to provide full coverage. Check with the manufacturer to determine if butt or overlapped splicing joints should be used for the particular application and film specified.

3. Splicing and Seaming: Vertical splicing only, horizontal splicing not permitted.
 - a. Splice and seam film only when glass is greater in width than film.
 - b. Splice and seam film only after receipt of written approval from [Owner] [Architect] [Consultant].
 - c. Use [butt] [overlapped] factory edges only.
 - d. Ensure maximum overlap of 0.118 inches (3 mm).
4. Mix film slip solution comprised of one capful of baby shampoo or dishwashing liquid to 1 gallon (3.8 L) of water. Spray solution on glass and film to facilitate proper film positioning.
5. Use no more soap than is needed to provide slip. Apply film to glass and lightly spray it with slip solution. Use polyplastic bladed squeegees to remove excess water and to maximize bonding of pressure sensitive adhesive.
6. Trim film to size if needed before using squeegee for second time, making sure to use new blade tip after 3 - 4 cuts. Spray slip solution to film and squeegee for second time. Bump film edge with lint-free towel wrapped around edge of 5-way tool. Wipe frame edge dry.

3.04 REPAIR

Specifier Note: After installation, film may have dimpled appearance from residual moisture. Under average weather conditions, film will dry flat within 30 days.

- A. Visual Inspection: In accordance with IWFA - Visual Quality Standard for Applied Window Film to determine optical quality, edge gap thickness control and film splicing and seaming quality.
- B. Remove and replace film that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from [6 feet (1.83 m)] minimum after [30] [_____] day period.

3.05 FIELD QUALITY CONTROL

Specifier Note: Specify requirements if manufacturers are to provide field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Manufacturer's field reports are included under PART 1, Submittals.

- A. Manufacturer Services:

Specifier Note: Use the following Subparagraphs only when manufacturer's field services are provided and are required to verify the quality of the installed components. Establish the number and duration of periodic site visits required by manufacturer and specify below. Consult manufacturer for services required. Delete if field services are not required.

1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control]. Have manufacturer review work involved in handling, installation/application, protection and cleaning of product[s], and submit written reports in acceptable format to verify compliance of work with Contract.
2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation inspection in accordance with manufacturer's instructions.
 - a. Schedule site visits to review work at stages listed:
 - 1) After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.

- 2) [Twice] during progress of work at [25%] and [60%] complete.
 - 3) Upon completion of work, after cleaning is carried out.
3. Obtain reports within [3] days of review and submit immediately to [Owner] [Architect] [Consultant].

Specifier Note: Specify final actions required to prepare installed products to perform properly. Only include the following Article when installation includes control settings or movable parts.

3.06 CLEANING

- A. Perform cleanup in accordance with Section [01 74 00 - Cleaning and Waste Management] and Section [01 74 13 - Progress Cleaning].
- B. Remove protective tarpaulins or drop cloths used to cover interior furnishings, floor, carpet, window ledges and walls near window(s) receiving film installation.
- C. Turn on or uncover heating, air conditioning and ventilation ducts that were turned off or covered.
- D. Remove toweling or other absorbent material placed on windowsill or sash.
- E. Wash interior and exterior of each filmed surface using cleaning solution recommended by film manufacturer.
- F. Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section [01 74 23 - Final Cleaning].

Specifier Note: Specify special measures needed to minimize waste, collect recyclable waste and dispose of or recycle field-generated construction waste created during demolition, construction or final cleaning.

- G. Waste Management:
 1. Coordinate recycling of waste materials with Section [01 74 19 - Construction Waste Management and Disposal].
 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during demolition, construction or final cleaning.
 3. Remove recycling containers and bins from site.

3.07 PROTECTION

- A. Protect installed product from damage during construction in accordance with Section [01 76 00 - Protecting Installed Construction].
- B. Repair damage to adjacent materials caused by security film installation.

END OF SECTION