

DETENTION FIXED EXTERIOR WINDOWS

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DEMA 111950-09  
December, 2009

GUIDE SPECIFICATIONS  
FOR DETENTION FIXED  
EXTERIOR WINDOWS

DEMA 111950-09  
December, 2009

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DETENTION FIXED EXTERIOR WINDOWS



This standard was developed by representative members of the Detention Equipment Manufacturers Association (DEMA) a Division of the National Association of Architectural Metal Manufacturers (NAAMM) to provide their opinion and guidance on the specification and use of detention equipment. This standard contains advisory information only and is published as a public service by NAAMM and its DEMA Division.

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# FORWARD

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These specifications have been prepared in accordance with the CSI Section Format: Part 1 - General, Part 2 - Product and Part 3 – Execution. Guide specifications are intended to be used as the basis for developing job specifications and must be edited to fit specific job requirements. Inapplicable provisions shall be deleted, appropriate selections shall be made where there are choices, and provisions applicable to the job shall be added where necessary. Optional items or requirements are shown in brackets. **Notes and instructions to specifiers are given in italics directly following the paragraphs to which they apply. Notes that contain permissive language are not considered part of the standard.** Dates given with ASTM and other standards were current at the time this specification was published, and define the specific standards referenced herein. When a more recent standard is available, the specifier should verify its applicability to this guide prior to its inclusion. *While the CSI Section Format locates Delivery, Storage and Handling in Part 1, NAAMM Standard include them under Part 3 – Execution.*

Materials and fabrication methods are specified in detail in Part 2. Detention fixed exterior windows made in accordance with these specifications have successfully met the testing and performance requirements of Section 1.05. However, the materials and fabrication methods called for in these specifications, while providing a sound guide, are not meant to restrict the use of other materials and methods, where it can be demonstrated through the specific testing procedures in Section 1.05 that the construction can equal or exceed the performance levels specified in this section. In order to ensure that a manufacturer's product meets the desired performance levels, the project specifications shall include the testing and performance requirements of Section 1.05 and the Quality Assurance requirements of Section 1.06.

Security grades were added in response to input from members of the architectural community, particularly those who are regularly involved in the design of Detention and Correctional Facilities and are also involved in ASTM standard development efforts for these facilities. The four (4) security grade levels cited in the specification refer not only to the DEMA performance requirements for detention fixed exterior windows, but also to related ASTM standards that have been recently developed for detention products. These grade levels provide a quick reference to performance standards outside DEMA, which are coordinated with this DEMA specification and can be easily used when writing project specifications.

The CSI Master Format 2004 placed detention equipment in Section 11 19 00 and detention windows in 08 56 63. Specifiers can use either the old or new numbers in their contract documents to incorporate specifications for detention fixed exterior windows. **However, the Specifier shall not utilize both systems within the same set of construction documents.**

This standard indicates both CSI Section [11 19 00 (or 08 56 63)] for detention fixed exterior windows until all specifiers have switched to the new Format.



# CSI SECTION 11 19 00 (or 08 56 63) DETENTION FIXED EXTERIOR WINDOWS

## PART 1 - GENERAL

### 1.01 SUMMARY

This Section includes detention fixed exterior windows (single and multi-lite) as required to complete the work as shown on the contract drawings, schedules and as specified herein.

### 1.02 PRODUCTS PROVIDED UNDER THIS SECTION

- A. Detention fixed exterior [thermally broken] [bullet resistant] windows with [1 ½ hour] [3/4 hour] [1/3 hour] fire rating, as shown in the approved submittal drawings and specified herein.

### 1.03 RELATED SECTIONS

Section 11 19 00 - - - - Basic Detention Equipment Requirements  
Section 11 19 10 - - - - Detention Hollow Metal  
Section 11 19 30 - - - - Detention Glass and Glazing  
Section 11 19 45 - - - - Detention Bar Grating - Wire Mesh  
Section 11 19 46 - - - - Detention Bar Grating – Expanded Metal  
Section 11 19 70 - - - - Detention Wall Systems  
Section 11 19 80 - - - - Detention Cells

### 1.04 REFERENCES

- A. ANSI A 250.10 – 1998, Standard Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
- B. ANSI / NAAMM HMMA 801-98, Glossary of Terms for Hollow Metal Doors and Frames
- C. ANSI / NAAMM HMMA 866-01, Guide Specifications for Stainless Steel Hollow Metal Doors and Frames
- D. ANSI / NFPA 80-1999, Fire Doors and Windows
- E. ANSI / NFPA 257-2000, Methods for Fire Test of Window Assemblies
- F. ANSI / UL 9-2000, Fire Tests of Window Assemblies, 7th Edition
- G. ASTM A 627-03, Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities
- H. ASTM A 653 / A 653M-04a, Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dipped Process, (Commercial Steel)
- I. ASTM A 666-03, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
- J. ASTM A 1008 / A 1008M-04b, Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- K. ASTM A 1011 / A 1011M-04a, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- L. ASTM C 143 / C 143M-03, Standard Test Method for Slump of Hydraulic Cement Concrete
- M. ASTM E 283-04, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

- N. ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- O. ASTM E 331-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- P. ASTM E 547-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference
- Q. ASTM F 1592-01, Standard Test Methods for Detention Hollow Metal Vision Systems
- R. ICBO UBC 7-4 (1997), Fire Tests of Window Assemblies
- S. NAAMM HMMA 803-98, Steel Tables
- T. NAAMM HMMA-820 TN01-03, Grouting Hollow Metal Frames
- U. NAAMM HMMA 840-99, Installation and Storage of Hollow Metal Doors and Frames
- V. UL 752-00, 10th Edition, Bullet Resisting Equipment

ANSI American National Standards Institute, Inc.  
 25 W. 43rd Street  
 New York, NY 10036  
 Telephone: 212/642-4900 [www.ansi.org](http://www.ansi.org)

ASTM American Society for Testing and Materials  
*Also known as ASTM International*  
 100 Barr Harbor Drive  
 West Conshohocken, PA 19428-2959  
 Telephone: 610-832-9585 [www.astm.org](http://www.astm.org)

ICBO International Code Council – Los Angeles Office  
*Formerly known as International Conference of Building Officials*  
 Uniform Building Code  
 5360 Workman Mill Road  
 Whittier, California 90601-2298  
 Telephone: 592-692-4226 [www.icbo.org](http://www.icbo.org)

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NFPA National Fire Protection Association  
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 Quincy, MA 02269  
 Telephone: 617-770-3000 [www.nfpa.org](http://www.nfpa.org)

UL Underwriters Laboratories, Inc.  
 333 Pfingsten Road  
 Northbrook, Illinois 60062  
 Telephone: 708-272-8800 [www.ul.com](http://www.ul.com)

*The following standards are used only for “traditional” negative pressure fire test methods and should be deleted from the project specifications when positive pressure testing is required by the governing building code: NFPA-257 (1.04.E).*

*Conversely, the following standards are used for positive pressure fire tests, and should be deleted from project specifications requiring negative pressure fire tests: UL-9 (1.04.F) and UBC 7-4 (1.04.R).*



## 1.05 TESTING AND PERFORMANCE

- A. Detention Window Vision System Impact Test In Accordance With ASTM F 1592
1. A multi-light detention fixed exterior window assembly, overall dimensions of 50 in. width x 50 in. height (1270 x 1270 mm), shall be constructed in accordance with this specification, Section 2.01, and shall be impact tested in accordance with ASTM F 1592, Section 7.2, Table 1, Figure 2, [Grade #1],[Grade #2],[Grade #3] and/or [Grade #4] as specified herein. The test assembly shall meet the acceptance criteria in Section 7.2 in order to qualify under Section 1.05 of this specification.
- B. Air Infiltration Test in accordance with ASTM E283
1. A multi-light detention fixed exterior window assembly, overall dimensions of 48 in. width x 48 in. height (1219 x 1219 mm), shall be constructed in accordance with this specification, Section 2.01, and shall be air infiltration tested and shall allow no more than 0.06 CFM/ft<sup>2</sup> air leakage at a test pressure of 1.57 PSF in order to qualify under Section 1.05 of this specification.
- C. Structural Performance in accordance with ASTM E330
1. Uniform Load Deflection Test: The same assembly tested for air infiltration (paragraph B) shall be additionally tested for uniform Load Deflection first to the exterior (positive) side of the window, then to the interior (negative) side. No member shall deflect more than 1/175 of its span at 30 psf (STP) uniform static air pressure difference between opposite sides of the window in order to qualify under Section 1.05 of this specification.
  2. Uniform Load Structural Test: The same assembly tested for air infiltration (paragraph B) shall be additionally tested for uniform Load Structural at 45 psf (STP) uniform static air pressure difference between opposite sides of the window:
    - a. No glass breakage or permanent damage to fasteners, hardware parts, support arms, actuating mechanisms, or other damage which would cause the window unit to be inoperable.
    - b. Permanent deformation of individual frame or vent members shall not exceed 0.2 percent of its span
- D. Water Resistance Test in accordance with ASTM E331 and ASTM E547
1. The same assembly tested for air infiltration (paragraph B) shall be additionally tested for water resistance and shall allow no water to penetrate for 15 minutes when the window is subject to a rate flow of 5.0 U.S. gal/ft<sup>2</sup>-h with a differential pressure across the window unit of 2.86 PSF in order to qualify under Section 1.05 of this specification.
- E. Bullet Resistance Test
1. Where specified for individual openings, bullet resistance shall be certified by a materials testing laboratory acceptable to the Authority Having Jurisdiction (AHJ), and the windows shall bear the laboratory bullet resistance rating labels indicating compliance with the testing procedure described in UL Standard 752.

*The .44 Magnum Revolver is used in this specification because it is the most powerful commonly available handgun. According to prison officials, high powered rifles, if any are kept on the premises, would be securely locked in an armory. Handguns, however, could be obtained in a riot situation or can be concealed and smuggled into public or secure areas. For this reason it is recommended that all doors which are indicated on the door schedule to be bullet resistant be certified for the .44 Magnum Revolver.*

#### F. Labeled Fire Rated Windows

1. Windows provided for those openings requiring fire protection ratings shall be listed and/or classified, and shall bear the label of a recognized testing agency having a factory inspection service. Such windows shall be tested in accordance with [ANSI/NFPA 257] or [ANSI/UL 9] or [UBC 7-4] and constructed as listed by a recognized testing laboratory having a factory inspection service.
2. If any window specified by the Architect to be fire-rated cannot qualify for appropriate labeling because of its design or any other reason, the Architect shall be so advised in the submittal documents or prior to manufacture of the product if glazing or other options affecting the fire rating are unknown at the time of submittal document preparation.

### 1.06 QUALITY ASSURANCE

#### A. Manufacturer's Qualification

1. Manufacturers shall provide evidence of having personnel and plant equipment capable of fabricating detention fixed exterior window assemblies of the type specified herein.
2. Manufacturer shall provide evidence of a current and active written quality system, or ISO 9000 certification. Quality system documents shall provide evidence of periodic review and revision. Manufacturer shall provide certified test data and production samples as requested. Production material shall be of same design and construction as provided samples.

#### B. Quality Criteria

1. All detention fixed exterior window construction shall meet the requirements of Section 1.05 of these specifications. Fabricate assemblies in strict accordance with approved submittal drawings.
2. Fabrication methods and product quality shall meet standards set by the Detention Equipment Manufacturers Association (DEMA), a Division of the National Association of Architectural Metal Manufacturers (NAAMM), as set forth in these specifications.

### 1.07 SUBMITTALS

#### A. Submittal Drawings

1. Show door and window elevations and sections.
2. Show listing of opening descriptions including locations, material thicknesses, and anchors.
3. Show location and details of all openings.
4. Indicate performance grade levels on the submittal as they are shown on the contract documents.

#### B. Samples (if required)

1. Window: 1 ft. x 1 ft. (305 mm x 305 mm) corner section showing welding of head to jamb. Glazing stop shall be applied in both head and jamb section to show their intersection.
2. All samples submitted shall be of the production type and shall represent in all respects the minimum quality of work to be furnished by the manufacturer. No work represented by the samples shall be fabricated until the samples are approved, and any degradation of fabrication quality compared to the samples is cause for rejection of the work.

#### C. Test Report

1. Manufacturer shall submit to the Architect upon request, ten (10) days prior to bid date, an independent testing laboratory report certifying that detention fixed exterior window assemblies meet the performance requirements of Section 1.05 and are constructed in accordance with Sections 2.01, 2.02 and 2.03 of these specifications. Test reports shall comply with the reporting requirements outlined in ASTM F1592.

2. The manufacturer shall not proceed with fabrication without receipt of approved submittal drawings.

*The approved submittal drawings are the versions that have been provided to the hollow metal manufacturer at the time of release for fabrication. These drawings are considered part of the project contract documents.*

D. Qualifications

1. Manufacturer shall submit to the Architect upon request, ten (10) days prior to bid date, their qualifications as required by Section 1.06.

## PART 2 - PRODUCTS

### 2.01 DETENTION FIXED EXTERIOR WINDOWS

#### A. Materials

1. Window sections shall be [for Grades 3 and 4; 0.067 in. (1.7 mm)] [for Grades 1 and 2; 0.093 in. (2.3 mm)] minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653M Commercial Steel (CS Type B), coating designation A60 (ZF180) or G60 (Z180).
2. Where specified for severely corrosive conditions and where specified for individual openings, either interior or exterior: Window sections shall be [0.067 in. (1.7 mm)] [0.093 in. (2.3 mm)] minimum thickness. Window sections and components shall be stainless steel conforming to ASTM A 666, Type [304] [316]. Finishes for stainless steel detention fixed exterior windows shall comply with ANSI/NAAMM HMMA 866, required polish not to exceed #4.

#### B. Construction:

1. All windows shall have integral stops and be welded units of the sizes and types shown on approved submittal drawings. Windows shall be constructed in accordance with these specifications and shall meet performance criteria specified in Section 1.05. Alternate materials and methods of construction which meet the aforementioned performance criteria shall be permitted.
2. Finished work shall be neat in appearance, square, and free of defects, warps and buckles. Pressed steel members shall be straight and of uniform profile throughout their lengths.
3. Jamb, header, mullion and sill profiles shall be in accordance with the window schedule and as shown on the approved submittal drawings.
4. Corner joints shall have all contact edges closed tight with faces mitered and stops either butted or mitered. Corner joints shall be continuously welded and the use of gussets or splice plates is not acceptable.

*For detailed information on continuously welded corner joints, see Tech Note HMMA-820 TN02-03.*

5. All other face joints shall be continuously welded and finished smooth.
6. Height of stops on security glazing or panel openings shall be as shown on approved submittal drawings.
7. When shipping limitations or site access so dictate, or when advised by the contractor responsible for installation, windows for large openings shall be fabricated in sections designated for assembly in the field by others. Alignment plates or angles shall be installed at each joint. Such components shall be the same material and thickness as the window. Field joints shall be made in accordance with approved submittal drawings, and shall be field welded by others.
8. Windows for multiple openings shall have mullion members which, after fabrication, are closed tubular shapes conforming to profiles shown on approved submittal drawings, and having no exposed visible seams or joints. All joints between faces of abutted members shall be continuously welded and finished smooth. All joints between stops of abutted members shall be welded along the soffit and shall be left neat and uniform in appearance. The contractor responsible for installation shall provide for welding and finishing all field joints between faces of abutted members.
9. Jamb Anchors:
  - a. Anchor Spacing - The number of anchors provided on each jamb shall be as follows:
    1. Windows: 2 anchors plus 1 for each 18 in. (457 mm) or fraction thereof over 36 in. (914 mm), spaced at 18 in. (457 mm) maximum between anchors

- b. Masonry Type:
    - 1. Windows for installation in masonry walls shall be provided with adjustable jamb anchors of the strap and stirrup type made from the same thickness steel as window. Straps shall be no less than 2 in. x 10 in. (50.8 mm x 254 mm) in size, corrugated and/or perforated.
  - c. Embedment Masonry Type:
    - 1. Windows for installation in pre-finished masonry or concrete openings shall be provided with removable faces at the jambs, and 0.187 in. x 2 in. x 2 in. (4.7 mm x 50.8 mm x 50.8 mm) angle anchors 4 in. (102 mm) long. The window anchors shall be located to coincide with matching embedded anchors to be provided for installation in the wall.
    - 2. Embedded wall anchors shall consist of a 0.187 in. x 4 in. wide x 6 in. long (4.7 mm x 102 mm wide x 152 mm long) plate with 0.187 in. x 2 in. x 2 in. (4.7 mm x 50.8 mm x 50.8 mm) angle anchors 4 in. (102 mm) long welded in place at locations to match angle anchors in windows. The embedded plate shall be provided with two (2) #4 re-bar wall anchors 10 in. (254 mm) long minimum, with 2 in. (50.8 mm) x 90 degree turn down on ends continuously welded in place. Embedments shall be prime painted in accordance with Section 2.03.
    - 3. Angle anchors shall each be fastened to jamb and to embed plate with 1 in. (25.4 mm) long arc welds at each end where the anchor contacts the jamb and embed plate. Anchors shall be shipped loose.
    - 4. The complete anchorage system shall provide that the jamb faces be removed from the windows in the field by the contractor responsible for installation, and the windows be moved into the opening. Using the 0.187 in. x 2 in. x 2 in. x 4 in. (4.7 mm x 50.8 mm x 50.8 mm x 102 mm) long angles, the installer shall weld one edge of the angle to the embedded anchor and the other edge to the window mounted anchor forming a rigid connection between the window and the embedded plate. The procedure shall be repeated for all anchor positions. The installer shall field weld all anchors and install the jamb faces in place. Embedment anchoring details shall be provided on approved submittal drawings.
  - d. Expansion Bolt Type:
    - 1. Windows for installation in existing masonry or concrete walls shall be prepared for expansion bolt type anchors. The preparation shall consist of a countersunk hole for a 0.5 in. (12.7 mm) diameter bolt and a conduit spacer from the unexposed surface of the window to the wall welded within the jamb profile. The preparation shall be spaced as described in Section 2.03.B.10.a. Fasteners for such anchors shall be provided by the installer.
    - 2. After sufficient tightening of the bolt, the bolt head shall be welded by the installation contractor so as to provide a non-removable condition. The welded bolt head shall be ground dressed and finished smooth.
  - e. Windows to be installed in pre-finished concrete, masonry or steel openings, shall be constructed and provided with anchoring systems of suitable design as shown on the approved submittal drawings.
10. Grout guards shall be provided at all glazing stop screws on windows to be set in masonry or concrete openings. Grout guards shall be sufficient to protect preparations from grout of a 4 in. (102 mm) maximum slump consistency which is hand troweled in place. If pump grout that exhibits slump values of higher than 4 in. (102 mm) is used, additional precautions shall be taken in the field by the contractor to seal grout guards to prevent leakage and to brace window sections to prevent deformation. (Ref. HMMA-820 TN01-03, "Grouting of Hollow Metal Windows")

- a. Grout guards for glazing stop screws shall be factory installed and shall cover the exposed portion of the screws inside the frame throat, around the perimeter. Where mullions are required to be grouted, screws inside mullions shall be protected with grout guards.

*For detailed information on grouting of hollow metal frames, see Tech Note HMMA-820 TN01-03.*

11. Removable glazing stops:

- a. In openings where non-security glazing is specified, loose channel type glazing stops shall be cold rolled steel, not less than 0.067 in. (1.7 mm) thickness, butted at corner joints and secured to the window using #8-32 countersunk tamper resistant security screws, spaced 2 in. (50.8 mm) maximum from each end and 9 in. (228 mm) o.c. maximum.
- b. In openings where security glazing is specified and where shown on the approved submittal drawings, pressed steel angle glazing stops, not less than 0.093 in. (2.3 mm) thick, shall be provided. Angle stops shall be mitered or butted and tight fitting at the corner joints, and secured in place using 1/4 - 20 or 1/4 - 28 tamper resistant security screws spaced 2 in. (50.8 mm) maximum from each end and 6 in. (152 mm) o.c. maximum. The glazing stop system shall satisfy the performance criteria in Section 1.05.A.

*It is recommended that view window stop heights be specified to provide 1 in. (25.4 mm) glass engagement.*

- c. The window section underneath the glazing stops shall be treated for maximum paint adhesion and painted with a rust inhibitive primer. The inside of the glazing stops shall be treated for maximum paint adhesion and painted with a rust inhibitive primer, or shall be fabricated from zinc coated steel pursuant to Section 2.03.A.3.

12. Thermally Improved Construction:

- a. Fabricate framing with an integral, concealed, low-conductance thermal barrier, located between exterior materials and members exposed on interior in a manner that eliminates direct metal-to-metal contact.

**2.02 MANUFACTURING TOLERANCES**

*The manufacturer of the windows is responsible only for the manufacturing tolerances listed in Section 2.02.*

A. Manufacturing tolerance shall be maintained within the following limits:

1. Windows:

- a. Width, measured between rabbets at the head: Nominal opening width + 1/16 in. (1.6 mm), - 1/32 in. (0.8 mm).
- b. Height (total length of jamb rabbet): Nominal opening height + 1/16 in. (1.6 mm), - 1/32 in. (0.8 mm).

2. Cross sectional profile dimensions (see Figure 1):

- a. Face.....+/- 1/32 in. (0.8 mm)
- b. Stop .....+/- 1/32 in. (0.8 mm)
- c. Rabbet .....+/- 1/32 in. (0.8 mm)
- d. Depth .....+/- 1/32 in. (0.8 mm)
- e. Throat .....+/- 1/16 in. (1.6 mm)

Windows overlapping walls to have throat dimension 1/8 in. (3.1 mm) greater than wall thickness to accommodate irregularities in wall construction.

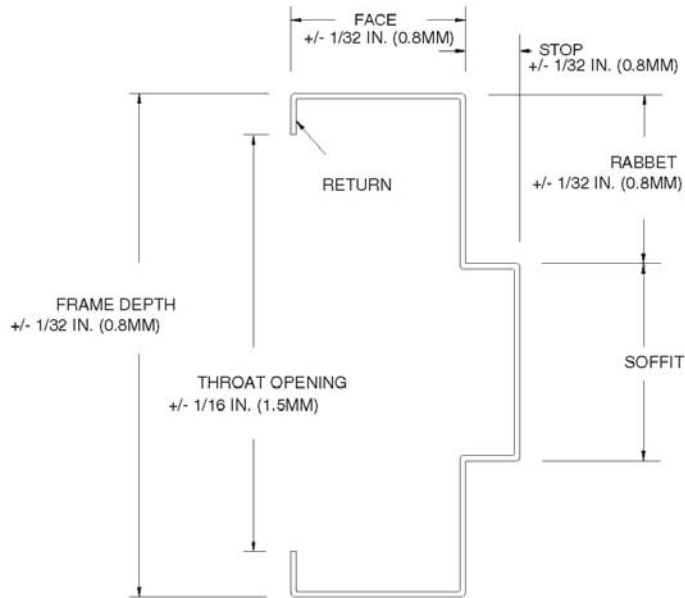


FIGURE 1

3. Flatness of large windows .....1/8 in (3.1 mm) in 10 ft (3048 mm) of length or width.

**2.03 FINISH**

- A. After fabrication, all tool marks and surface imperfections shall be filled and sanded as required to make face sheets, vertical edges and weld joints free from irregularities. After appropriate metal preparation, all exposed surfaces of detention fixed exterior windows shall receive a rust inhibitive primer, which meets or exceeds ANSI A 250.10, "Test Procedures and Acceptance Criteria for Prime Painting Steel Surfaces for Steel Doors and Frames". For stainless steel finishes refer to ANSI/NAAMM/HMMA 866.
- B. As an option detention fixed exterior windows shall receive a factory applied finish. Prior to painting, all surfaces shall be cleaned of rust, oil and other impurities by receiving a multi stage pre-treatment consisting of degrease and clear water rinse to condition the surface of the metal to resist and inhibit corrosion and promote paint adhesion. Windows shall then be coated with an approved TGIC Polyester powder coat paint, applied to a thickness (dry) and baked to a temperature as specified in the technical data for the specific powder used. Colors of finish coats shall be as indicated or specified.

*All primer and finish paint must be formulated for Direct to Metal (DTM) application.*

## PART 3 – EXECUTION

*Note to Architect: Proper storage and protection is essential to the proper performance of detention fixed exterior windows. The requirements for proper storage are given in the following sections. However, it is important to recognize that proper storage is not the responsibility of the detention fixed exterior window manufacturer. For this reason, the requirements for storage and protection of detention fixed exterior windows shall be referenced in that section of the specifications where installation of work is specified (Reference: HMMA 840 "Installation and Storage of Hollow Metal Doors and Frames").*

### 3.01 SITE STORAGE AND PROTECTION OF MATERIALS

- A. The contractor responsible for installation shall remove wraps or covers from detention fixed exterior windows upon delivery at the building site. The contractor responsible for installation shall ensure that any scratches or disfigurement caused in shipping or handling are promptly sanded smooth, cleaned and touched up with a compatible rust inhibitive Direct to Metal (DTM) primer.
- B. The contractor responsible for installation shall ensure that materials are properly stored on planks or dunnage in a dry location. Detention fixed exterior windows shall be stored in a vertical position and spaced by blocking. Figure 2 illustrates recommended storage positioning. Materials shall be covered to protect them from damage but in such a manner as to permit air circulation.

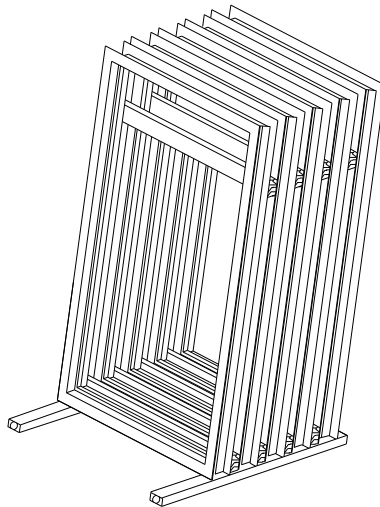


FIGURE 2

*Note to Architect: Correct installation is essential to the proper performance of detention fixed exterior windows. The requirements for proper installation are given in the following sections. However, it is important to recognize that installation is not the responsibility of the detention fixed exterior window manufacturer. For this reason, the requirements for installation of detention fixed exterior windows shall be referenced in that section of the specifications where installation of work is specified. It is the responsibility of the general contractor using experienced personnel to perform the work outlined in this section.*

### 3.02 INSTALLATION

- A. The maximum tolerances that should be permitted in respect to squareness, plumbness, alignment and twist of the installed window are shown in Figure 3.



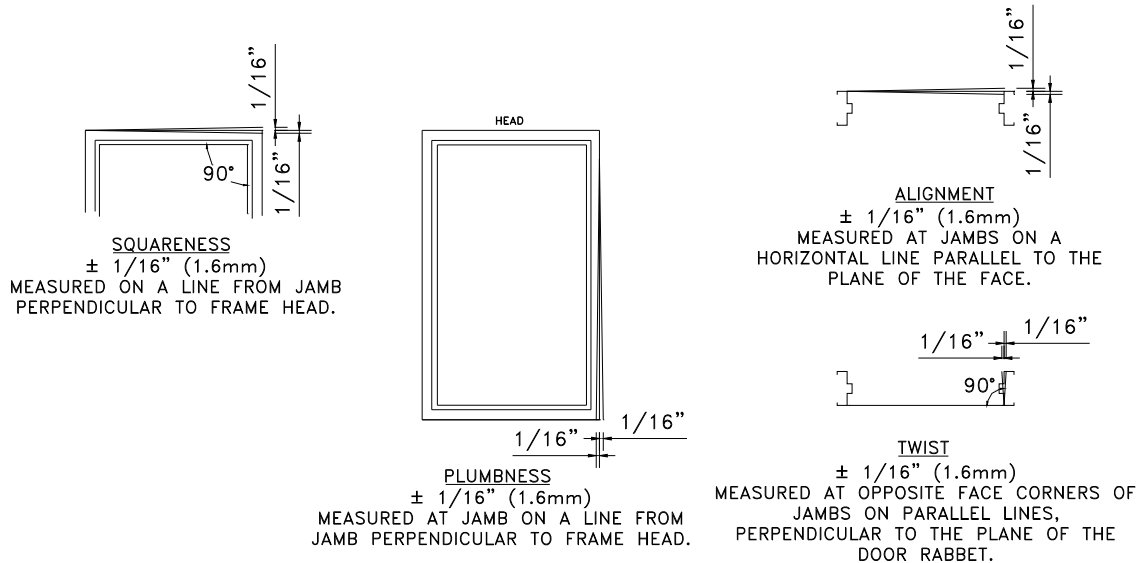


FIGURE 3

- B. Protecting the window from accidental abuse, build walls to the window while maintaining proper alignment. Check plumb and square as wall progresses (see Figure 4).

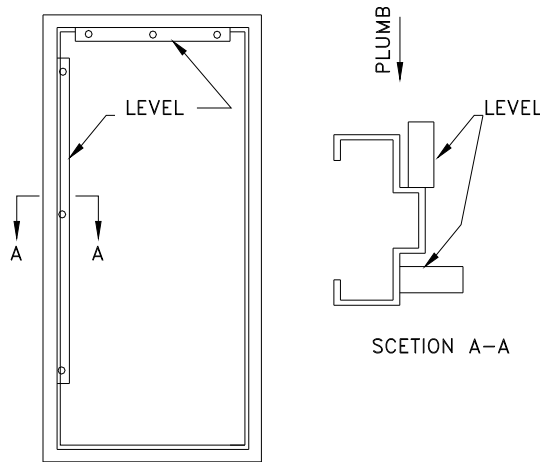


FIGURE 4

- C. Window members shall be fully grouted to provide added security protection against battering, wedging, and spreading of the window. Grout guards for glazing stop screws are intended to protect exposed removable screws from masonry grout of 4 in. (102 mm) maximum slump consistency which is hand troweled in place. If a light consistency grout (greater than 4 in. (102 mm) slump in accordance with ASTM C 143 / C 143M) is to be used, special precautions shall be taken in the field by the installation contractor to protect tapped holes in the windows.
1. Large window sections are not intended or designed to act as forms for grout or concrete. Grouting of large hollow metal sections shall be done in "lifts" or precautions shall be otherwise taken by the contractor to insure that windows are not deformed or damaged by the hydraulic forces that occur during this process.
  2. The drawbacks and benefits associated with the use of water based masonry grouts, with or without antifreeze agents, should be carefully weighed during the detailing and specification process. Plaster based grouts should not be used under any circumstances. Refer to NAAMM's HMMA TechNotes HMMA-820 TN01-03, "Grouting Hollow Metal Frames"

- D. Any grout or other bonding material shall be cleaned off of windows or doors immediately following installation. Exposed window surfaces shall be kept free of grout, tar, or other bonding material or sealer.
- E. Exposed field welds shall be finished smooth and touched up with a rust inhibitive primer.
- F. Primed or painted surfaces which have been scratched or otherwise marred during installation, cleaning, and/or field welding, shall promptly be finished smooth, cleaned, treated for maximum paint adhesion and touched up with a rust inhibitive Direct to Metal (DTM) primer comparable to and compatible with the shop applied primer and finish paint specified in Section 09900 [09 90 00]. All touch-up primer and finish paint must be formulated for DTM application.
- G. Finish paint in accordance with Section 09900 [09 90 00].
- H. Install glazing materials in accordance with manufacturers' installation instructions and related Section 11 19 30.

**END OF SECTION**

# APPENDIX

## (Not Part of the Standard)

### STEEL TABLES

Prior to 1970, sheet steel was referred to by gage. ASTM and ANSI currently do not list gage numbers in their standards. Like many generic terms, gage (or gauge) is ingrained in many vocabularies and is misunderstood as a term for thickness. NAAMM is publishing this minimum thickness table to be used instead of discontinued gage numbers.

The values shown were taken from the Underwriters Laboratories, Inc. publication for gage number and equivalent thickness.

<b>MINIMUM THICKNESS</b>		
Uncoated Steel Sheet		
Gage	Decimal	mm
4	0.214	5.4
5	0.199	5.0
6	0.184	4.6
7	0.167	4.2
8	0.152	3.8
10	0.123	3.1
12	0.093	2.3
14	0.067	1.7
16	0.053	1.3
18	0.042	1.0
20	0.032	0.8
22	0.026	0.6
24	0.020	0.5
26	0.016	0.4
28	0.013	0.3

<b>CONVERSION</b>		
Fraction	Decimal	mm
	1.000	25.4
15/16	0.937	23.8
7/8	0.875	22.2
13/16	0.812	20.6
3/4	0.750	19.0
11/16	0.687	17.4
5/8	0.625	15.8
9/16	0.562	14.2
1/2	0.500	12.7
7/16	0.437	11.1
3/8	0.375	9.5
5/16	0.312	7.9
1/4	0.250	6.3
3/16	0.187	4.7
1/8	0.125	3.1
1/16	0.062	1.5

## ASTM F 1592 TABLE 1, FIGURE 2

Performance grades for each opening shall be as indicated on the contract documents. Performance test requirements for each opening shall be as indicated for individual grade number designations shown in the tables. Test procedures shall be performed on window designs as described in Section A.

ASTM F 1592, TABLE 1: IMPACT SERIES FOR FRAME AND GLAZING/PANEL IMPACT TEST MULTILIGHT FRAME						
Sequence A	Number of Blows Grade 1	Number of Blows Grade 2	Number of Blows Grade 3	Number of Blows Grade 4	Impact Energy Of Each Blow Ft. Lbf. (J)	Location of Blows
1	600	400	200	100	200 (271.2)	<b>Frame</b> On the frame joint between the vertical mullion and the sill or head (test agent to select at time of test).
2	600	400	200	100	200 (271.2)	On the frame joint between the horizontal mullion and the jamb (either side, test agent to select at time of test).
3	600	400	200	100	200 (271.2)	On the frame joint where the vertical and horizontal mullions cross.
4	600	400	200	100	200 (271.2)	On the frame joint between the jamb and sill or head (either side, test agent to select at time of test).
5	600	400	200	100	200 (271.2)	<b>Glazing</b> On the glazing/panel at the corner of the glazing/panel within 6 in. (15.2 cm) of the frame stop. Corner selected by the test agent at time of test.
6	600	400	200	100	200 (271.2)	On the glazing/panel at the center of the glazing/panel. Glazing/panel to be selected by the test agent at time of test.
Cyclic Sequence	200	200	100	50		

*A. The cyclic sequence of impacts will be as indicated by the grade number and then move to the next sequence number location. If the testing agent observes a location in the assembly where failure is beginning to occur, the testing agent may alter the test sequence to attack the weakened location.*



## **GUIDE SPECIFICATIONS BY DETENTION EQUIPMENT MANUFACTURERS ASSOCIATION (DEMA)**

**NAAMM / DEMA 11 19 00 – Basic Detention Equipment Requirements**

**NAAMM / DEMA 11 19 10 (HMMA 863) - Detention Hollow Metal**

**NAAMM / DEMA 11 19 20 - Detention Hardware**

**NAAMM / DEMA 11 19 30 - Detention Glass and Glazing**

**NAAMM / DEMA 11 19 40 - Detention Furnishing and Accessories**

**NAAMM / DEMA 11 19 45 - Detention Bar Grating – Wire Mesh**

**NAAMM / DEMA 11 19 46 - Detention Bar Grating – Expanded Metal**

**NAAMM / DEMA 11 19 50 - Detention Fixed Exterior Windows**

**NAAMM / DEMA 11 19 60 - Detention Wall Systems**

**NAAMM / DEMA 11 19 70 - Detention Ceiling**

**NAAMM / DEMA 11 19 80 - Detention Cells**

**NAAMM / DEMA 11 19 90 - Detention Electronics**