

Paladin Series Tornado Resistance Specification

FOREWORD

This Steelcraft specification, for Paladin Series tornado resistant doors and frames has been prepared in accordance with the CSI recommended format with Part 1-General, Part 2-Product and Part 3-Execution. Inapplicable provisions should be deleted, appropriate selections should be made where there are choices, and provisions applicable to the job should be added where necessary. Notes and instructions to specifiers are in italics directly following the paragraphs to which they apply. Dates for ASTM and other standards have been omitted. Specifiers should use the latest dates when preparing job specifications.

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steel doors
- B. Steel frames
- C. Steel architectural stick systems

1.02 RELATED SECTIONS

<i>Spec Writer's Note:</i>	<i>Edit the following related sections. Delete sections not applicable.</i>
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- A. Section 08210 - Wood Doors
- B. Section 08220 - Plastic Doors
- C. Section 08710 - Door Hardware
- D. Section 08800 - Glazing
- E. Section 09900 - Paints and Coatings
- F. Section 13710 - Intrusion Detection: Security system
- G. Section 13800 - Building Automation and Control: Building monitoring system
- H. Section 16123 - Building Wire and Cable: Power supply to electric hardware devices

1.03 REFERENCES

<i>Spec Writer's Note:</i>	<i>It is the intent of this specification that all hollow metal and its application will comply or exceed the standards as listed. The latest published edition of each reference applies</i>
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- A. ASTM - American Society for Testing and Materials
 - 1. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 924 - Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot Dip Process.
 - 3. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, High Strength Low-Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
 - 4. ASTM E 90 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
 - 5. ASTM E 413 - Classification for Rating Sound Insulation.
- B. ANSI - American National Standards Institute
 - 1. ANSI/DHI A115 - Specifications for Hardware Preparations in Standard Steel Doors and Frames.

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2. ANSI/DHI A115.IG - Installation Guide for Doors and Hardware.
 3. ANSI A156.7 - Hinge Template Dimensions.
 4. ANSI A 250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
 5. ANSI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing.
 6. ANSI A 250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames.
 7. ANSI A 250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
 8. ANSI/SDI 250.11 - Recommended Erection Instructions for Steel Frames
- C. SDI - Steel Door Institute
1. SDI 105 - Recommended Erection Instructions for Steel frames.
 2. SDI 111 - Recommended Details and Guidelines for Standard Steel Doors and Frames and Accessories.
 3. SDI 112 - Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames.
 4. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.
 5. SDI 118 - Basic Fire Door Requirements.
 6. SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
 7. SDI 124 - Maintenance of Standard Steel Doors and Frames.
- D. NAAMM/HMMA - Hollow Metal Manufacturers Association
1. HMMA 840 - Guide Specification for Installation and Storage of Hollow Metal Doors and Frames
 2. HMMA 820 TN01- Grouting Hollow Metal Frames
 3. HMMA 820 TN03 – Guidelines for Glazing of Hollow Metal Transom, Sidelight and Windows

Spec Writer's Note:	<i>Delete the standards which are not applicable to your area</i>
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- E. Building Code references
1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
 2. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives
 3. NFPA 252 – Standard Method of Fire Tests of Door Assemblies
 4. ANSI/UL 10C - Standard for Safety for Positive Pressure Fire Tests of Door Assemblies
 5. UL 1784 - Air Leakage Tests of Door Assemblies
 6. UL - Building Materials Directory; Underwriters Laboratories Inc
 7. WH - Certification Listings; Warnock Hersey International Inc.
 8. Federal Emergency Management Agency (FEMA) 361 Guidelines

1.04 REQUIREMENTS OF REGULATORY AGENCIES:

- A. Doors and frames: conform to applicable codes for fire ratings. It is the intent of this specification that door hardware and its application comply or exceed the standards for labeled openings. In case of conflicts in required fire protection ratings, provide fire ratings as required by NFPA and UL.

1.05 SUBMITTALS

- A. Submit for review six (6) complete copies of the hollow metal shop drawings covering complete identification of items required for the project. Include manufacturer's names and identification of product. Included six (6) complete copies of catalog cuts and/or technical data sheets and other pertinent data as required to indicate compliance with these specifications.

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1. Shop Drawings: submit complete and detailed with respect to quantities, dimensions, specified performance, and design criteria, materials and similar data to enable the Architect to review the information as required.
 2. Include test documentation validating compliance with FEMA-361 and code requirements.
- B. Indicate frames configuration, anchor types and spacing, location of cutouts for hardware, reinforcement, to ensure doors and frames are properly prepared and coordinated to receive hardware.
- C. Indicate door elevations, internal reinforcement, closure method.
- D. Submit manufacturer's installation instructions, including a current copy of ANSI A250.11 as part of the shop drawing submittal.
- E. Shop drawings, product data, and samples: stamp with Contractor's stamp verifying they have been coordinated and reviewed for completeness and compliance with the contract documents.
- F. Shop drawings submitted without the above requirements will be considered incomplete, will NOT be reviewed, and will be returned directly to the Contractor.
- G. Follow the same procedures for re-submittal as the initial submittal with the appropriate dates revised.
- H. Provide evidence of manufacturer's membership in the Steel Door Institute.

1.06 QUALITY ASSURANCE

- A. Select a qualified hollow metal distributor who is a direct account of the manufacturer of the products furnished. In addition, that distributor must have in their regular employment an Architectural Hardware Consultant (AHC), a Certified Door Consultant (CDC) or an Architectural Openings Consultant (AOC), who will be available to consult with the Architect and Contractor regarding matters affecting the door and frame opening.
- B. Conform to requirements of the above reference standards. Submit test reports upon request by the Owner or Architect.
- C. Underwriters' Laboratories and Intertek Testing Services / Warnock Hersey, labeled fire doors and frames:
1. Label fire doors and frames listed in accordance with Underwriters Laboratories standard UL10C, and Positive Pressure Fire Tests of Door Assemblies.
 2. Construct and install doors and frames to comply with applicable issue of ANSI/NFPA 80.
 3. Manufacture Underwriters' Laboratories labeled doors and frames under the UL factory inspection program and in strict compliance to UL procedures, and provide the degree of fire protection, heat transmission and panic loading capability indicated by the opening class.
 4. Manufacture Intertek Testing Services / Warnock Hersey labeled doors and frames under the ITS/WH factory inspection program and in strict compliance to ITS/WH procedures, and provide the degree of fire protection capability indicated by the opening class.
 5. Affixed physical label or approved marking to fire doors and/or fire door frames, at an authorized facility as evidence of compliance with procedures of the labeling agency. Labels to be metal,

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paper or plastic. Stamped or die cast labels are not permitted. Labels are not to be removed, defaced or made illegible while the door is in service as covered in NFPA Pamphlet 80.

6. Conform to applicable codes for fire ratings. It is the intent of this specification that hardware and its application comply or exceed the standards for labeled openings. In case of conflict between types required for fire protection, furnish type required by NFPA and UL.

Spec Writer's Note:	Choose the appropriate Severe Storm Products where applicable. Delete this section if not applicable.
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D. Severe Storm Products:

1. Tornado Doors: Door Systems for Federal Emergency Management Agency (FEMA) community shelters and other areas of refuge meeting the design wind pressures and missile impact loads as detailed in the National Performance Criteria for Tornado Shelters as published by FEMA.

E. Manufacturer Qualifications: Member of the Steel Door Institute.

F. Installer: Minimum five years documented experience installing products specified in this Section.

Spec Writer's Note:	Include paragraph 1.07 if product samples are required by the architect or owner. Delete 1.07 if samples are not required.
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1.07 SAMPLES:

- A. If requested by the Architect, submit a 18" X 24" cut-away sample door with provisions for lockset, hinge and corner section of frame.
 1. Construct door sample to show vertical edge construction, top and bottom construction, insulation, face stiffeners, hinge, and other applied hardware reinforcements. Include louver sections and glazing stop where applicable.
 2. Construct frame sample to show frame profile, welded corner joint, welded hinge reinforcement, dust cover boxes, floor anchors and wall anchors. Include panel and louver sections and glazing stops where applicable.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Storage of Doors

1. Store doors vertically in a dry area, under proper cover. Place the units on at least 4" high wood sills on floors in a manner that will prevent rust and damage. Avoid storage in non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. If the door becomes wet, or moisture appears, remove protective wrapping immediately. Provide a 4" space between the doors to permit air circulation. Proper storage is required to meet the requirements of ANSI/SDI A250.10 and HMMA 840.

B. Storage of Frames

1. Store frames in an upright position with heads uppermost under cover on 4" wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. Store assembled frames in a

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vertical position, five units maximum in a stack. Provide a 2" space between frames to permit air circulation.

2. Provide proper storage for doors and frames, to maintain the quality and integrity of the factory applied paint, and maintain the requirements of ANSI/SDI A250.10 and HMMA 840.
3. Sand, touch up and clean prime painted surfaces prior to finish painting in accordance with the manufacturer's instructions.

1.09 COORDINATION

- A. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices and recessed items.
- B. Coordinate work with frame opening construction, door and hardware installation.
- C. Sequence installation to accommodate required door hardware.
- D. Verify field dimensions for factory assembled frames prior to fabrication.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Acceptable manufacturers for doors and frames specified are listed below. Only the products of the listed manufacturers will be accepted. No alternates will be accepted.
 1. Steelcraft, Cincinnati, Ohio
- B. Provide steel doors and frames from a single manufacturer.

2.02 DOORS:

- A. Construct exterior/interior doors to these designs and gages:

Spec Writer's Note:	<i>Choose one of the appropriate steel thickness and type.</i>
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1. Exterior Doors: Zinc-Iron Alloy-Coated galvanized steel, ASTM A 653, Class A60, 18 gage [0.042" (1mm)], 16 gage [0.053" (1.3mm)] or 14 gage [0.067" (1.7mm)] Zinc-Iron Alloy-Coated galvanized steel, with closed tops.
 - a. Include galvanized components and internal reinforcements with galvanized doors.
2. Interior Doors: Cold-rolled steel, A 1008, 20 gage [0.032" (.8mm)], 18 gage [0.042" (1mm)], or 16 gage [0.053" (1.3mm)] cold rolled or galvanized steel.
 - a. Include galvanized components and internal reinforcements with galvanized doors.

Spec Writer's Note:	<i>GrainTech and finish paint are finish options. Delete these options when not applicable.</i>
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3. Factory prime painted doors indicated on door schedule as HM.
4. Hardware Reinforcements:
 - a. Hinge reinforcements for full mortise hinges: minimum 7 gage [0.180" (4.7mm)].
 - b. Lock reinforcements: minimum 16 gage [0.053" (1.3mm)].
 - c. Closer reinforcements: minimum 14 gage [0.067" (1.7mm)], 20" long.
 - d. Projection welded hinge and lock reinforcements to the edge of the door.
 - e. Provided adequate reinforcements for other hardware as required.
- B. Tornado Door Systems: comply with Federal Emergency Management Agency (FEMA) 361 Guidelines and provides the highest level of security and safety for tornado shelters and severe storm areas of refuge.
 1. Acceptable Product:
 - a. Steelcraft Paladin Tornado Door Systems.
 - 1 Steelcraft: P
 - 2 Curries: Stormpro
 2. Face sheets: 14 gage [0.067" (1.7mm)] hot-dipped galvanized steel having an A60 zinc-iron alloy coating conforming to ASTM designations A653 and A924.
 3. Hinge and lock edges: include continuous vertical mechanical joints with edge seams welded, filled and ground smooth.
 4. Bevel hinge and lock door edges 1/8 inch (3 mm) in 2 inches (50 mm). Square edges on hinge and/or lock stiles are not acceptable
 5. Galvanized 14 gage [0.067" (1.7mm)] top and bottom steel reinforcement channels projection welded to both face sheets on 4 inches (102 mm) centers.
 6. Hinge reinforcements: minimum 7 gage [0.167" (4.4mm)] galvanized steel, projection welded to the edge of the door.
 7. Reinforce door faces with 18 gage [0.042" (1.0mm)] vertical stiffeners manufactured from steel conforming to ASTM A653 and A924 and welded to each face sheet.
 8. Reinforce lock stiles with full-height 12 gage [0.093" (2.5mm)] channels.
 9. Fire Rated Doors: Provide door units bearing Labels for fire ratings required in locations indicated.

Spec Writer's Note:***Electrified access control is an option. Delete section if not applicable.*****C. Electrical Requirements:**

1. General: Coordinate electrical requirements for doors and frames. Make provisions for installation of electrical items arranged so that wiring can be readily removed and replaced.

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2. Doors with Electric Hinges:

- a. General: Furnish conduit raceway to permit wiring from electric door hardware.
- b. Hinge Locations: Provide electric hinge at intermediate or center location. Top or bottom electric hinge locations are not acceptable.
- c. Refer to 08710 for electrified hardware items.

2.03 DOOR FRAMES:

- A. Construct exterior and metal door frames to these profiles, designs and gages;

Spec Writer's Note:	<i>Choose one of the appropriate steel thickness and type</i>
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- 1. Frames: Zinc-Iron Alloy-Coated galvanized steel, ASTM A 653, Class A60, 14 gage [0.067" (1.7mm)] steel.
- 2. Include galvanized components and internal reinforcements with galvanized frames.
- B. Flush Frames: knocked down for field assembly or set-up and welded with temporary shipping bars. Factory die-mitered corner connections reinforced with four integral tabs to secure and interlock at jams to head. Unless otherwise indicated, frame will have 2" faces and 5/8" stops. Frame depths per the architectural door schedule.
 - 1. Provide frames with a minimum of six wall anchors and two adjustable base anchors of manufacturer's standard design. Acceptable products:
 - a. Steelcraft: FP14
 - 2. Provide welded 3 sided frames as follows:

Spec Writer's Note:	<i>Select the appropriate welding process and delete the not applicable section.</i>
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- a. Face welded: Weld miter joints between head and jamb faces completely along their length either internally or externally. The remaining elements of the frame profile (soffit, stop and rabbets) are not welded. Grind and finish face joints smooth.
 - b. Full profile welded:
 - 1 Weld miter joints between head and jamb faces completely along their length either internally or externally.
 - 2 Internally weld perimeter profile joints full length of soffit and rabbets with hairline seams on external meeting surfaces. Grind and finish face joints smooth.
- C. Prepare frames to receive inserted type door silencers (3) per strike jamb on single doors, and (2) per head for pair of doors. Stick-on silencers are not permitted.
- D. Frame Hardware Reinforcements
 - 1. Mortise hinge reinforcement: minimum 7 gage [0.180" (4.7mm)].

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- a. Provide high frequency hinge reinforcement for top hinge on all exterior, cross corridor, and stairwell frames, in accordance with SDI 111-H, Example "A" Application, where full mortise hinges are specified.
2. Strike reinforcements: minimum 16 gage [0.053" (1.3mm)] and prepared for an ANSI-A115.1-2 strike.
3. Closer reinforcement: minimum 14 gage [0.067" (1.7mm)] steel.
4. Projection weld hinge and strike reinforcements to the door frame.
5. Provide metal plaster guards for all mortised cutouts.
6. Include galvanized hardware reinforcements in all galvanized frames.

Spec Writer's Note:***Electrified access control is an option. Delete section if not applicable.*****E. Electrical Requirements:**

1. General: Coordination all electrical requirements for doors and frames. Make provisions for installation of electrical items arranged so that wiring can be readily removed and replaced.
 - a. Provide cutouts and reinforcements required for metal door frame to accept electric components.
 - b. Frame with Electrical Hinges: Weld UL listed grout guard cover box welded over center hinge reinforcing. Top or bottom hinge locations are not permitted. Contractor to reference 3.01.E, for continuous hinges.
 - a. Provide cutouts and reinforcements required to accept security system components.
 - b. Refer to 08710 for electrified hardware items.

Spec Writer's Note:***Use paragraph #2 only when monitoring switch are required***

2. Provide mortar box, welded in head of door frame at exterior frames for future door contact switch provided by Owner. Size, type, location and conduit requirements to be provided by Owner.

2.05 FABRICATION:**A. Face Welded Frames:**

1. Continuous face weld the joint between the head and jamb faces along their length either internally or externally. Grind, prime paint, and finish smooth face joints with no visible face seams.
2. Externally weld, grind, prime paint, and finish smooth face joints at meeting mullions or between mullions and other frame members per a current copy of ANSI/SDI A250.8.

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3. Provide two temporary steel spreaders (welded to the jambs at each rabbet of door openings) on welded frames during shipment. Remove temporary steel spreaders prior to installation of the frame.

2.06 FINISH:

- A. Doors, frames and frame components are required to be cleaned, phosphatized, and finished with one coat of baked-on rust inhibiting prime paint in accordance with the ANSI/SDI A250.10 "Test Procedures and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."

PART 3 EXECUTION:**3.01 INSTALLATION:**

- A. Install doors and frames in accordance with Steel Door Institute's recommended erection instructions for steel frames ANSI A250.11.
- B. Install label doors and frames in accordance with NFPA-80.
- C. Remove temporary steel spreaders prior to installation of frames.
- D. Set frames accurately in position; plumb, align and brace until permanent anchors are set. After wall construction is complete, remove temporary wood spreaders.
 1. Field splice only at approved locations indicated on the shop drawings. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.
- E. Provide full height 3/8" to 1-1/2" thick strip of polystyrene foam blocking at frames requiring grouting where continuous hinges are specified. Apply the strip to the back of the frame, where the hinge is to be installed, to facilitate field drilling or tapping.
- F. Where grouting is required in masonry, provide and install temporary bottom and intermediate wood spreaders to maintain proper width and avoid bowing or deforming of frame members. Refer to ANSI A250.11-2001, Standard.
 2. Hollow Metal Frames to receive grouting: comply with a current copy of ANSI/SDI Standard A250.8, paragraph 4.2.2, whereby grout will be mixed to provide a 4" maximum slump consistency and hand troweled into place. Do not use grout mixed to a thinner, pumpable consistency; this practice is not recommended and not permissible. Refer to HMMA 820 TN01 Grouting Hollow Metal Frames.
- G. Provide a vertical wood brace during grouting of frame at openings over 4'0" wide, to prevent sagging of frame header.
- H. Glaze and seal exterior transom, sidelight and window frames in accordance with HMMA-820 TN03.
- I. Apply hardware in accordance with hardware manufacturers' instructions and Section 08710 FINISH HARDWARE of these Specifications. Install hardware with only factory-provided fasteners. Adjust door installation to provide uniform clearance at head and jambs, to achieve maximum operational effectiveness and appearance.

3.02 ADJUSTING:

- A. Final Adjustments: Adjust operating doors and hardware items just prior to final inspection and acceptance by the Owner and Architect. Leave work in complete and proper operating condition.

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Remove and replace defective work, including doors or frames that are damaged, bowed or otherwise unacceptable.

- B. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touch-up of compatible air-drying primer.

3.03 PROTECTION

- A. Provide protective measures required throughout the construction period to ensure that door and frame units will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION