International Code Council

ICC 500-2023 edition

Comments on the 1st draft based on input received on 2020 edition of the ICC 500 Standard

9-7-2023

For September, 2023 Meeting – Teleconference

Matrix for ICC 500 Comments

Matrix for ICC 500 Comments

Revisions to the text are in legislative format – strikeout of what is to be removed, and underlined for new. Revised text in the proposals in red is to highlight the changes in a proposal where it was difficult to find the revision quickly.

Staff notes located in this document after a proponents reason are provided to indicate proposals that may require coordination; technical information; or terminology that is not good code language (e.g. "may" or "guarantee", the use of "when" where the use is not a function of time). Staff notes are provided to assist the committee or proponent for possible modification. It is not intended to provide an opinion.

Proposal #	Section Number	Date of meeting proposal considered	Committee Action	Comment #	Date of meeting proposal considered	Commi Action
CHAPTER 1 APPLICATION AND ADMINISTRATION						
IS-STM 01-02-23	106.1	2-23-2023	AS 11-0-0	BC1		
IS-STM 01-07-23	107.1, 107.2, 107.3	3-6-2023	AS 11-0-0	BC1		
IS-STM 01-08-23	107.3, 108, 109, 110, 111, 112, 114	3-6-2023	AS 11-0-0	BC1		
IS-STM 01-09-23	108.3(New), 113.2, 113.3.3(New), 113.4	5-30-2023	AM 9-1-0	BC1		
CHAPTER 2 DEFINITIONS						
IS-STM 02-01-23	202	3-6-2023	AS 12-0-0	BC1		
CHAPTER 3 STRUCTURAL DESING AND TESTING CRITERIA						
IS-STM 03-02-23	203, 301.4(New), 302.5(New), 304, Table 305.1.1, Chapter 9	5-4-2023 6-15-2023	Split 10-0-0 Part A AM 10-0-0 Part B AM 9-0-0 Reconsideration AM 11-0-0	BC1		
				BC2		
				BC3		
				BC4		
				PC5		
				PC6		
IS-STM 03-08-23	306.4.1.1, 306.5	5-18-2023	AM 7-4-0	BC1		
IS-STM 03-10-23	306.4.1.5(New)	5-4-2023	AM 7-1-0	PC1		
IS-STM 03-11-23	306.5, 306.5.1(New), 306.5.2(New), 306.5.2.1(New), 306.5.2.2(New)	6-6-2023	AM 8-0-0	BC1		
				PC2		

Proposal #	Section Number	Date of meeting proposal considered	Committee Action	Comment #	Date of meeting proposal considered	Commi Action
CHAPTER 4 SITING						
CHAPTER 5 OCCUPANT, DEINSITY, ACCESS, ACCESSIBILITY, EGRESS AND SIGNAGE						
IS-STM 05-06-23	504.1, 504.3, 504.4, 504.5, 505.2, 505.3, 505.3.1, 506.1, 506.3, 506.3.1, 506.5	4-20-2023	Item 1 – AM 10-0-0 Item 2 – AM 10-0-0 Item 3 – AM 10-0-0 Item 4 – AM 9-0-0 Item 5 – AM 10-0-0	BC1		
IS-STM 05-07-23	504.6	4-20-2023	AM 8-1-0	BC1		
IS-STM 05-08-23	504.6	4-20-2023	AM 8-0-1	BC1		
IS-STM 05-09-23	504.6	4-20-2023 5-30-2023	AM 8-1-0 AM 10-1-0	BC1		
CHAPTER 6 FIRE SAFETY						
CHAPTER 7 STORM SHELTER ESSENTIAL FEATURES AND ACCESSORIES						
IS-STM 07-02-23	701.2 (twice), 702.1, 703.1	6-15-2023	AS 9-1-1	BC1		
				PC2		
				PC3		
IS-STM 07-12-23	703.7.3	6-15-2023	AM 10-0-1	BC1		
CHAPTER 8 TEST METHODS FOR IMPACT AND PRESSURE TESTING						
IS-STM 08-03-23	803.9.1	5-30-2023	AS 11-0-0	PC1		Editoria
				PC2		
IS-STM 08-05-23	803.9.4.3, Figure 803.9.4.3	5-30-2023	AS 11-0-0	BC1		Editoria
				PC2		
IS-STM 08-06-23	202, 803.9.5	5-30-2023	AM 12-0-0	PC1		
				PC2		
				PC3		
				PC4		
IS-STM 08-10-23	803.9.6	6-15-2023	AM 10-0-0	PC1		
				PC2		
IS-STM 08-13-23	803.10.1, 803.10.4	6-15-2023	D 7-1-0	BC1		
				BC2		
IS-STM 08-15-23	805.3.2	5-30-2023	AS 12-0-0	PC1		
IS-STM 08-16-23	805.4(New), 805.4.1(New), 805.4.2(New), 805.4.3(New)	6-6-23	AM 11-0-0	PC1		

Proposal #	Section Number	Date of meeting proposal considered	Committee Action	Comment #	Date of meeting proposal considered	Commi Action
IS-STM 08-17-23	805.5(New)	6-6-23	AM 11-0-0	PC1		
CHAPTER 9 REFERENCE STANDARDS						
IS-STM 09-01-23	Chapter 9	6-1-2023	AS 8-0-0	BC1		
APPENDIX STORM SHELTER PREPAREDNESS AND EMERGENCY OPERATIONS PLAN (SSPEOP)						

Chapter 1
APPLICATION AND ADMINISTRATION

IS-STM 01-02-23
106.1

Proponent: ICC 500 Work Group 1

Revise as follows:

SECTION 106
SUBMITTAL DOCUMENTS

106.1 General. Submittal documents consisting of construction documents and other documentation shall be prepared and submitted to the authority having jurisdiction with each permit application. Such documents shall contain information as required by the applicable code and this standard. Storm shelter construction documents~~, including the design information listed in Section 106.2.1,~~ shall be prepared and sealed by a registered design professional.

Reason: Why is the design information highlighted, but not 106.2.3 - 106.2.6? All submittal documents listed under section 106 shall be prepared and sealed by a RDP.

Committee Action: Approval as submitted (Vote:11-0-0)
Modification (if any):
Committee Reason: All submittal documents listed under section 106 shall be prepared and sealed by a RDP.

IS-STM 01-02-23 Ballot Comment 1
104.1, 106.2, 202, A101.3

Proponent: Gary Ehrlich

Further revise as follows:

SECTION 104
CONSTRUCTION AND OCCUPANCY

104.1 Dedicated storm shelters. Where a ~~facility~~ storm shelter is designed to be occupied solely as a *storm shelter*, the designated occupancy shall be Group A-3 as defined by the *International Building Code*® for purposes of determination of applicable requirements that are not included in this standard.

Exceptions:

1. Where the ~~facility~~ storm shelter has a *design occupant capacity* of less than 50 persons the designated occupancy shall be in accordance with Section 303 of the *International Building Code.*
2. Where the ~~facility~~ storm shelter is a *residential storm shelter,* the designated occupancy shall be the Group R occupancy served as defined by the *International Building Code* or the ~~facility~~ storm shelter shall comply with the *International Residential Code*®, as applicable.

SECTION 106
SUBMITTAL DOCUMENTS

106.2 Design Information. The following information applicable to the design, construction, and operation of the storm shelter shall be documented or explicitly referenced on a single sheet within the construction documents.

1. Type of *storm shelter*: Residential or community and tornado, hurricane or a combination of both.
2. Use of *community storm shelter*: use by the general public, building occupants or a combination of both.
3. A statement that the design conforms to the provisions of the ICC 500 *Standard for the Design and Construction of Storm Shelters*, with the edition year specified.
4. The *storm shelter* tornado speed, V_T or design wind speed, V_H, or both, mph (m/s).
5. The tornado and wind exposure category (indicate all where more than one is used).
6. The internal pressure coefficient, GC_{pi} and GC_{piT}.
7. The topographic factor, K_{zt}.
8. The directionality factor, K_d and K_{dt}.
9. *Design* tornado and *wind pressures* and their applicable zones with dimensions needed for the specification of the components and cladding of the *storm shelter envelope*, psf (kN/m^2).
10. Where the *storm shelter* is subject to the requirements of Section 402.1, a statement that the *storm shelter* has or has not been constructed in accordance with Chapter 4.
11. Where the *storm shelter* is subject to the requirements of Section 402.1, the minimum elevation of the lowest floor required by the *authority having jurisdiction* for the location where the *storm shelter* is installed; the *base flood elevation, 500-year flood elevation* and *storm surge flood elevation* where applicable; and the *storm shelter* floor elevation. Where the National Hurricane Center's Sea, Lake and Overland Surges from Hurricanes (SLOSH) or other approved source is utilized for data, the construction documents shall indicate the version, date and the source of the maps.
12. Documentation showing that components of the *storm shelter envelope* will meet the static and cyclic pressure and impact test requirements identified in Chapters 3 and 8.

13. A floor plan drawing or image indicating location of the *storm shelter* on a site or within a building or ~~facility~~ storm shelter; including a drawing or image indicating the entire facility.
14. A *storm shelter* section or elevation indicating the height of the *storm shelter* relative to the finished grade, finished floor and the *host building*, where applicable.
15. The lowest *storm shelter* floor elevation and corresponding datum, except for *residential tornado shelters* outside of special *flood hazard areas*.
16. The *design occupant capacity.*
17. Calculations for the *usable floor area,* in square feet (m^2).
18. Calculations for the venting area provided and the locations in the *storm shelter*.
19. Calculations for the number of sanitation facilities for *community storm shelters.*
20. Minimum foundation capacity requirements including foundation thickness, steel reinforcement and concrete cover.
21. Installation requirements for prefabricated *storm shelters, storm shelter* structural components, and *impact protective systems*, including anchor location, minimum edge and end distance and minimum required capacity for all post-installed anchors.
22. For *hurricane shelters*, the rainfall rate of the roof primary drainage system.
23. For *hurricane shelters*, the rainfall rate of the roof secondary (overflow) drainage system where required.
24. For *hurricane shelters*, the rainwater drainage design rainfall rate for ~~facilities~~ storm shelters subject to rainwater impoundment.

SECTION 202
DEFINITIONS

ON-SITE. Either inside, immediately adjacent to, or on the same site as the designated *storm shelter* ~~facility~~, and under the control of the owner or lawful tenant.

SECTION A101
GENERAL

A101.3 Availability. A copy of the SSPEOP shall be maintained at the ~~facility~~ storm shelter at all times. The SSPEOP shall be available in the ~~facility~~ storm shelter for reference and review by the designated *storm shelter management team*, and a copy shall be provided by the owner or owner's representative for maintenance by the *authority having jurisdiction* or Emergency Management Agency where the shelter is designated for use by the general public.

Reason: Reason: Since we retitled 104.2 (now 104.1) to "Dedicated storm shelters" suggest revising the four remaining uses of "facility" in the section to "storm shelter?" Note the term is also used in items #13 and #24 of the design information, the definition of "on-site", and in A101.3 referring to the storm shelter. (There are a couple of other uses of "facility" or "facilities" in ICC 500 but the term is used in relation to sanitary facilities, day care facilities, or RC IV essential facilities.)

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *01-02– 23*		
Committee decision: AS	***Committee Vote at Meeting: 11-0-0***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any):		
Committee Reason: All submittal documents listed under section 106 shall be prepared and sealed by a RDP.		

BALLOT COMMENT 1- FIRST DRAFT:

Proponent: Gary Ehrlich

Desired Action: **Affirmative with comment**

Modification:

Further modify as follows:

SECTION 104
CONSTRUCTION AND OCCUPANCY

104.1 Dedicated storm shelters. Where a ~~facility~~ storm shelter is designed to be occupied solely as a *storm shelter*, the designated occupancy shall be Group A-3 as defined by the *International Building Code*® for purposes of determination of applicable requirements that are not included in this standard.

Exceptions:

1. Where the ~~facility~~ storm shelter has a *design occupant capacity* of less than 50 persons the designated occupancy shall be in accordance with Section 303 of the *International Building Code.*
2. Where the ~~facility~~ storm shelter is a *residential storm shelter,* the designated occupancy shall be the Group R occupancy served as defined by the *International Building Code* or the ~~facility~~ storm shelter shall comply with the *International Residential Code*®, as applicable.

SECTION 106
SUBMITTAL DOCUMENTS

106.2 Design Information. The following information applicable to the design, construction, and operation of the storm shelter shall be documented or explicitly referenced on a single sheet within the construction documents.

1. Type of *storm shelter*: Residential or community and tornado, hurricane or a combination of both.
2. Use of *community storm shelter*: use by the general public, building occupants or a combination of both.
3. A statement that the design conforms to the provisions of the ICC 500 *Standard for the Design and Construction of Storm Shelters*, with the edition year specified.
4. The *storm shelter* tornado speed, V_T or design wind speed, V_H, or both, mph (m/s).
5. The tornado and wind exposure category (indicate all where more than one is used).
6. The internal pressure coefficient, GC_{pi} and GC_{piT}.
7. The topographic factor, K_{zt}.
8. The directionality factor, K_d and K_{dt}.
9. *Design* tornado and *wind pressures* and their applicable zones with dimensions needed for the specification of the components and cladding of the *storm shelter envelope*, psf (kN/m^2).
10. Where the *storm shelter* is subject to the requirements of Section 402.1, a statement that the *storm shelter* has or has not been constructed in accordance with Chapter 4.
11. Where the *storm shelter* is subject to the requirements of Section 402.1, the minimum elevation of the lowest floor required by the *authority having jurisdiction* for the location where the *storm shelter* is installed; the *base flood elevation, 500-year flood elevation* and *storm surge flood elevation* where applicable; and the *storm shelter* floor elevation. Where the National Hurricane Center's Sea, Lake and Overland Surges from Hurricanes (SLOSH) or other approved source is utilized for data, the construction documents shall indicate the version, date and the source of the maps.
12. Documentation showing that components of the *storm shelter envelope* will meet the static and cyclic pressure and impact test requirements identified in Chapters 3 and 8.
13. A floor plan drawing or image indicating location of the *storm shelter* on a site or within a building or ~~facility~~ storm shelter; including a drawing or image indicating the entire facility.
14. A *storm shelter* section or elevation indicating the height of the *storm shelter* relative to the finished grade, finished floor and the *host building*, where applicable.
15. The lowest *storm shelter* floor elevation and corresponding datum, except for *residential tornado shelters* outside of special *flood hazard areas*.
16. The *design occupant capacity.*
17. Calculations for the *usable floor area,* in square feet (m^2).
18. Calculations for the venting area provided and the locations in the *storm shelter*.
19. Calculations for the number of sanitation facilities for *community storm shelters.*
20. Minimum foundation capacity requirements including foundation thickness, steel reinforcement and concrete cover.

Report for *01-02– 23*

21. Installation requirements for prefabricated *storm shelters, storm shelter* structural components, and *impact protective systems*, including anchor location, minimum edge and end distance and minimum required capacity for all post-installed anchors.
22. For *hurricane shelters*, the rainfall rate of the roof primary drainage system.
23. For *hurricane shelters*, the rainfall rate of the roof secondary (overflow) drainage system where required.
24. For *hurricane shelters*, the rainwater drainage design rainfall rate for ~~facilities~~ storm shelters subject to rainwater impoundment.

SECTION 202
DEFINITIONS

ON-SITE. Either inside, immediately adjacent to, or on the same site as the designated *storm shelter* ~~facility~~, and under the control of the owner or lawful tenant.

SECTION A101
GENERAL

A101.3 Availability. A copy of the SSPEOP shall be maintained at the ~~facility~~ storm shelter at all times. The SSPEOP shall be available in the ~~facility~~ storm shelter for reference and review by the designated *storm shelter management team*, and a copy shall be provided by the owner or owner's representative for maintenance by the *authority having jurisdiction* or Emergency Management Agency where the shelter is designated for use by the general public.

Reason: Since we retitled 104.2 (now 104.1) to "Dedicated storm shelters" suggest revising the four remaining uses of "facility" in the section to "storm shelter?" Note the term is also used in items #13 and #24 of the design information, the definition of "on-site", and in A101.3 referring to the storm shelter. (There are a couple of other uses of "facility" or "facilities" in ICC 500 but the term is used in relation to sanitary facilities, day care facilities, or RC IV essential facilities.)

PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 01-07-23
107.1, 107.2, 107.3

Proponent: ICC 500 Work Group 1

Revise as follows:

SECTION 107
QUALITY ASSURANCE PLAN

107.1 Quality assurance plan. The construction documents for community storm shelters shall contain a quality assurance plan prepared by a registered design professional ~~in accordance with Sections 107.2 through 107.4.~~ and shall identify the following:

~~**107.2 Detailed requirements.** A quality assurance plan shall be provided for the following:~~

1. Roof cladding, soffits and roof framing connections.
2. Wall connections to roof and floor diaphragms and framing.
3. Roof and floor diaphragm systems, including con- nectors, drag struts and boundary elements.
4. Main windforce-resisting systems, including braced frames, moment frames and shear walls.
5. Main windforce-resisting system connections to the foundation.
6. Fabrication and installation of components and assemblies that are part of wall assemblies, roof assemblies or *impact-protective systems* of the *storm shelter envelope* required to meet impact or static or cyclic pressure test requirements of Chap- ter 3, such as, window assembly, door assembly, shutter assembly or louver.
7. Wall cladding and wall cladding connections.
8. Corrosion resistance or protection of exposed metal connectors providing load path continuity.
9. *Storm shelter critical support systems* and connec- tions and impact protection of the components and connections.
10. Foundation design.
11. Prefabricated *storm shelter* installation require- ments, including anchor location and minimum required capacity for each type of anchor.
12. Prefabricated *storm shelter* minimum foundation capacity requirements.

~~**107.3 Quality assurance plan preparation.** A quality assurance plan prepared by a registered design professional shall be provided for each main windforce-resisting system and wind-resisting components and cladding.~~

~~The quality assurance plan shall identify the following:~~

~~1. The main windforce-resisting systems and wind- resisting components and~~

~~cladding.~~

~~2. The *special inspections* and testing to be required in accordance with Section 110.1.~~

~~3.~~13. The type and frequency of testing required.

~~4.~~14. The type and frequency of *special inspections* required in accordance with Section 110.

~~5.~~15. The structural observations to be performed in accordance with Section ~~111.1~~ 111.

~~6.~~16. The required distribution, type and frequency of reports of test, inspections and structural observations.

Reason: Not sure why we need 2 lists between 107.2 and 107.3 as several items repeat. Propose delete section 107.3 and add remaining items to end of 107.2. Another alternative would be to make section 107.3 just about tests, inspections, observations, and reports.
107.3: Item 1 is already identified in 107.2. Item 2 is the same as 3 and 4. Delete lines 1 and 2, and in line 4 add "in accordance with Section 110" at end of sentence.

Committee Action: Approval as Submitted (Vote: 11-0-0)

Modification (if any):

Committee Reason: Removes redundant text and consolidates the list.

IS-STM 01-07-23 Ballot Comment 1

107.1

Proponent: Gary Ehrlich

Further revise as follows:

SECTION 107
QUALITY ASSURANCE PLAN

107.1 Quality assurance plan. The construction documents for community storm shelters shall contain a quality assurance plan prepared by a registered design professional and shall identify the following:

1. Roof cladding, soffits and roof framing connections.
2. Wall connections to roof and floor diaphragms and framing.
3. Roof and floor diaphragm systems, including connectors, drag struts and boundary elements.
4. Main windforce-resisting systems, including braced frames, moment frames and shear walls.
5. Main windforce-resisting system connections to the foundation.
6. ~~Fabrication and installation of~~ components and assemblies that are part of wall

assemblies, roof assemblies or *impact-protective systems* of the *storm shelter envelope* required to meet impact or static or cyclic pressure test requirements of Chapter 3, such as, window assembly, door assembly, shutter assembly or louver.

7. Wall cladding and wall cladding connections.
8. Corrosion resistance or protection of exposed metal connectors providing load path continuity.
9. *Storm shelter critical support systems* and connections and impact protection of the components and connections.
10. Foundation design.
11. Prefabricated *storm shelter* installation requirements, including anchor location and minimum required capacity for each type of anchor.
12. Prefabricated *storm shelter* minimum foundation capacity requirements.
13. The type and frequency of testing required.
14. The type and frequency of *special inspections* required in accordance with Section 110.
15. The structural observations to be performed in accordance with Section 111.
16. The required distribution, type and frequency of reports of test, inspections and structural observations.

Reason: Reason: Should Item #6 refer to “fabrication and installation” of storm shelter envelope components and assemblies, or just to the assemblies and impact protective systems themselves?

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *01-07– 23*		
Committee decision: AS	***Committee Vote at Meeting: 11-0-0***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any):		
Committee Reason: Removes redundant text and consolidates the list.		
BALLOT COMMENT 1- FIRST DRAFT: Proponent: Gary Ehrlich		
Desired Action: **Affirmative with comment**		
Modification: Further modify as follows: **SECTION 107** **QUALITY ASSURANCE PLAN** **107.1 Quality assurance plan.** The construction documents for community storm shelters shall contain a quality assurance plan prepared by a registered design professional and shall identify the following: 17. Roof cladding, soffits and roof framing connections. 18. Wall connections to roof and floor diaphragms and framing. 19. Roof and floor diaphragm systems, including connectors, drag struts and boundary elements. 20. Main windforce-resisting systems, includingbraced frames, moment frames and shear walls.		

Report for *01-07– 23*
21. Main windforce-resisting system connections to the foundation. 22. ~~Fabrication and installation of~~ components and assemblies that are part of wall assemblies, roof assemblies or *impact-protective systems* of the *storm shelter envelope* required to meet impact or static or cyclic pressure test requirements of Chapter 3, such as, window assembly, door assembly, shutter assembly or louver. 23. Wall cladding and wall cladding connections. 24. Corrosion resistance or protection of exposed metal connectors providing load path continuity. 25. *Storm shelter critical support systems* and connections and impact protection of the components and connections. 26. Foundation design. 27. Prefabricated *storm shelter* installation requirements, including anchor location and minimum required capacity for each type of anchor. 28. Prefabricated *storm shelter* minimum foundation capacity requirements. 29. The type and frequency of testing required. 30. The type and frequency of *special inspections* required in accordance with Section 110. 31. The structural observations to be performed in accordance with Section 111. 32. The required distribution, type and frequency of reports of test, inspections and structural observations.
Reason: Should Item #6 refer to “fabrication and installation” of storm shelter envelope components and assemblies, or just to the assemblies and impact protective systems themselves?
PUBLIC COMMENT- FIRST DRAFT: Proponent:
Desired Action:
Modification:
Reason:

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 01-08-23

107.3, 108, 109, 110, 111, 112, 114

Proponent: ICC 500 Work Group 1

Revise as follows:

SECTION 107 QUALITY ASSURANCE PLAN
SECTION ~~109~~ 108 PEER REVIEW
SECTION ~~108~~ 109 OWNER'S RESPONSIBILITY

SECTION 110
CONTRACTOR'S STATEMENT OF RESPONSIBILITY

~~107.4~~ 110.1 Contractor's statement of responsibility. Each con- tractor responsible for the construction, fabrication or installation of a main windforce-resisting system, *impact- protective system* or any component listed in the quality assurance plan shall submit a written statement of responsibility to the *authority having jurisdiction*, the responsible design professional and the owner or the owner's authorized agent prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain:

1. Acknowledgement of awareness of the special requirements contained in the quality assurance plan.
2. Acknowledgement that control will be exercised to obtain compliance with the construction documents.
3. Procedures for exercising control within the con- tractor's organization, the method and frequency of reporting and the distribution of reports.
4. Identification and qualifications of the person exercising such control and their position in the organization.

Exception: A written statement of responsibility shall not be required for the fabrication of *storm shelter* com- ponents that have been inspected and *labeled* by an *approved agency* as meeting the requirements of the *applicable code* and this standard.

SECTION ~~110~~ 111 SPECIAL INSPECTIONS
SECTION ~~111~~ 112 STRUCTURAL OBSERVATIONS
SECTION ~~112~~ 113 LISTING AND LABELING.
SECTION ~~113~~ 114 EVALUATION, MAINTENANCE AND REPAIRS

Reason: Proposed re-organization of Chapter 1 to better follow sequence of design and construction. Contractor's statement should be it's own section. The intent is also that the clear distinction of responsibility is outlined for design professionals, peer reviewers, owners, and contractors.

Staff Note: Section 112 Listing and Labeling proposed to be relocated in 01-09-23.

Committee Action: Approval as Submitted (Vote: 11-0-0)

Modification (if any):

Committee Reason: The intent is that the clear distinction of responsibility is outlined for design professionals, peer reviewers, owners, and contractors.

IS-STM 01-08-23 Ballot Comment 1

108.5.1

Proponent: Gary Ehrlich

Further revise as follows:

SECTION 108
PEER REVIEW

108.1 Storm shelters requiring peer review. A *peer review* shall be conducted for the following community *storm shelter* types:

1. *Storm shelter*s with *a design occupant capacity* of 50 or greater.
2. *Storm shelters* in elementary schools, secondary schools and day care facilities with *a design occupant capacity* greater than 16.
3. *Storm shelters* for buildings and structures assigned to Risk Category IV (essential facilities) as defined in Table 1604.5 in the *International Building Code.*

108.2 Peer review. The owner or the owner's authorized agent, other than the registered design professionals for the project, shall employ independent registered design professionals to conduct a *peer review* for compliance with the requirements of Sections 106, 107, 111and 112 and Chapters 3, 4, 5, 6 and 7.

Exception: A registered design professional for the project is permitted to employ the peer reviewer where the registered design professional for the project is also the owner.

108.5.1 Changes. The registered design professional in responsible charge shall submit to the peer reviewer changes to the main windforce-resistance system or components and cladding that occur after the peer review report, that are related to the requirements of Section ~~108.1~~ 108.2 and occur before the issuance of permits for construction. If determined to be needed by the authority having jurisdiction, an amended peer review report shall be submitted before such design changes are implemented.

Reason: Reason: Section 108.5.1 on Changes (formerly 109.5.1) refers to changes "that are related to the requirements of Section 108.1". Section 108.1 is just the list of storm shelter types that require peer review. Should the reference be to Section 108.2 (formerly 109.2) that lists the actual sections and chapters of ICC 500 whose requirements the peer reviewer is checking compliance with?

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *01-08– 23*		
Committee decision: AS	***Committee Vote at Meeting: 11-0-0***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any):		
Committee Reason: The intent is that the clear distinction of responsibility is outlined for design professionals, peer reviewers, owners, and contractors.		
BALLOT COMMENT 1- FIRST DRAFT: Proponent: Gary Ehrlich		
Desired Action: **Affirmative with comment**		
Modification: Further modify as follows: **SECTION 108** **PEER REVIEW** **108.1 Storm shelters requiring peer review.** A *peer review* shall be conducted for the following community *storm shelter* types: 1. *Storm shelter*s with *a design occupant capacity* of 50 or greater. 2. *Storm shelters* in elementary schools, secondary schools and day care facilities with *a design occupant capacity* greater than 16. 3. *Storm shelters* for buildings and structures assigned to Risk Category IV (essential facilities) as defined in Table 1604.5 in the *International Building Code.* **108.2 Peer review.** The owner or the owner's authorized agent, other than the registered design professionals for the project, shall employ independent registered design professionals to conduct a *peer review* for compliance with the requirements of Sections 106, 107, 111and 112 and Chapters 3, 4, 5, 6 and 7. **Exception:** A registered design professional for the project is permitted to employ the peer reviewer where the registered design professional for the project is also the owner. **108.5.1 Changes.** The registered design professional in responsible charge shall submit to the peer reviewer changes to the main windforce-resistance system or components and cladding that occur after the peer review report, that are related to the requirements of Section ~~108.1~~ 108.2 and occur before the issuance of permits for construction. If determined to be needed by the authority having jurisdiction, an amended peer review report shall be submitted before such design changes are implemented.		
Reason: Section 108.5.1 on Changes (formerly 109.5.1) refers to changes "that are related to the requirements of Section 108.1". Section 108.1 is just the list of storm shelter types that require peer review. Should the reference be to Section 108.2 (formerly 109.2) that lists the actual sections and chapters of ICC 500 whose requirements the peer reviewer is checking compliance with?		
PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 01-09-23

108.3(New), 113.2, 113.3.3(New), 113.4

Proponent: Marc Levitan, representing ICC Work Group 1

Revise as follows:

SECTION 108
OWNER'S RESPONSIBILITY

108.1 Owner's statement of responsibility. For each *com- munity storm shelter,* the owner shall submit to the *authority having jurisdiction* a written statement of responsibility acknowledging the owner's responsibilities regarding shelter operation and maintenance with the application for a construction permit.

108.2 Preparedness and e**mergency operations plan.** For each *community storm shelter,* the owner or the owner's authorized agent shall submit to the *authority having jurisdiction* a written preparedness and emergency operations plan for the *storm shelter* prior to approval of the certificate of occupancy.

108.3 Testing and maintenance plan. For each *community storm shelter,* the owner or the owner's authorized agent shall submit to the *authority having jurisdiction* a written testing and maintenance plan for *impact protective systems* and *critical support systems* for the *storm shelter* prior to approval of the certificate of occupancy. Testing and maintenance schedules and procedures shall be in accordance with the manufacturers requirements.

SECTION 113
EVALUATION, MAINTENANCE AND REPAIRS

113.1 General. Community shelters shall be evaluated and maintained in accordance with Sections 113.2 through 113.4.

113.2 Evaluation. The owner or owner's authorized agent shall evaluate the *storm shelter* annually and when requested by the *authority having jurisdiction*. The evaluation of the storm shelter shall include the following:

1. The *storm shelter envelope* shall be evaluated through visual observation to assess whether the walls and roofs are intact and undamaged.
2. *Impact-protective systems* shall be evaluated for compliance with the manufacturer's operational and maintenance requirements.
3. *Critical support systems* testing, maintenance, and repair records shall be reviewed for compliance with Section 113.3.3.

113.3 Maintenance and repairs. *Storm shelters* shall be maintained in an operable condition at all times. All structural and operational elements shall be repaired or replaced where damaged or found to be inoperable.

113.3.1 Damaged or missing components. *Storm shelters* shall be maintained so that walls and roofs are intact and undamaged. Any damage to the *storm shelter* or its *impact-protective systems* that impair its functionality shall be repaired or replaced. Damaged or missing components shall be replaced with components that are specified within the tested or listed assembly.

113.3.2 Replacement assemblies and systems. Where it is necessary to replace certified or listed *impact-protective systems*, replacements shall comply with applicable ICC 500 requirements, and shall be tested and installed as required by this standard for new installations or construction.

113.3.3 Critical support systems. *Critical support systems* shall be tested and maintained and repaired in compliance with manufacturers requirements and Section 108.3. Stored supplies such as generator fuel and water supply shall be maintained at appropriate levels in accordance with Section 108.3.

1113.4 Recordkeeping. A record of the evaluations shall be maintained by the owner or owner's authorized agent. A record of the evaluations, and any other tests, repairs or replacements, and other operations and maintenance shall be kept on the premises or other *approved* location. ~~and consist of all~~ All changes to the original *storm shelter envelope* or *impact-protective systems* or *critical support systems* shall be recorded. Records shall include the date and person conducting the evaluations and maintenance or repairs.

Reason: Generator, batteries, mechanical systems and other critical support systems need periodic testing and maintenance, and when not operating correctly, repairs. If they are important enough that we require these systems to be included with the shelter when constructed, they need be tested, maintained and repaired so that they will be in working order when the shelter is needed, otherwise, why bother to require them in the first place?

To simplify application of the requirements for scheduling and evaluation of maintenance and testing, a testing and maintenance plan is added to Section 108, which would include compilation of manufacturers requirements and things like minimum generator fuel and potable water levels.

IS-STM 01-09-23 Modification

108.3(New), 113.2, 113.3.3(New), 113.4

Proponent: ICC Work Group 1

Further revise as follows:

SECTION 108
OWNER'S RESPONSIBILITY

108.1 Owner's statement of responsibility. For each *com- munity storm shelter,* the owner shall submit to the *authority having jurisdiction* a written statement of responsibility acknowledging the owner's responsibilities regarding shelter operation

and maintenance with the application for a construction permit.

108.2 Preparedness and emergency operations plan. For each *community storm shelter,* the owner or the owner's authorized agent shall submit to the *authority having jurisdiction* a written preparedness and emergency operations plan for the *storm shelter* prior to approval of the certificate of occupancy.

108.3 Evaluation ~~Testing~~ and maintenance plan. For each *community storm shelter,* the owner or the owner's authorized agent shall submit to the *authority having jurisdiction* a written evaluation ~~testing~~ and maintenance plan ~~for *impact protective systems* and *critical support systems* for the *storm shelter* prior to approval of the certificate of occupancy. Testing and maintenance schedules and procedures shall be in accordance with the manufacturers requirements~~.

SECTION 113
EVALUATION, MAINTENANCE AND REPAIRS

113.1 General. Community shelters shall be evaluated and maintained in accordance with Sections 113.2 through 113.4.

113.2 Evaluation. The owner or owner's authorized agent shall evaluate the *storm shelter* annually and when requested by the *authority having jurisdiction*. The evaluation of the storm shelter shall include the following:

1. The *storm shelter envelope* shall be evaluated through visual observation to assess whether the walls and roofs are intact and undamaged.
2. *Impact-protective systems* shall be evaluated for compliance with the manufacturer's operational and maintenance requirements.
3. *Critical support systems* evaluation ~~testing~~, maintenance, and repair records shall be reviewed for compliance with Section 113.3.3.

113.3 Maintenance and repairs. *Storm shelters* shall be maintained in an operational ~~operable~~ condition at all times. All structural ~~and operational~~ elements, *impact-protective systems* and *critical support systems* shall be repaired or replaced where damaged or found to be inoperable.

113.3.1 Damaged or missing components. *Storm shelters* shall be maintained so that walls and roofs are intact and undamaged. Any damage to the *storm shelter* or its *impact-protective systems* that impair its functionality shall be repaired or replaced. Damaged or missing components shall be replaced with components that are specified within the tested or listed assembly.

113.3.2 Replacement assemblies and systems. Where it is necessary to replace assemblies ~~certified~~ or listed *impact-protective systems*, replacements shall comply with applicable ICC 500 requirements, and shall be ~~tested and~~ installed as required by this standard for new installations or construction.

1113.3.3 Critical support systems. *Critical support systems* shall be ~~tested and~~ maintained and repaired in compliance with manufacturers requirements and Section 108.3. Stored supplies such as generator fuel and water supply shall be maintained at appropriate levels in accordance with Section 108.3.

1113.4 Recordkeeping. A record of the evaluations shall be maintained by the owner or owner's authorized agent. A record of the evaluations, and any other tests, repairs or replacements, and other operations and maintenance shall be kept on the premises or other *approved* location. All changes to the original *storm shelter envelope* or *impact-protective systems* or *critical support systems* shall be recorded. Records shall include the date and person conducting the evaluations and maintenance or repairs.

Reason: Work Group 1 generally concurred with extending evaluation and maintenance requirements to storm shelter critical support systems but had concerns about the proposed language. Not all the storm shelter elements or systems included require testing as part of maintenance, it was noted particularly impact-protective system manufacturers do not specify in-service testing or maintenance procedures. It was felt "evaluation" was the proper term to use, and the reference to testing and maintenance procedures in 108.3 was also recommended for deletion. In 113.3 it was felt "operational" was the correct term when referring to the state of the entire storm shelter. Individual elements or components (such as a shutter) can be "operable", but the entire shelter is operational (that is, functional).

Notes 3-6-2023: On hold till 3-27-2023 for additional input from Work Group 1.
5-3-2023 returned from Work Group

Committee Action: Approval as Modified (Vote: 9-1-0)

Modification (if any):

Further revise as follows:

SECTION 108
OWNER'S RESPONSIBILITY

108.3 Evaluation ~~Testing~~ and maintenance plan. For each *community storm shelter,* the owner or the owner's authorized agent shall submit to the *authority having jurisdiction* a written evaluation ~~testing~~ and maintenance plan ~~for *impact protective systems* and *critical support systems* for the *storm shelter* prior to approval of the certificate of occupancy. Testing and maintenance schedules and procedures shall be in accordance with the manufacturers requirements~~.

SECTION 113
EVALUATION, MAINTENANCE AND REPAIRS

113.2 Evaluation. The owner or owner's authorized agent shall evaluate the *storm shelter* annually and when requested by the *authority having jurisdiction*. The evaluation of the storm shelter shall include the following:

1. The *storm shelter envelope* shall be evaluated through visual observation to assess

whether the walls and roofs are intact and undamaged.

2. *Impact-protective systems* shall be evaluated for compliance with the manufacturer's operational and maintenance requirements.
3. *Critical support systems* evaluation ~~testing~~, maintenance, and repair records shall be reviewed for compliance with Section 113.3.3.

113.3 Maintenance and repairs. *Storm shelters* shall be maintained in an operational ~~operable~~ condition at all times. All structural ~~and operational~~ elements, *impact-protective systems* and *critical support systems* shall be repaired or replaced where damaged or found to be inoperable.

113.3.2 Replacement assemblies and systems. Where it is necessary to replace assemblies ~~certified~~ or listed *impact-protective systems*, replacements shall comply with applicable ICC 500 requirements, and shall be ~~tested and~~ installed as required by this standard for new installations or construction.

1113.3.3 Critical support systems. *Critical support systems* shall be ~~tested and~~ maintained and repaired in compliance with manufacturers requirements and Section 108.3. Stored supplies such as generator fuel and water supply shall be maintained at appropriate levels in accordance with Section 108.3.

Committee Reason: The modifications were as follows:

Not all the storm shelter elements or systems included require testing as part of maintenance, it was noted particularly impact-protective system manufacturers do not specify in-service testing or maintenance procedures. It was felt "evaluation" was the proper term to use, and the reference to testing and maintenance procedures in 108.3 was also recommended for deletion. In 113.3 it was felt "operational" was the correct term when referring to the state of the entire storm shelter. Individual elements or components (such as a shutter) can be "operable", but the entire shelter is operational (that is, functional).

In general, generator, batteries, mechanical systems and other critical support systems need periodic testing and maintenance, and when not operating correctly, repairs.

There was a discussion about the definition for critical support systems that is currently being reviewed by work group 7. This may need coordination later.

IS-STM 01-09-23 Ballot Comment 1

113.3.3

Proponent: Gary Ehrlich

Further revise as follows:

SECTION 113
EVALUATION, MAINTENANCE AND REPAIRS

113.3.3 Critical support systems. *Critical support systems* shall be maintained and repaired in compliance with manufacturers requirements and Section ~~108.3~~ 109.3. Stored supplies such as generator fuel and water supply shall be maintained at appropriate levels in accordance with Section ~~108.3~~ 109.3.

Reason: The two references to Section 108.3 should be 109.3. This was intended to refer to the owner's evaluation and maintenance plan that was added under Owner's Responsibility. That was originally Section 108 but became Section 109 due to the IS-STM 01-08-23 reorganization.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *01-09– 23*		
Committee decision: AM	***Committee Vote at Meeting: 9-1-0***	***Committee Vote on Ballot:***

REPORT OF HEARING:
Modification (if any):
Further revise as follows:

SECTION 108
OWNER'S RESPONSIBILITY

108.3 Evaluation ~~Testing~~ and maintenance plan. For each *community storm shelter,* the owner or the owner's authorized agent shall submit to the *authority having jurisdiction* a written evaluation ~~testing~~ and maintenance plan ~~for *impact protective systems* and *critical support systems* for the *storm shelter* prior to approval of the certificate of occupancy. Testing and maintenance schedules and procedures shall be in accordance with the manufacturers requirements~~.

SECTION 113
EVALUATION, MAINTENANCE AND REPAIRS

113.2 Evaluation. The owner or owner's authorized agent shall evaluate the *storm shelter* annually and when requested by the *authority having jurisdiction*. The evaluation of the storm shelter shall include the following:

4. The *storm shelter envelope* shall be evaluated through visual observation to assess whether the walls and roofs are intact andundamaged.
5. *Impact-protective systems* shall be evaluated for compliance with the manufacturer's operational and maintenance requirements.
6. *Critical support systems* evaluation ~~testing~~, maintenance, and repair records shall be reviewed for compliance with Section 113.3.3.

113.3 Maintenance and repairs. *Storm shelters* shall be maintained in an operational ~~operable~~ condition at all times. All structural ~~and operational~~ elements, *impact-protective systems* and *critical support systems* shall be repaired or replaced where damaged or found to be inoperable.

113.3.2 Replacement assemblies and systems. Where it is necessary to replace assemblies ~~certified~~ or listed *impact-protective systems*, replacements shall comply with applicable ICC 500 requirements, and shall be ~~tested and~~ installed as required by this standard for new installations or construction.

1113.3.3 Critical support systems. *Critical support systems* shall be ~~tested and~~ maintained and repaired in compliance with manufacturers requirements and Section 108.3. Stored supplies such as generator fuel and water supply shall be maintained at appropriate levels in accordance with Section 108.3.

Committee Reason: The modifications were as follows:
Not all the storm shelter elements or systems included require testing as part of maintenance, it was noted particularly impact-protective system manufacturers do not specify in-service testing or maintenance procedures. It was felt "evaluation" was the proper term to use, and the reference to testing and maintenance procedures in 108.3 was also recommended for deletion. In 113.3 it was felt "operational" was the correct term when referring to the state of the entire storm shelter. Individual elements or components (such as a shutter) can be "operable", but the entire shelter is operational (that is, functional).

Report for *01-09– 23*

In general, generator, batteries, mechanical systems and other critical support systems need periodic testing and maintenance, and when not operating correctly, repairs.

There was a discussion about the definition for critical support systems that is currently being reviewed by work group 7. This may need coordination later.

BALLOT COMMENT 1- FIRST DRAFT:
Proponent: Gary Ehrlich

Desired Action: **Affirmative with comment**

Modification:
Further modify as follows:

SECTION 113
EVALUATION, MAINTENANCE AND REPAIRS

113.3.3 Critical support systems. *Critical support systems* shall be maintained and repaired in compliance with manufacturers requirements and Section ~~108.3~~ 109.3. Stored supplies such as generator fuel and water supply shall be maintained at appropriate levels in accordance with Section ~~108.3~~ 109.3.

Reason: The two references to Section 108.3 should be 109.3. This was intended to refer to the owner's evaluation and maintenance plan that was added under Owner's Responsibility. That was originally Section 108 but became Section 109 due to the IS-STM 01-08-23 reorganization. – errata/editorial

PUBLIC COMMENT- FIRST DRAFT:
Proponent:
Desired Action:
Modification:
Reason:

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

REPORT OF HEARING – FIRST DRAFT
Modification (if any):
Committee Reason:

PUBLIC COMMENT- SECOND DRAFT:
Proponent:
Desired Action:
Modification:
Reason:

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

FINAL ACTION:
Modification (if any):
Committee Reason:

Chapter 2
DEFINITIONS

IS-STM 02-01-23
202

Proponent: ICC 500 committee

Revise as follows:

[A] APPROVED AGENCY. An established and recognized ~~agency~~ organization that is regularly engaged in conducting tests, furnishing inspection services or furnishing product evaluation or certification where such ~~agency~~ organization has been *approved*.

[BS] BASE FLOOD ELEVATION. The elevation of the *base flood*, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the *Flood Insurance Rate Map* (FIRM).

[A] LISTED. Equipment, materials, products or services included in a list published by an organization acceptable to the *building official* and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. Terms that are used to identify listed equipment, products, or materials include “listed”, “certified”, “classified” or other terms as determined appropriate by the listing organization.

SPECIAL INSPECTION. Inspection of construction requiring the expertise of ~~a~~ an *approved special inspector* in order to ensure compliance with this standard and the *approved* construction documents.

Reason: Staff reviewed the definitions in the I-codes that were used in the ICC 500 for consistency. This proposal identifies the differences.

- Approved agency – ADM13-22 AM
- Base flood elevation – existing in 2021
- Listed – ADM1-22 Part 1 AS
- Special Inspection – existing in 2021

Please note that the 2020 ICC 500 changed the definition for Community Storm Shelter, but we did not submit a code change proposal to change to IBC or IEBC to include that change.

Committee Action: Approval as Submitted (Vote:12-0-0)

Modification (if any):
Committee Reason: Consistency with IBC definitions.

IS-STM 02-01-23 Ballot Comment 1
202

Proponent: Borjen Yeh

Further revise as follows:

[A] APPROVED AGENCY. An established and recognized agency ~~organization~~ that is regularly engaged in conducting tests, furnishing inspection services or furnishing product evaluation or certification where such agency ~~organization~~ has been *approved*.

Reason: : I don't agree that this proposed change is necessary. After all, IBC still references "agency" in the definition, instead of "organization."

Staff note: Approved agency was revised for the 2024 IBC by ADM13-22.

Committee Action for BC1: (Vote:)
Modification (if any):
Committee Reason:

Report for *02-01– 23*		
Committee decision: AS	***Committee Vote at Meeting: 12-0-0***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any):		
Committee Reason: Consistency with IBC definitions.		
BALLOT COMMENT- FIRST DRAFT: Proponent: Borjen Yeh		
Desired Action: **Affirmative with comment**		
Modification: **Further modify as follows:** **[A] APPROVED AGENCY.** An established and recognized agency ~~organization~~ that is regularly engaged in conducting tests, furnishing inspection services or furnishing product evaluation or certification where such agency ~~organization~~ has been *approved*.		
Reason: I don't agree that this proposed change is necessary. After all, IBC still references "agency" in the definition, instead of "organization." *Staff note: Approved agency was revised for the 2024 IBC by ADM13-22.*		
PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		

Report for *02-01– 23*		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

Chapter 3
STRUCTURAL DESIGN CRITERIA

IS-STM 03-02- 23
203, 301.4(New), 302.5(New), 304, Table 305.1.1, Chapter 9

Proponent: ICC 500 Work Group 3

Revise as follows:

SECTION 203
SYMBOLS AND NOMENCLATURE

K_d – directionality factor for wind loads
K_{dT} – directionality factor for tornado loads
~~K_{zt} – topographic factor~~
W_T – loads due to tornado ~~winds~~ loads

SECTION 301
GENERAL

301.4 Performance based design for tornado loads. Where tornado loads are determined using a performance-based procedures, the tornado loads shall be in accordance with ASCE 7 Section 32.1.3, providing loads are not lesser in magnitude than required by this chapter.

301.5 Performance based design for wind loads. Where wind loads are determined using a performance-based procedures, the wind loads shall be in accordance with ASCE 7 Section 26.1.3, providing loads are not lesser in magnitude than required by this chapter.

SECTION 304
TORNADO LOADS AND WIND LOADS

304.1 General. ~~Wind loads from hurricanes, W_H, and tornadoes~~ Tornado loads, W_T, wind loads for hurricanes, W_H, and wind loads for storms in Alaska, W_H, shall be determined in accordance with ASCE 7, Chapters 26 through ~~31~~ 32, except as modified by this section. For tornado loads the procedures from ASCE 7 Section 32.1.2 shall be applicable.

304.2 Design tornado ~~wind~~ speed. For *tornado shelters*, the design ~~wind~~ tornado speed, V_T, shall be in accordance with Figure 304.2(1). Alternatively, V_T shall be permitted to be determined in accordance with ASCE 7 Figures G.2-3A through G.2-

3H, where the effective plan area shall be the area of the smallest convex polygon enclosing the storm shelter and any associated external critical support systems not meeting the soil protection requirements of Section 305.2.2.

304.3 Design wind speed. For *hurricane shelters*, the design wind speed, V_H, shall be in accordance with Figure 304.2(2). For *storm shelters* in Alaska, the design wind speed, V_H, shall be in accordance with Figure 304.2(3).

304.4 ~~304.3~~ Tornado and wind ~~Wind~~ directionality ~~factor~~ factors. The directionality factors for tornado loads, K_{dT} and the directionality factors for wind loads, K_d, shall be taken as ~~K_d =~~ 1.0.

304.5 ~~304.4~~ Exposure category. ~~For *tornado shelters*, wind loads shall be based on Exposure Category C.~~ For *hurricane shelters*, ~~use of~~ that are located in Exposure Category B ~~is not permitted~~ in accordance with ASCE 7 Section 26.7, Exposure C shall be used

Exception: ~~For *hurricane shelters*, wind~~ Wind loads for the main wind force-resisting system (MWFRS) only shall be permitted to be based on Exposure Category B, where Exposure Category B exists for all wind directions and is likely to remain Exposure Category B after a hurricane with design wind speeds as determined from Section 304.3 ~~304.2~~.

~~**304.5 Topographic effects.** For *tornado shelters*, the topo- graphic factor, K_{zt}, need not exceed 1.0.~~

304.6 Enclosure classifications. Enclosure classifications for *storm shelters* shall be determined in accordance with ASCE 7, Chapter 26. For determining the enclosure classification for *community storm shelters*, the largest opening protected by an *impact-protective system* on a wall that receives positive external pressure shall be considered as an opening.

304.7 Tornado Internal Pressure Coefficient for Enclosed Buildings ~~Atmospheric Pressure Change (APC)~~. For *tornado shelters* classified as enclosed buildings, the ~~additional internal pressures caused by atmospheric pressure change shall be included in the design. The~~ internal pressure coefficient, GC_{piT}, shall be taken as ±0.18 where atmospheric pressure change (APC) venting area of 1 square foot (0.0929 m^2) per 1,000 cubic feet (28.3 m^3) of interior *storm shelter* volume is provided. APC venting shall consist of openings in the *storm shelter* roof having a pitch 10 degrees or less from the horizontal or openings divided equally (within 10 percent of one another) on opposite walls. A combination of APC venting meeting the above requirements is permitted.

Exception: ~~Calculation of venting area to relieve APC is not required for *tornado shelters* classified as partially enclosed buildings.~~ An internal pressure coefficient of GC_{piT} = ±0.55 shall be used for *tornado shelters* where APC

venting meeting the requirements of Section 304.7 is not provided~~, or where APC venting area requirements are not calculated~~.

SECTION 305
DEBRIS HAZARDS

305.1.1 Missile criteria for tornado shelters. The missile testing for all components of the *storm shelter envelope* of *tornado shelters* shall be a 15-pound (6.8 kg) sawn lumber 2 by 4 traveling at the speeds shown in Table 305.1.1.

TABLE 305.1.1
MISSILE SPEED FOR TORNADO SHELTERS

DESIGN ~~WIND~~ TORNADO SPEED	MISSILE SPEED AND IMPACT SURFACE
≤ 130 mph	80 mph Vertical Surfaces 53 mph Horizontal Surfaces
>130 to ≤ 160 mph	84 mph Vertical Surfaces 56 mph Horizontal Surfaces
>160 to ≤ 200 mph	90 mph Vertical Surfaces 60 mph Horizontal Surfaces
~~250~~ > 200 mph	100 mph Vertical Surfaces 67 mph Horizontal Surfaces

For SI: 1 mile per hour = 0.447 m/s.

CHAPTER 9
REFERENCED STANDARDS

ASCE
7-~~16~~ 22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures with Supplement No. 1.

Reason: This proposal is to update the reference edition of ASCE 7 to ASCE 7-22. The changes to the wind load provisions from 7-16 to 7-22 were fairly modest, with the exception of the addition of a new Chapter 32 with tornado load requirements. The tornado load procedures are similar to the wind load procedures, although most of the parameters and equations have at least some slight differences. It should be noted that ASCE 7-22 tornado loads have been approved for incorporation into the 2024 IBC.

The two ASCE 7-22 tornado load provisions that will have an impact on the tornadic wind loads for storm shelters are described below.

1. ASCE 7 does not define an exposure or topographic factor for tornadoes; the velocity pressure exposure coefficient is a uniform value of 1.0 between the ground and 200 ft, and decreases slightly above that. Currently, our Section 304.4 says to use Exposure C for tornadoes. A comparison of the K_z factor for Exposure C and K_{zTor} is shown below (from ASCE 7 commentary). K_{zTor} exceeds K_z for exposure C at heights below 33 ft, and is less than Kz for heights above 33 ft. The tornado velocity pressure profile was developed from analysis of mobile radar data tornado velocity profiles.

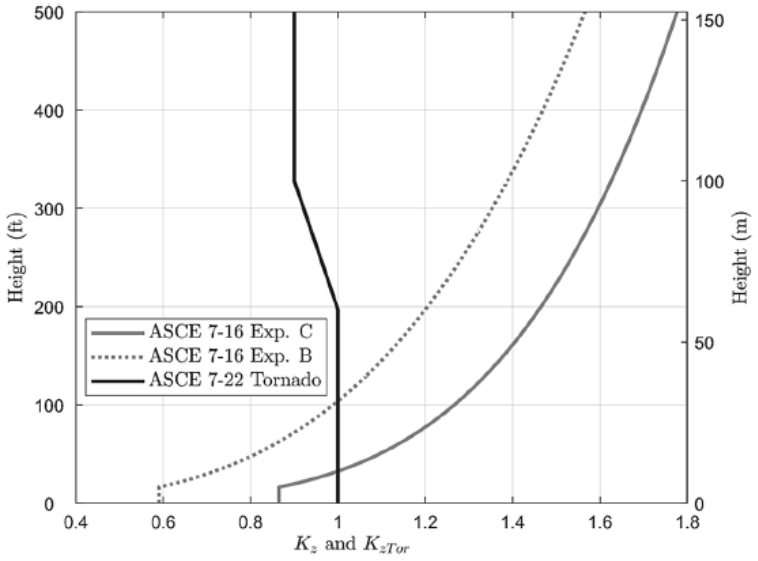


Figure C32.10-2. Vertical profiles of tornado velocity pressure (K_{zTor}) versus that of Exposure B and Exposure C for nontornadic winds (K_z) in Chapter 26 for the lowest 500 ft (152.4 m).

2. Tornado loads include a new parameter to adjust pressure coefficients to account for increased uplift on the roof due to the vertical updrafts in tornadoes. Pressure coefficients for the design of the MWFRS (i.e., C_p) and for design of the C&C (i.e., (GC_p)) are multiplied by the new Tornado Pressure Coefficient Adjustment Factor for Vertical Winds, K_{vT}. Values for this new coefficient are provided in the table below. $K_{vT} > 1$ for roof uplift, and $K_{vT} = 1$ for all other cases. The values for K_{vT} were developed through specialized wind tunnel testing.

Table 32.14-1. Tornado Pressure Coefficient Adjustment Factor for Vertical Winds, K_{vT}.

STRUCTURE TYPE	K_{vT}
Buildings	
Negative (Uplift) Pressures on Roofs	
Main Wind Force Resisting System	1.1
Components and Cladding	
Roof slope ≤ 7 degrees	
Zone 1	1.2
Zone 2	1.05
Zone 3	1.05
Roof slope > 7 degrees	
Zone 1	1.2
Zone 2	1.2
Zone 3	1.3
Positive Pressures (Downward Acting) on Roofs	1.0
Wall Pressures	1.0
All Other Cases	1.0
Other Structures	
Negative (Uplift) Pressures on Rooftop Structures and Equipment and Rooftop Solar Panels Parallel to the Roof Surface	
Main Wind Force Resisting System	1.1
Components and Cladding	Use values for building C&C
Negative (Uplift) Pressures on Roofs of Bins, Silos, and Tanks	
Main Wind Force Resisting System	1.1
Components and Cladding	See Section 32.17.5
All Other Cases	1.0

Additional information on specific changes –

The changes to Section 203 for Nomenclature is correlation with this change

Section 301.4 – This is a general allowance for performance design and is consistent with the 2024 changes for the Performance Code in the I-codes

Where tornado loads were added to criteria, the tornado load comes before the wind load (hurricanes) for consistency with the order in other Chapters in the standard where there is different criteria for tornadoes and hurricanes (e.g. Chapter 7).

Existing 304.2 was split into two sections for clarity in the requirements for tornado loads and wind loads.

Existing 304.4 Exposure Category – was made a positive statement for hurricane shelters, instead of a negative. ASCE 7 Tornado Loads do not use exposure category.

Existing 304.6 Topographic effects was deleted because ASCE 7 Tornado Loads do not use topographic effects.

Existing 304.6 Current reference to Chapter 26 is sufficient. No need to point to Chapter 32 Section 32.12 for tornado shelters, since the only parts of that section applicable to shelters point back to Chapter 26 anyway.

Existing 304.7 - Instead of main paragraph and exception, reformatting to simplify as two options, either provide venting or use +/- 0.55. Last phare in exception deleted because This should be deleted regardless of any other ASCE 7 tornado change or not. Simply calculating venting area requirements Table 305.1.1 – providing range in tornado speed

IS-STM 03-02- 23 Replacement Part A

203, 304, Table 305.1.1, Chapter 9

Proponent: ICC 500 Work Group 3

Replace and revise as follows:

SECTION 203
SYMBOLS AND NOMENCLATURE

K_d –directionality factor for wind loads
K_{dT} – directionality factor for tornado loads
~~K_{zt} – topographic factor~~
W_T – loads due to tornado ~~winds~~ loads

SECTION 304
TORNADO LOADS AND WIND LOADS

304.1 General. ~~Wind loads from hurricanes, W_H, and tornadoes~~ Tornado loads, W_T, wind loads for hurricanes, W_H, and wind loads for storms in Alaska, W_H, shall be determined in accordance with ASCE 7, Chapters 26 through ~~31~~ 32, except as modified by this section. For tornado loads the procedures from ASCE 7 Section 32.1.2 shall be applicable.

304.2 Design tornado ~~wind~~ speed. For *tornado shelters*, the design ~~wind~~ tornado speed, V_T, shall be in accordance with Figure 304.2(1).

304.3 Design wind speed. For *hurricane shelters*, the design wind speed, V_H, shall be in accordance with Figure 304.2(2). For *storm shelters* in Alaska, the design wind speed, V_H, shall be in accordance with Figure 304.2(3).

304.4 ~~304.3~~ Tornado and wind ~~Wind~~ directionality ~~factor~~ factors. The directionality factors for tornado loads, K_{dT} and the directionality factors for wind loads, K_d, shall be taken as ~~K_d =~~ 1.0.

304.5 ~~304.4~~ Exposure category. ~~For *tornado shelters*, wind loads shall be based on Exposure Category C.~~ For *hurricane shelters*, ~~use of~~ that are located in Exposure

Category B ~~is not permitted~~ in accordance with ASCE 7 Section 26.7, Exposure C shall be used.

Exception: ~~F~~or ~~*hurricane shelters*, wind~~ Wind loads for the main wind force-resisting system (MWFRS) only shall be permitted to be based on Exposure Category B, where Exposure Category B exists for all wind directions and is likely to remain Exposure Category B after a hurricane with design wind speeds as determined from Section 304.3 ~~304.2~~.

~~**304.5 Topographic effects.** For *tornado shelters*, the topo- graphic factor, K_{zt}, need not exceed 1.0.~~

304.6 Enclosure classifications. Enclosure classifications for *storm shelters* shall be determined in accordance with ASCE 7, Chapter 26. For determining the enclosure classification for *community storm shelters*, the largest opening protected by an *impact-protective system* on a wall that receives positive external pressure shall be considered as an opening.

304.7 Tornado Internal Pressure Coefficient for Enclosed Buildings ~~Atmospheric Pressure Change (APC)~~.For *tornado shelters* classified as enclosed buildings, the ~~additional internal pressures caused by atmospheric pressure change shall be included in the design. The~~ internal pressure coefficient, GC_{piT}, shall be taken as ±0.18 where atmospheric pressure change (APC) venting area of 1 square foot (0.0929 m^2) per 1,000 cubic feet (28.3 m^3) of interior *storm shelter* volume is provided. APC venting shall consist of openings in the *storm shelter* roof having a pitch 10 degrees or less from the horizontal or openings divided equally (within 10 percent of one another) on opposite walls. A combination of APC venting meeting the above requirements is permitted.

Exception: ~~Calculation of venting area to relieve APC is not required for *tornado shelters* classified as partially enclosed buildings.~~ An internal pressure coefficient of GC_{piT} = ±0.55 shall be used for *tornado shelters* where APC venting meeting the requirements of Section 304.7 is not provided~~, or where APC venting area requirements are not calculated~~.

SECTION 305
DEBRIS HAZARDS

305.1.1 Missile criteria for tornado shelters. The missile testing for all components of the *storm shelter envelope* of *tornado shelters* shall be a 15-pound (6.8 kg) sawn lumber 2 by 4 traveling at the speeds shown in Table 305.1.1.

TABLE 305.1.1
MISSILE SPEED FOR TORNADO SHELTERS

DESIGN	MISSILE SPEED AND IMPACT SURFACE

~~**WIND**~~ **TORNADO SPEED**	
130 mph	80 mph Vertical Surfaces 53 mph Horizontal Surfaces
160 mph	84 mph Vertical Surfaces 56 mph Horizontal Surfaces
200 mph	90 mph Vertical Surfaces 60 mph Horizontal Surfaces
250 mph	100 mph Vertical Surfaces 67 mph Horizontal Surfaces

For SI: 1 mile per hour = 0.447 m/s.

CHAPTER 9
REFERENCED STANDARDS

ASCE
7-~~16~~ 22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures with Supplement No. 1.

Reason: This proposal is to update the reference edition of ASCE 7 to ASCE 7-22. The changes to the wind load provisions from 7-16 to 7-22 were fairly modest, with the exception of the addition of a new Chapter 32 with tornado load requirements. The tornado load procedures are similar to the wind load procedures, although most of the parameters and equations have at least some slight differences. It should be noted that ASCE 7-22 tornado loads have been approved for incorporation into the 2024 IBC.

The two ASCE 7-22 tornado load provisions that will have an impact on the tornadic wind loads for storm shelters are described below.

1. ASCE 7 does not define an exposure or topographic factor for tornadoes; the velocity pressure exposure coefficient is a uniform value of 1.0 between the ground and 200 ft, and decreases slightly above that. Currently, our Section 304.4 says to use Exposure C for tornadoes. A comparison of the K_z factor for Exposure C and K_{zTor} is shown below (from ASCE 7 commentary). K_{zTor} exceeds K_z for exposure C at heights below 33 ft, and is less than Kz for heights above 33 ft. The tornado velocity pressure profile was developed from analysis of mobile radar data tornado velocity profiles.

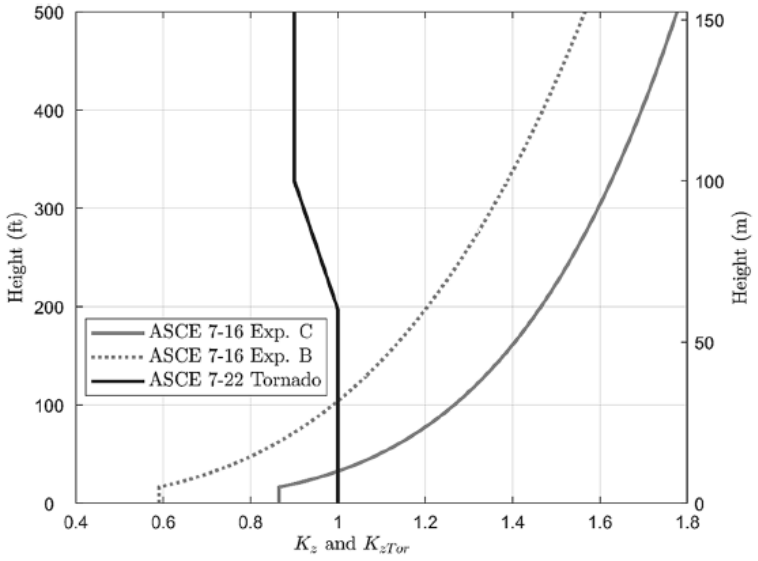


Figure C32.10-2. Vertical profiles of tornado velocity pressure (K_{zTor}) versus that of Exposure B and Exposure C for nontornadic winds (K_z) in Chapter 26 for the lowest 500 ft (152.4 m).

2. Tornado loads include a new parameter to adjust pressure coefficients to account for increased uplift on the roof due to the vertical updrafts in tornadoes. Pressure coefficients for the design of the MWFRS (i.e., C_p) and for design of the C&C (i.e., (GC_p)) are multiplied by the new Tornado Pressure Coefficient Adjustment Factor for Vertical Winds, K_{vT}. Values for this new coefficient are provided in the table below. $K_{vT} > 1$ for roof uplift, and $K_{vT} = 1$ for all other cases. The values for K_{vT} were developed through specialized wind tunnel testing.

Table 32.14-1. Tornado Pressure Coefficient Adjustment Factor for Vertical Winds, K_{vT}.

STRUCTURE TYPE	K_{vT}
Buildings	
Negative (Uplift) Pressures on Roofs	
Main Wind Force Resisting System	1.1
Components and Cladding	
Roof slope ≤ 7 degrees	
Zone 1	1.2
Zone 2	1.05
Zone 3	1.05
Roof slope > 7 degrees	
Zone 1	1.2
Zone 2	1.2
Zone 3	1.3
Positive Pressures (Downward Acting) on Roofs	1.0
Wall Pressures	1.0
All Other Cases	1.0
Other Structures	
Negative (Uplift) Pressures on Rooftop Structures and Equipment and Rooftop Solar Panels Parallel to the Roof Surface	
Main Wind Force Resisting System	1.1
Components and Cladding	Use values for building C&C
Negative (Uplift) Pressures on Roofs of Bins, Silos, and Tanks	
Main Wind Force Resisting System	1.1
Components and Cladding	See Section 32.17.5
All Other Cases	1.0

Additional information on specific changes –

Existing 304.2 was split into two sections for clarity in the requirements for tornado loads and wind loads.

Existing 304.4 Exposure Category – was made a positive statement for hurricane shelters, instead of a negative. ASCE 7 Tornado Loads do not use exposure category.

Existing 304.6 Topographic effects was deleted because ASCE 7 Tornado Loads do not use topographic effects.

Existing 304.6 Current reference to Chapter 26 is sufficient. No need to point to Chapter 32 Section 32.12 for tornado shelters, since the only parts of that section applicable to shelters point back to Chapter 26 anyway.

Existing 304.7 - Instead of main paragraph and exception, reformatting to simplify as two options, either provide venting or use +/- 0.55. Last phare in exception deleted because This should be deleted regardless of any other ASCE 7 tornado change or not. Simply calculating venting area requirements Table 305.1.1 – providing range in tornado speed

IS-STM 03-02- 23 Replacement Part B

301.4(New), 301.5(New), Table 305.1.1

Proponent: ICC 500 Work Group 3

Replace and revise as follows:

SECTION 301
GENERAL

301.4 Performance based design for tornado loads. Where tornado loads are determined using a performance-based procedures, the tornado loads shall be in accordance with ASCE 7 Section 32.1.3, providing loads are not lesser in magnitude than required by this chapter.

301.5 Performance based design for wind loads. Where wind loads are determined using a performance-based procedures, the wind loads shall be in accordance with ASCE 7 Section 26.1.3, providing loads are not lesser in magnitude than required by this chapter.

SECTION 304
TORNADO LOADS AND WIND LOADS

304.2 Design tornado ~~wind~~ speed. For *tornado shelters*, the design ~~wind~~ tornado speed, V_T, shall be in accordance with Figure 304.2(1). Alternatively, V_T shall be permitted to be determined in accordance with ASCE 7 Figures G.2-3A through G.2-3H, where the effective plan area shall be the area of the smallest convex polygon enclosing the storm shelter and any associated external critical support systems not meeting the soil protection requirements of Section 305.2.2.

SECTION 305
DEBRIS HAZARDS

305.1.1 Missile criteria for tornado shelters. The missile testing for all components of the *storm shelter envelope* of *tornado shelters* shall be a 15-pound (6.8 kg) sawn lumber 2 by 4 traveling at the speeds shown in Table 305.1.1.

TABLE 305.1.1
MISSILE SPEED FOR TORNADO SHELTERS

DESIGN ~~WIND~~ TORNADO SPEED	MISSILE SPEED AND IMPACT SURFACE

≤ 130 mph	80 mph Vertical Surfaces 53 mph Horizontal Surfaces
>130 to ≤ 160 mph	84 mph Vertical Surfaces 56 mph Horizontal Surfaces
>160 to ≤ 200 mph	90 mph Vertical Surfaces 60 mph Horizontal Surfaces
~~250~~ > 200 mph	100 mph Vertical Surfaces 67 mph Horizontal Surfaces

For SI: 1 mile per hour = 0.447 m/s.

Reason: This change provides a) clarification of the shelter application of ASCE 7-22 specifically permitted performance-based wind and tornado design procedures, and b) provides for an alternate, probabilistic tornado shelter wind speed using the one million-year return period maps provided in Appendix G of ASCE 7. For reference, the ICC 500 hurricane shelter wind map uses a 10,000-year return period map. Note – Appendix G is written in mandatory language, and therefore are adoptable. This proposal only changes the tornado speed used for tornado shelter design – it is unrelated to requirement for whether shelters are required to be installed or not.

Additional information on specific changes –

Section 301.4 and 301.5 – This is a general allowance for performance design and is consistent with the 2024 changes for the Performance Code in the I-codes

Where tornado loads were added to criteria, the tornado load comes before the wind load (hurricanes) for consistency with the order in other Chapters in the standard where there is different criteria for tornadoes and hurricanes (e.g. Chapter 7).

Committee Action: Approval as Modified – proposal split
Part A (Vote: 10-0-0)
Part B
All of Part B AM – Vote: 0-3-6;
Just 301.4 and 301.5 – Vote: 9-0-0

Modification (if any):

Replace and revise as follows:

SECTION 203
SYMBOLS AND NOMENCLATURE

K_d –directionality factor for wind loads
K_{dT} – directionality factor for tornado loads
~~K_{zt} – topographic factor~~
W_T – loads due to tornado ~~winds~~ loads

SECTION 301
GENERAL

301.4 Performance based design for tornado loads. Where tornado loads are determined using a performance-based procedures, the tornado loads shall be in accordance with ASCE 7 Section 32.1.3, providing loads are not lesser in magnitude than required by this chapter.

301.5 Performance based design for wind loads. Where wind loads are determined using a performance-based procedures, the wind loads shall be in accordance with ASCE 7 Section 26.1.3, providing loads are not lesser in magnitude than required by this chapter.

SECTION 304
TORNADO LOADS AND WIND LOADS

304.1 General. ~~Wind loads from hurricanes, W_H, and tornadoes~~ Tornado loads, W_T, wind loads for hurricanes, W_H, and wind loads for storms in Alaska, W_H, shall be determined in accordance with ASCE 7, Chapters 26 through ~~31~~ 32, except as modified by this section. For tornado loads the procedures from ASCE 7 Section 32.1.2 shall be applicable.

304.2 Design tornado ~~wind~~ speed. For *tornado shelters*, the design ~~wind~~ tornado speed, V_T, shall be in accordance with Figure 304.2(1).

304.3 Design wind speed. For *hurricane shelters*, the design wind speed, V_H, shall be in accordance with Figure 304.2(2). For *storm shelters* in Alaska, the design wind speed, V_H, shall be in accordance with Figure 304.2(3).

304.4 ~~304.3~~ Tornado and wind ~~Wind~~ directionality ~~factor~~ factors. The directionality factors for tornado loads, K_{dT} and the directionality factors for wind loads, K_d, shall be taken as ~~K_d =~~ 1.0.

304.5 ~~304.4~~ Exposure category. ~~For *tornado shelters*, wind loads shall be based on Exposure Category C.~~ For *hurricane shelters*, ~~use of~~ that are located in Exposure Category B ~~is not permitted~~ in accordance with ASCE 7 Section 26.7, Exposure C shall be used.

Exception: ~~For *hurricane shelters*, wind~~ Wind loads for the main wind force-resisting system (MWFRS) only shall be permitted to be based on Exposure Category B, where Exposure Category B exists for all wind directions and is likely to remain Exposure Category B after a hurricane with design wind speeds as determined from Section 304.3 ~~304.2~~.

~~**304.5 Topographic effects.** For *tornado shelters*, the topo- graphic factor, K_{zt}, need not exceed 1.0.~~

304.6 Enclosure classifications. Enclosure classifications for *storm shelters* shall be determined in accordance with ASCE 7, Chapter 26. For determining the enclosure classification for *community storm shelters*, the largest opening protected by an *impact-protective system* on a wall that receives positive external pressure shall be considered as an opening.

304.7 Tornado Internal Pressure Coefficient for Enclosed Buildings ~~Atmospheric Pressure Change (APC)~~.For *tornado shelters* classified as enclosed buildings, the~~ additional internal pressures caused by atmospheric pressure change shall be included in the design. The~~ internal pressure coefficient, GC_{piT}, shall be taken as ±0.18 where atmospheric pressure change (APC) venting area of 1 square foot (0.0929 m^2) per 1,000 cubic feet (28.3 m^3) of interior *storm shelter* volume is provided. APC venting shall consist of openings in the *storm shelter* roof having a pitch 10 degrees or less from the horizontal or openings divided equally (within 10 percent of one another) on opposite walls. A combination of APC venting meeting the above requirements is permitted.

Exception: ~~Calculation of venting area to relieve APC is not required for *tornado shelters* classified as partially enclosed buildings.~~ An internal pressure coefficient of GC_{piT} = ±0.55 shall be used for *tornado shelters* where APC venting meeting the requirements of Section 304.7 is not provided~~, or where APC venting area requirements are not calculated~~.

SECTION 305
DEBRIS HAZARDS

305.1.1 Missile criteria for tornado shelters. The missile testing for all components of the *storm shelter envelope* of *tornado shelters* shall be a 15-pound (6.8 kg) sawn lumber 2 by 4 traveling at the speeds shown in Table 305.1.1.

TABLE 305.1.1
MISSILE SPEED FOR TORNADO SHELTERS

DESIGN ~~WIND~~ TORNADO SPEED	MISSILE SPEED AND IMPACT SURFACE
130 mph	80 mph Vertical Surfaces 53 mph Horizontal Surfaces
160 mph	84 mph Vertical Surfaces 56 mph Horizontal Surfaces
200 mph	90 mph Vertical Surfaces 60 mph Horizontal Surfaces
250 mph	100 mph Vertical Surfaces 67 mph Horizontal Surfaces

For SI: 1 mile per hour = 0.447 m/s.

CHAPTER 9

REFERENCED STANDARDS

ASCE
7-~~16~~ 22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures with Supplement No. 1.

Committee Reason:
Part A – Update referenced standard to ASCE7 -22 including supplement 1 (which updates referenced standards) and to incorporate the relevant components of the new ASCE 7 tornado loads. Need to coordinate with terminology in other chapters of the standard (e.g. 'wind loads' in chapter 8).

Part B – Approval of 301.4 and 301.5 performance options provides a clarification of the shelter application of ASCE 7-22 specifically permitted performance-based wind and tornado design procedures. The option in Section 304 and 305 was disapproved because this would generally lower wind speeds for tornado shelters.

IS-STM 03-02- 23 Reconsideration

Introduction, 106.2, 202, 203, Figure 304.2(1), 305.1, 306.4.1.1.1, 306.4.1, 306.4.1.2, 307.1.1, 307.1.2, 307.2, 508.2, 602.1, 701.2, 802.1, 803.9.7.1, 803.9.7.2, 803.9.7.3, 805.1, 805.2, 805.3.1

This text is based on the approved proposals so that we can address new text.

Proponent: ICC 500 Work Group 3

Replace and revise as follows:

Further revise as follows:

Introduction
In May of 2002 the International Code Council (ICC) and the National Storm Shelter Association (NSSA) initiated a joint project to write a standard for the design and construction of storm shelters. A standard development committee was created, and the first meeting of that committee was in May of 2003. The scope of the standard is to provide minimum design and construction requirements for storm shelters that provide a safe refuge from storms that produce high winds, hurricanes and tornadoes. Hurricanes and tornadoes generate high winds that produce ~~wind~~ pressures on buildings and structures and that create flying debris at levels and intensities that are higher than those for which most commercial building and residences are designed. The magnitude of the tornado and wind speeds associated with these storms are such that building occupants and residents are required to evacuate the area or seek protection in a shelter designed for

resistance to extraordinary loads and flying debris. This standard provides design requirements for the main wind force resisting structural system and components and cladding of these shelters, and provides basic occupant life safety and health requirements for these shelters, including means of egress, lighting, sanitation, ventilation, fire safety and minimum required floor space for occupants.

CHAPTER 1
APPLICATION AND ADMINISTRATION

SECTION 106
SUBMITTAL DOCUMENTS

IS-STM 01-03-23 AM

106.2 Design Information ~~required~~. The following information applicable to the design, construction, and operation of the storm shelter shall be ~~supplied as part of the construction documents~~ documented or explicitly referenced on a single sheet within the construction documents.

IS-STM 01-03-23 AM; IS-STM 01-04-23 AM

~~106.2.1 Design information.~~ ~~For the areas of a building designed for occupancy as a *storm shelter*, the following information shall be provided within the construction documents:~~

1. Type of *storm shelter*: Residential or community and tornado, hurricane or a combination of both.
2. Use of *community storm shelter*: use by the general public, building occupants or a combination of both.
3. A statement that the design conforms to the provisions of the ICC 500 *Standard for the Design and Construction of Storm Shelters*, with the edition year specified.
4. The *storm shelter* tornado speed, V_T or design wind speed, ~~V_T,~~ V_H, or both, mph (m/s).
5. The tornado and wind exposure category (indicate all where more than one is used).
6. The internal pressure coefficient, GC_{pi} and GC_{piT}.
7. The topographic factor, K_{zt}.
8. The directionality factor, K_d and K_{dt}.
9. *Design* tornado and *wind pressures* and their applicable zones with dimensions needed for the specification of the components and cladding of the *storm shelter envelope*, psf (kN/m^2).
10. Where the *storm shelter* is subject to the requirements of Section 402.1, a statement that the *storm shelter* has or has not been constructed in accordance with Chapter 4.
11. Where the *storm shelter* is subject to the requirements of Section 402.1, the minimum elevation of the lowest floor required by the *authority having jurisdiction* for the location where the *storm shelter* is installed; the *base flood elevation, 500-year flood elevation* and *storm surge flood elevation* where applicable; and the

storm shelter floor elevation. Where the National Hurricane Center's Sea, Lake and Overland Surges from Hurricanes (SLOSH) or other approved source is utilized for data, the construction documents shall indicate the version, date and the source of the maps.

12. Documentation showing that components of the *storm shelter envelope* will meet the static and cyclic pressure and impact test requirements identified in Chapters 3 and 8.
13. A floor plan drawing or image indicating location of the *storm shelter* on a site or within a building or facility; including a drawing or image indicating the entire facility.
14. A *storm shelter* section or elevation indicating the height of the *storm shelter* relative to the finished grade, finished floor and the *host building*, where applicable.
15. The lowest *storm shelter* floor elevation and corresponding datum, except for *residential tornado shelters* outside of special *flood hazard areas*.
16. The *design occupant capacity.*
17. Calculations for the *usable floor area,* in square feet (m^2).
18. Calculations for the venting area provided and the locations in the *storm shelter*.
19. Calculations for the number of sanitation facilities for *community storm shelters.*
20. Minimum foundation capacity requirements including foundation thickness, steel reinforcement and concrete cover.
21. Installation requirements for prefabricated *storm shelters,* ~~*Storm*~~ *storm shelter* structural components, and *impact protective systems* ~~installation requirements,~~ including anchor location, minimum edge and end distance and minimum required capacity for all post-installed anchors.
22. For *hurricane shelters*, the rainfall rate of the roof primary drainage system.
23. For *hurricane shelters*, the rainfall rate of the roof secondary (overflow) drainage system where required.
24. For *hurricane shelters*, the rainwater drainage design rainfall rate for facilities subject to rainwater impoundment.

CHAPTER 2
DEFINITIONS

SECTION 202
DEFINITIONS

DESIGN WIND PRESSURE. For hurricane shelters, ~~The~~ the wind pressure on a specific location of the *storm shelter envelope*, as determined in accordance with Section 304, ~~Wind Loads,~~ which controls the design of components and cladding (C & C) of the *storm shelter envelope* or the main wind force resisting system (MWFRS) for the *storm shelter*.

DESIGN TORNADO PRESSURE. For tornado shelters, the tornado pressure on a specific location of the *storm shelter envelope*, as determined in accordance with Section

304, which controls the design of components and cladding (C & C) of the *storm shelter envelope* or the main wind force resisting system (MWFRS) for the *storm shelter*.

HAZARDS.

Coastal. See **"**Coastal high hazard area.**"**

Falling debris. Exterior components, cladding, and appurtenances, such as parapet walls, masonry cladding, or rooftop equipment, that could fall onto the roof of a *storm shelter* from ~~wind~~ windstorm damage to adjacent, taller buildings or taller sections of a *host building*.

Flood. See "500-year flood hazard area" and " Flood hazard area."

Laydown. Adjacent building elements, other structures and natural objects, that could fall onto the roof of a *storm shelter*, such as exterior walls of adjacent single story structures, self-supporting towers, poles or large trees.

Storm surge. See "Storm surge flood hazard area.**"**

WIND PRESSURE. See "Design wind pressure" and "Design tornado pressure."

SECTION 203
SYMBOLS AND NOMENCLATURE

IS-STM 03-02-23 AM

APC = atmospheric pressure change.
D = dead load.
F_{aH} = flood load on *hurricane shelters* in accordance with Section 303.5.
GC_{pi} = internal pressure coefficient.
GC_{piT} = internal tornado pressure coefficient.
L = uniform live load for floors in *hurricane shelters* in accordance with the *applicable code* for the normal use of the space.
L_T = uniform live load for floors in *tornado shelters* in accordance with Section 303.2.
L_{rH} = roof live load for *hurricane shelters* in accordance with Sections 303.3 and 305.3.
L_{rT} = roof live load for *tornado shelters* in accordance with Sections 303.3 and 305.3.
LRFD = load and resistance factor design.
K_d = directionality factor for wind loads.
K_{dT} = directionality factor for tornado loads
~~K_{zt} = topographic factor~~
MWFRS = main wind force resisting system.
R_H = rain load for *hurricane shelters* in accordance with Section 303.1.1.
R = rain load for *tornado shelters* in accordance with the *applicable code*.
V_H = design wind speed for hurricanes.
V_T = design ~~wind~~ tornado speed ~~for tornadoes~~.
W_H = load due to hurricane winds.
W_T = load due to ~~tornadoes winds~~ tornadic winds.

CHAPTER 3
STRUCTURAL DESIGN AND TESTING CRITERIA

Notes:
1. Values are nominal three-second gust wind speeds in miles per hour at 33 feet above ground for Exposure Category C.
2. Multiply miles per hour by 0.477 to obtain meters per second.
3. Location-specific storm shelter design ~~wind~~ tornado speeds shall be permitted to be determined using the ATC Hazards by Location website, https://hazards.atcouncil.org/.

FIGURE 304.2(1)
DESIGN ~~WIND~~ TORNADO SPEEDS, V_T, ~~FOR TORNADOES~~

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.1 Storm shelters meeting tornado impact test requirements. *Storm shelter envelope* components meeting impact test requirements for *tornado shelters* at the 250 mph design ~~wind~~ tornado speed in accordance with Section 305.1.1 shall be considered acceptable for the impact test requirements for *hurricane shelters* provided the components meet the structural design load requirements for *hurricane shelters*.
306.3 Roof and wall assemblies. Roof and wall assemblies shall meet the impact criteria of Section 305.1, and the *design tornado pressure* and *design wind pressure* in accordance with Section 304.

IS-STM 03-06-23 AM
306.4.1 Impact-protective systems. *Impact-protective systems* for use in the *storm shelter envelope* shall be tested, listed and labeled for impact in accordance with Section 803 and static and cyclic pressure in accordance with Sections 804 and 805. Any changes to *listed impact-protective systems,* such as a change of glazing, shall require evaluation by the listing agency or retesting of the entire assembly.

Exceptions:
1. Window assemblies and other glazed openings where the opening is protected on the exterior side by an *impact-protective system* are not required to be tested for impact.
2. Window assemblies and other glazed openings where the opening is protected on the interior side by an *impact-protective system* are not required to be tested for impact and static and cyclic pressure.
3. Nonoperable, permanently affixed shields or cowlings designed to resist the *design tornado pressure* or *design wind pressures* are not required to be tested for static and cyclic pressure in accordance with Sections 804 and 805.

IS-STM 01-11-23 AM relocated
306.4.1.1.1 ~~112.1.1~~ Marking. The following function and performance characteristics shall be provided on the *label* for each *impact-protective system* tested:
1. Manufacturer's identification reference or listing number for the assembly

2. Type of *impact-protective system,* such as window assembly, door assembly, shutter assembly or louver.
3. Hazard: hurricane, tornado or both.
4. Missile weight and speed.
5. *Design tornado pressure, design wind pressure,* or both.
6. Edition of ICC 500.

IS-STM 03-05-23 AM; IS-STM 03-06-23 AM

306.4.1.2 ~~306.4.1.3~~ Alternate anchorage ~~Anchorage~~ for impact-protective systems. Where anchorage of *impact-protective systems* to the *storm shelter* structure is required by means other than those provided in the manufacturer's listed system ~~listing in accordance with Section 112~~, anchorage shall be designed for pull-out and shear to resist the tornado and wind loads in accordance with Section 304.

SECTION 307
CONNECTION OF STORM SHELTERS TO FOUNDATIONS OR SLABS

307.1.1 Calculation of resistance. Structural stability of *storm shelters* shall be determined by engineering calculations for design tornado and wind loads. Where *storm shelters* are anchored to ~~foundations~~ foundation systems and such top surfaces extending outward from the *storm shelter* walls are at grade, the top surfaces of the foundation systems shall not be considered to have tornado and wind uplift forces acting on them.

307.1.2 Elevated storm shelter foundation systems. Where *storm shelters* are constructed with the top of the supporting foundation system located at an elevation higher than the surrounding finished grade level, the structural stability of the *storm shelter* and elevated supporting foundation system shall be computed assuming that both are fully exposed to the *storm shelter* design tornado, wind and flood loads. Where applicable, and in accordance with the *applicable code*, the impacts of flood-borne debris on stability of the foundation system shall be considered.

307.2 Slabs-on-ground. Where slabs-on-ground are serving as part of the foundation system for the *storm shelter*, the slabs-on-ground shall be designed in accordance with ACI 318 to resist all loads specified in Chapter 3 and to transfer the resultant forces into the ground.

Exceptions:

1. Slabs-on-ground within a *storm shelter* not utilized to transfer tornado and wind forces acting on the *storm shelter* to the ground or to a foundation system supporting the storm shelter shall be designed in accordance with the *applicable code*.
2. Slabs-on-ground within a one- or two-family dwelling and supporting a *residential storm shelter* shall be designed in accordance with ACI 318 or ACI 332.

CHAPTER 4

SITING

CHAPTER 5

IS-STM 05-01-23 AS; IS-STM 05-06-23 AM

~~OCCUPANCY~~ OCCUPANT DENSITY, ~~ACCESS~~ ENTRY, ACCESSIBILITY, EGRESS AND SIGNAGE

SECTION 508
SIGNAGE

IS-STM 05-16-23 AS

508.2 Design information signage. All *storm shelters* shall have a sign on or within the *storm shelter* with all of the following:

1. ~~The *design*~~ *Design occupant capacity.*
2. ~~The storm~~ Storm type.
3. ~~The *design*~~ Design tornado and wind speed.
4. ~~The edition~~ Edition of the ICC 500 used for the design.
5. ~~The name~~ Name of the manufacturer or builder of the *storm shelter*.

CHAPTER 6
FIRE SAFETY

SECTION 602
FIRE PROTECTION SYSTEMS

602.1 Fire protection system. Fire protection systems shall be provided within the *storm shelter* where required by the *applicable code* for the normal use of the space. These systems are not required to remain functional for the design storm event and minimum period of shelter occupancy (24 hours for *hurricane shelters*, 2 hours for *tornado shelters*) or to be protected from the tornado and wind load and impact requirements of Chapter 3 or the flood-resistance requirements of Chapter 4.

CHAPTER 7

IS-STM 07-01-23 AS

~~STORM SHELTER~~ ESSENTIAL FEATURES AND ACCESSORIES

SECTION 701
GENERAL

701.2 Protection of storm shelter critical support systems. *Storm shelter critical support systems* shall remain functional for the design storm event and minimum period of *storm shelter* occupancy (24 hours for hurricane shelters, 2 hours for tornado shelters). *Storm shelter critical support systems* located outside of the *storm shelter* areas shall be protected by a means that meets the tornado and wind load and impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4.

CHAPTER 8
TEST METHODS FOR IMPACT AND PRESSURE TESTING

SECTION 802
TEST SPECIMENS

802.1 Test assembly. All parts of the test *specimen* shall be full size, using the same materials, details, methods of construction and methods of attachment as proposed for actual use. Testing of components consisting of wall assemblies, roof assemblies, or *impact-protective systems* shall be allowed in lieu of testing entire *storm shelters*.

Where failure of framing members controls the impact performance, wall and roof assemblies subjected to impact testing shall be a minimum of 4 feet (1219 mm) wide and the full length of the span of the wall or roof section from support to support. Where failure of framing members has been shown through testing to not control the impact performance, wall and roof sections subjected to debris impact testing shall be a minimum of 4 feet (1219 mm) wide by 4 feet (1219 mm) high unless dimensions of the actual assembly are less than these dimensions.

Impact-protective systems shall be impact tested and cyclic pressure tested where applicable, at the maximum and minimum size *listed* for use. Static pressure testing shall be conducted on the maximum size *listed* for use. Operable door assemblies and window assemblies shall be tested for the conditions of swing and latching including inward or outward swing separately as specified for use of the product. *Impact-protective systems* shall be static pressure tested in both directions unless a clear worst-case direction is determined by the *test laboratory*. Paired doors and their latching hardware shall be tested independently from single doors. The *specimen* shall consist of the entire assembled unit and shall, where practical, be mounted as it will be installed in a *storm shelter*, and shall contain all devices used to resist tornado and wind forces and wind-borne debris. Where it is not practical to install for testing door assemblies and window assemblies as they will be mounted in a *storm shelter*, then the unit or assembly shall be mounted in a test buck to connect the *specimen* to the test frame, stand or *test chamber*. Details of the mounting shall be described in the test report.

SECTION 803
IMPACT TESTING

803.9.7.1 Alcove or baffled storm shelter entry systems for which no testing is required. *Storm shelter* entrances, whether provided with a door assembly or not, that are protected by an alcove or baffled *storm shelter* entry system that require missiles to impact at least two surfaces meeting the requirements of Section 306.3 prior to arriving at the protected occupant area shall not be required to undergo impact testing. See Figure 803.9.7.1 for an example. Where a solid door assembly is installed as a closure for this type of entry system or to meet the fire-resistance requirements in Section 603, the door assembly need not meet the tornado and wind load requirements of Section 304.

803.9.7.2 Door assembly subject to rebound impact. Where the *alcove or baffled storm shelter entry system* prevents a first impact of the missile on the door assembly but the door assembly is subject to a *rebound impact* of the missile after it has impacted one surface meeting the requirements of Section 306.3 (see Figure 803.9.7.2 for an example), then a door assembly shall meet the tornado and wind load requirements of Section 304 and the impact requirements of Section 305 except that the missile shall be, at a minimum, a 9-pound (4.1 kg) sawn lumber 2 by 4 traveling at 50 feet per second (15.2 m/s). Entry systems having door assemblies that are protected from the initial and first *rebound impacts* of missile shall comply with the requirements of Section 803.9.7.1.

IS-STM 08-12-23 AS

803.9.7.3 Door assemblies subject to first impact. Where a first-strike angle missile will impact on the door assembly (see Figure 803.9.7.3 for an example) the door assembly shall meet the tornado or wind load requirements of Section 306.3, the fire-resistance requirements of Section 603, and ~~meets~~ meet one of the following debris impact criteria:

1. The door assembly withstands the impact of a missile striking the door assembly at an angle closest to perpendicular to the plane of the door.
2. The door assembly withstands missile impacts by the design missile striking perpendicular to the surface with speed equal to or greater than the *storm shelter* design missile's velocity component perpendicular to the door assembly for the most critical angle that can occur in the application.

The minimum debris impact criterion for the door assembly shall be an impact perpendicular to the door assembly of a 9-pound sawn lumber 2 by 4 traveling at 50 feet per second [34 mph (15.2 m/s)].

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.1 Pressure testing procedures. For wall assemblies, roof assemblies and *impact-protective systems* that are components of the *storm shelter envelope,* static or cyclic pressure testing shall be in accordance with Sections 805.2 and 805.3, as applicable. *Design tornado pressure* and *design wind pressures* used for static or cyclic pressure testing of the *storm shelter envelope* shall be in accordance with Section 304.

805.2 Wall assemblies and roof assemblies. Where testing of wall assemblies and roof assemblies is required, such assemblies shall be static pressure tested in the as-supplied condition. Static pressure testing of roof assemblies shall be conducted in accordance with FM 4474, ASTM E1592, UL 1897 or ASTM E330, whichever is applicable, to a static pressure 1.2 times the *design tornado pressure* and *design wind pressure* or greater. Static pressure testing of wall assemblies shall be conducted in accordance with ASTM E330 to 1.2 times the *design tornado pressure* and *design wind pressure* or greater.

805.3.1 Tornado shelters. Impact-protective systems for use in tornado shelters shall be tested for static pressure to a pressure of 1.2 times the *design* tornado ~~*wind*~~ *pressure* or greater in accordance with ASTM E330.

Reason: This change is for coordination with terminology throughout the standard with the changes in 03-02-23 for tornado loads.
Staff note: Some editorial changes were made during the discussion which are reported in the text above.

Vote: As Modified (11-0-0)

IS-STM 03-02-23 Ballot Comment 1

302.2 and 302.3

Proponent: Gary Ehrlich

Further revise as follows: No suggestion

Reason: In the load combinations (302.2 and 302.3) snow was deliberately excluded as it was considered highly unlikely an intense tornado or hurricane would happen concurrently with a significant snow event; the respective seasons for such events just don't line up. I am not certain that applies to Alaska; a quick glance at historic data (https://akclimate.org/data/) suggests it is possible high winds and heavy snowfall could happen concurrently. Is a special set of load combinations for Alaska needed?
I'm not voting negative but remain disappointed there was not consensus to modify the bounds of Zone IV on the current deterministic Figure 304.2(1) to reflect what appears to be a reduced tornado hazard in portions of the zone, particularly towards the northeastern areas of the zone covering portions of Ohio and Pennsylvania, based on the probabilistic hazard analysis in ASCE 7-22.

Committee Action for BC1: (Vote:)

Modification (if any):
Committee Reason:

IS-STM 03-02-23 Ballot Comment 2

Introduction

Proponent: Marc Leviton

Further revise as follows:

Introduction
In May of 2002 the International Code Council (ICC) and the National Storm Shelter Association (NSSA) initiated a joint project to write a standard for the design and

construction of storm shelters. A standard development committee was created, and the first meeting of that committee was in May of 2003. The scope of the standard is to provide minimum design and construction requirements for storm shelters that provide a safe refuge from storms that produce high winds, hurricanes and tornadoes. Hurricanes and tornadoes generate high winds that produce wind pressures on buildings and structures and that create flying debris at levels and intensities that are higher than those for which most commercial buildings and residences are designed. The magnitude of the ~~tornado and~~ wind speeds associated with these storms are such that building occupants and residents are required to evacuate the area or seek protection in a shelter designed for resistance to extraordinary loads and flying debris.

Reason: While we make technical distinction between tornado and wind speeds and pressures in the body of the standard, it is not needed in this introduction and the original sentence indicates 'wind speeds associated with these storms' , referring to the previous sentence which indicated "hurricanes and tornadoes".

Committee Action for BC2: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 03-02-23 Ballot Comment 3

106.2

Proponent: Marc Leviton

Further revise as follows:

SECTION 106
SUBMITTAL DOCUMENTS

106.2 Design Information. The following information applicable to the design, construction, and operation of the storm shelter shall be documented or explicitly referenced on a single sheet within the construction documents.

1. Type of *storm shelter*: Residential or community and tornado, hurricane or a combination of both.
2. Use of *community storm shelter*: use by the general public, building occupants or a combination of both.
3. A statement that the design conforms to the provisions of the ICC 500 *Standard for the Design and Construction of Storm Shelters*, with the edition year specified.
4. The *storm shelter* design tornado speed, V_T or design wind speed, V_H, or both, mph (m/s).
5. The ~~tornado and~~ wind exposure category (indicate all where more than one is used).

6.~~8.~~ The directionality factor, K_d ~~and~~ or ~~K_{dt}~~ K_{dt} or both.

7. The topographic factor, K_{zt}.

8.~~6.~~ The internal pressure coefficient, GC_{pi} ~~and~~ or ~~-~~ GC_{piT} or both.

9. *Design* tornado ~~and~~ or ~~-~~ *wind pressures* and their applicable zones with dimensions needed for the specification of the components and cladding of the *storm shelter envelope*, psf (kN/m^2) or both.

10. Where the *storm shelter* is subject to the requirements of Section 402.1, a statement that the *storm shelter* has or has not been constructed in accordance with Chapter 4.

11. Where the *storm shelter* is subject to the requirements of Section 402.1, the minimum elevation of the lowest floor required by the *authority having jurisdiction* for the location where the *storm shelter* is installed; the *base flood elevation, 500-year flood elevation* and *storm surge flood elevation* where applicable; and the *storm shelter* floor elevation. Where the National Hurricane Center's Sea, Lake and Overland Surges from Hurricanes (SLOSH) or other approved source is utilized for data, the construction documents shall indicate the version, date and the source of the maps.

12. Documentation showing that components of the *storm shelter envelope* will meet the static and cyclic pressure and impact test requirements identified in Chapters 3 and 8.

13. A floor plan drawing or image indicating location of the *storm shelter* on a site or within a building or facility; including a drawing or image indicating the entire facility.

14. A *storm shelter* section or elevation indicating the height of the *storm shelter* relative to the finished grade, finished floor and the *host building*, where applicable.

15. The lowest *storm shelter* floor elevation and corresponding datum, except for *residential tornado shelters* outside of special *flood hazard areas*.

16. The *design occupant capacity.*

17. Calculations for the *usable floor area,* in square feet (m^2).

18. Calculations for the venting area provided and the locations in the *storm shelter*.

19. Calculations for the number of sanitation facilities for *community storm shelters.*

20. Minimum foundation capacity requirements including foundation thickness, steel reinforcement and concrete cover.

21. Installation requirements for prefabricated *storm shelters, storm shelter* structural components, and *impact protective systems*, including anchor location, minimum edge and end distance and minimum required capacity for all post-installed anchors.

22. For *hurricane shelters*, the rainfall rate of the roof primary drainage system.

23. For *hurricane shelters*, the rainfall rate of the roof secondary (overflow) drainage system where required.

24. For *hurricane shelters*, the rainwater drainage design rainfall rate for facilities subject to rainwater impoundment.

Reason:

1. In 106.2 item 4, add 'design' as shown for consistency with Section 203 and 304.2

2. In 106.2 item 5, delete the new 'tornado and' text because exposure category is not used for tornado loads
3. In 106.2 items 6, 8 and 9, they read as requiring both tornado and wind directionality factors and pressures, which would only apply for combined tornado and hurricane shelters. Revise to language like item 4, which indicates reporting design speed requirements for tornado or hurricane or both.
4. Also, rearrange order of terms in items 6 and 8 to put tornado first, for consistency with the rest of the list

---

Committee Action for BC3: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 03-02-23 Ballot Comment 4

508.2

Proponent: Marc Leviton

Further revise as follows:

SECTION 508
SIGNAGE

508.2 Design information signage. All *storm shelters* shall have a sign on or within the *storm shelter* with all of the following:

1. *Design occupant capacity.*
2. Storm type.
3. Design tornado speed, ~~and~~ design wind speed, or both.
4. Edition of the ICC 500 used for the design.
5. Name of the manufacturer or builder of the *storm shelter*.

Reason: Revise for consistency with presentation in similar sections (e.g., 106.2 item 4).

Committee Action for BC4: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 03-02-23 Public Comment 5

306.4.1.1.1

Proponent: Work Group 8

Further revise as follows:

Staff note: Section number is what is shown in draft for clarity of revision location.

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.1.1 Marking. The following function and performance characteristics shall be provided on the *label* for each *impact-protective system* tested:

1. Manufacturer's identification reference or listing number for the assembly
2. Type of *impact-protective system,* such as window assembly, door assembly, shutter assembly or louver.
3. Hazard: hurricane, tornado or both.
4. Missile weight and speed.
5. *Design tornado pressure~~, design wind pressure, or both~~*.
6. Edition of ICC 500.

Reason: Only show "Design Pressure" since manufacturing tested pressure does not distinguish between tornado or wind (Hazard in #3 will specify)

Committee Action for PC5: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 03-02-23 Public Comment 6

305.3.3

Proponent: Timothy L Gettelfinger

Further revise as follows:

SECTION 305
DEBRIS HAZARDS

305.3.3 Impact Loads. Impact loads from laydown and falling debris hazards shall be determined using a minimum impact factor of 2.0 times the estimated weight of the debris hazard. Each laydown and falling debris hazard load shall be considered one at a time, applied simultaneously with the uniform live loads on the roof of the shelter in accordance with Section 303.3. Impact and falling debris hazard loads shall be combined with roof live loads for load combinations including wind indicated in Section 302.

Reason: It is not clear if impact loads are to be combined with roof live loads for load combinations that include wind. Where impact loads exist, these load combinations will likely control the design of roof frame members and this should be clearly stated.

Committee Action for PC6: (Vote:)

Modification (if any):

Committee Reason:

Report for *03-02– 23*		
Committee decision: AM	***Committee Vote at Meeting: Part A 10-0-0; Part B 9-0-0; Reconsideration 11-0-0***	***Committee Vote on Ballot:***

REPORT OF HEARING:
Modification (if any):

Staff note 6-15-2023 – the reconsideration was with the modified proposals so that the coordination could be throughout the standard with current text. Red text shows this modification.

Replace and revise as follows:

Introduction
In May of 2002 the International Code Council (ICC) and the National Storm Shelter Association (NSSA) initiated a joint project to write a standard for the design and construction of storm shelters. A standard development committee was created, and the first meeting of that committee was in May of 2003. The scope of the standard is to provide minimum design and construction requirements for storm shelters that provide a safe refuge from storms that produce high winds, hurricanes and tornadoes. Hurricanes and tornadoes generate high winds that produce ~~wind~~ pressures on buildings and structures and that create flying debris at levels and intensities that are higher than those for which most commercial building and residences are designed. The magnitude of the tornado and wind speeds associated with these storms are such that building occupants and residents are required to evacuate the area or seek protection in a shelter designed for resistance to extraordinary loads and flying debris. This standard provides design requirements for the main wind force resisting structural system and components and cladding of these shelters, and provides basic occupant life safety and health requirements for these shelters, including means of egress, lighting, sanitation, ventilation, fire safety and minimum required floor space for occupants.

CHAPTER 1
APPLICATION AND ADMINISTRATION

SECTION 106
SUBMITTAL DOCUMENTS

IS-STM 01-03-23 AM
106.2 Design Information ~~required~~. The following information applicable to the design, construction, and operation of the storm shelter shall be ~~supplied as part of the construction documents~~ documented or explicitly referenced on a single sheet within the construction documents.

IS-STM 01-03-23 AM; IS-STM 01-04-23 AM
~~106.2.1 Design information.~~ ~~For the areas of a building designed for occupancy as a *storm shelter*, the following information shall be provided within the construction documents:~~

1. Type of *storm shelter*: Residential or community and tornado, hurricane or a combination of both.
2. Use of *community storm shelter*: use by the general public, building occupants or a combination of both.
3. A statement that the design conforms to the provisions of the ICC 500 *Standard for the Design and Construction of Storm Shelters*, with the edition year specified.
4. The *storm shelter* tornado speed, V_T or design wind speed, ~~V_{ult}~~ V_H, or both, mph (m/s).
5. The tornado and wind exposure category (indicate all where more than one is used).
6. The internal pressure coefficient, GC_{pi} and GC_{piT}.
7. The topographic factor, K_{zt}.
8. The directionality factor, K_d and K_{dt}.
9. *Design* tornado and *wind pressures* and their applicable zones with dimensions needed for the specification of the components and cladding of the *storm shelter envelope*, psf (kN/m^2).
10. Where the *storm shelter* is subject to the requirements of Section 402.1, a statement that the *storm shelter* has or has not been constructed in accordance with Chapter 4.
11. Where the *storm shelter* is subject to the requirements of Section 402.1, the minimum elevation of the lowest floor required by the *authority having jurisdiction* for the location where the *storm shelter* is installed; the *base flood elevation, 500-year flood elevation* and *storm surge flood elevation* where applicable; and the *storm shelter* floor elevation. Where the National Hurricane Center's Sea, Lake and Overland Surges from Hurricanes (SLOSH) or other approved source is utilized for data, the construction documents shall indicate the version, date and the source of the maps.
12. Documentation showing that components of the *storm shelter envelope* will meet the static and cyclic pressure and impact test requirements identified in Chapters 3 and 8.
13. A floor plan drawing or image indicating location of the *storm shelter* on a site or within a building or facility; including a drawing or image indicating the entire facility.
14. A *storm shelter* section or elevation indicating the height of the *storm shelter* relative to the finished grade, finished floor and the *host building*, where applicable.

Report for *03-02– 23*

15. The lowest *storm shelter* floor elevation and corresponding datum, except for *residential tornado shelters* outside of special *flood hazard areas*.
16. The *design occupant capacity.*
17. Calculations for the *usable floor area,* in square feet (m^2).
18. Calculations for the venting area provided and the locations in the *storm shelter*.
19. Calculations for the number of sanitation facilities for *community storm shelters.*
20. Minimum foundation capacity requirements including foundation thickness, steel reinforcement and concrete cover.
21. Installation requirements for prefabricated *storm shelters, ~~Storm~~ storm shelter* structural components, and *impact protective systems* ~~installation requirements~~, including anchor location, minimum edge and end distance and minimum required capacity for all post-installed anchors.
22. For *hurricane shelters*, the rainfall rate of the roof primary drainage system.
23. For *hurricane shelters*, the rainfall rate of the roof secondary (overflow) drainage system where required.
24. For *hurricane shelters*, the rainwater drainage design rainfall rate for facilities subject to rainwater impoundment.

CHAPTER 2
DEFINITIONS

SECTION 202
DEFINITIONS

DESIGN WIND PRESSURE. For hurricane shelters, ~~The~~ the wind pressure on a specific location of the *storm shelter envelope*, as determined in accordance with Section 304, ~~Wind Loads,~~ which controls the design of components and cladding (C & C) of the *storm shelter envelope* or the main wind force resisting system (MWFRS) for the *storm shelter*.

DESIGN TORNADO PRESSURE. For tornado shelters, the tornado pressure on a specific location of the *storm shelter envelope*, as determined in accordance with Section 304, which controls the design of components and cladding (C & C) of the *storm shelter envelope* or the main wind force resisting system (MWFRS) for the *storm shelter*.

HAZARDS.

Coastal. See **"**Coastal high hazard area.**"**

Falling debris. Exterior components, cladding, and appurtenances, such as parapet walls, masonry cladding, or rooftop equipment, that could fall onto the roof of a *storm shelter* from ~~wind~~ windstorm damage to adjacent, taller buildings or taller sections of a *host building*.

Flood. See "500-year flood hazard area" and " Flood hazard area."

Laydown. Adjacent building elements, other structures and natural objects, that could fall onto the roof of a *storm shelter*, such as exterior walls of adjacent single story structures, self-supporting towers, poles or large trees.

Storm surge. See "Storm surge flood hazard area.**"**

WIND PRESSURE. See "Design wind pressure" and "Design tornado pressure."

SECTION 203
SYMBOLS AND NOMENCLATURE

IS-STM 03-02-23 AM

APC = atmospheric pressure change.
D = dead load.
F_{aH} = flood load on *hurricane shelters* in accordance with Section 303.5.
GC_{pi} = internal pressure coefficient.
GC_{piT} = internal tornado pressure coefficient.
L = uniform live load for floors in *hurricane shelters* in accordance with the *applicable code* for the normal use of the space.
L_T = uniform live load for floors in *tornado shelters* in accordance with Section 303.2.
L_{rH} = roof live load for *hurricane shelters* in accordance with Sections 303.3 and 305.3.
L_{rT} = roof live load for *tornado shelters* in accordance with Sections 303.3 and 305.3.
LRFD = load and resistance factor design.
K_d = directionality factor for wind loads.
K_{dT} = directionality factor for tornado loads
~~K_{zt} = topographic factor~~
MWFRS = main wind force resisting system.
R_H = rain load for *hurricane shelters* in accordance with Section 303.1.1.
R = rain load for *tornado shelters* in accordance with the *applicable code*.
V_H = design wind speed for hurricanes.

Report for *03-02– 23*

V_T = design ~~wind~~ tornado speed ~~for tornadoes~~.
W_H = load due to hurricane winds.
W_T = load due to ~~tornadoes winds~~ tornadic winds.

CHAPTER 3
STRUCTURAL DESIGN AND TESTING CRITERIA

SECTION 301
GENERAL

301.4 Performance based design for tornado loads. Where tornado loads are determined using a performance-based procedures, the tornado loads shall be in accordance with ASCE 7 Section 32.1.3, providing loads are not lesser in magnitude than required by this chapter.

301.5 Performance based design for wind loads. Where wind loads are determined using a performance-based procedures, the wind loads shall be in accordance with ASCE 7 Section 26.1.3, providing loads are not lesser in magnitude than required by this chapter.

SECTION 304
TORNADO LOADS AND WIND LOADS

304.1 General. ~~Wind loads from hurricanes, W_H, and tornadoes~~ Tornado loads, W_T, wind loads for hurricanes, W_H, and wind loads for storms in Alaska, W_H, shall be determined in accordance with ASCE 7, Chapters 26 through ~~31~~ 32, except as modified by this section. For tornado loads the procedures from ASCE 7 Section 32.1.2 shall be applicable.

304.2 Design tornado ~~wind~~ speed. For *tornado shelters*, the design ~~wind~~ tornado speed, V_T, shall be in accordance with Figure 304.2(1).

Notes:
1. Values are nominal three-second gust wind speeds in miles per hour at 33 feet above ground for Exposure Category C.
2. Multiply miles per hour by 0.477 to obtain meters per second.
3. Location-specific storm shelter design ~~wind~~ tornado speeds shall be permitted to be determined using the ATC Hazards by Location website, https://hazards.atcouncil.org/.

FIGURE 304.2(1)
DESIGN ~~WIND~~ TORNADO SPEEDS, V_T, ~~FOR TORNADOES~~

304.3 Design wind speed. For *hurricane shelters*, the design wind speed, V_H, shall be in accordance with Figure 304.2(2). For *storm shelters* in Alaska, the design wind speed, V_H, shall be in accordance with Figure 304.2(3).

304.4 ~~304.3~~ Tornado and wind ~~Wind~~ directionality ~~factor~~ factors. The directionality factors for tornado loads, K_{dT} and the directionality factors for wind loads, K_d, shall be taken as ~~K_d =~~ 1.0.

304.5 ~~304.4~~ Exposure category. ~~For *tornado shelters*, wind loads shall be based on Exposure Category C.~~ For *hurricane shelters*, ~~use of~~ that are located in Exposure Category B ~~is not permitted~~ in accordance with ASCE 7 Section 26.7, Exposure C shall be used.

Exception: ~~For *hurricane shelters*, wind~~ Wind loads for the main wind force-resisting system (MWFRS) only shall be permitted to be based on Exposure Category B, where Exposure Category B exists for all wind directions and is likely to remain Exposure Category B after a hurricane with design wind speeds as determined from Section 304.3 ~~304.2~~.

~~**304.5 Topographic effects.** For *tornado shelters*, the topo- graphic factor, K_{zt}, need not exceed 1.0.~~

304.6 Enclosure classifications. Enclosure classifications for *storm shelters* shall be determined in accordance with ASCE 7, Chapter 26. For determining the enclosure classification for *community storm shelters*, the largest opening protected by an *impact-protective system* on a wall that receives positive external pressure shall be considered as an opening.

304.7 Tornado Internal Pressure Coefficient for Enclosed Buildings ~~Atmospheric Pressure Change (APC)~~. For *tornado shelters* classified as enclosed buildings, the ~~additional internal pressures caused by atmospheric pressure change shall be included in the design. The~~ internal

Report for *03-02– 23*

pressure coefficient, GC_{piT}, shall be taken as ±0.18 where atmospheric pressure change (APC) venting area of 1 square foot (0.0929 m^2) per 1,000 cubic feet (28.3 m^3) of interior *storm shelter* volume is provided. APC venting shall consist of openings in the *storm shelter* roof having a pitch 10 degrees or less from the horizontal or openings divided equally (within 10 percent of one another) on opposite walls. A combination of APC venting meeting the above requirements is permitted.

Exception: ~~Calculation of venting area to relieve APC is not required for *tornado shelters* classified as partially enclosed buildings.~~ An internal pressure coefficient of GC_{piT} = ±0.55 shall be used for *tornado shelters* where APC venting meeting the requirements of Section 304.7 is not provided~~, or where APC venting area requirements are not calculated~~.

SECTION 305
DEBRIS HAZARDS

305.1.1 Missile criteria for tornado shelters. Themissile testing for all components of the *storm shelter envelope* of *tornado shelters* shall be a 15-pound (6.8 kg) sawnlumber 2 by 4 traveling at the speeds shown in Table 305.1.1.

TABLE 305.1.1
MISSILE SPEED FOR TORNADO SHELTERS

DESIGN ~~WIND~~ TORNADO SPEED	MISSILE SPEED AND IMPACT SURFACE
130 mph	80 mph Vertical Surfaces 53 mph Horizontal Surfaces
160 mph	84 mph Vertical Surfaces 56 mph Horizontal Surfaces
200 mph	90 mph Vertical Surfaces 60 mph Horizontal Surfaces
250 mph	100 mph Vertical Surfaces 67 mph Horizontal Surfaces

For SI: 1 mile per hour = 0.447 m/s.

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.1 Storm shelters meeting tornado impact test requirements. *Storm shelter envelope* components meeting impact test requirements for *tornado shelters* at the 250 mph design ~~wind~~ tornado speed in accordance with Section 305.1.1 shall be considered acceptable for the impact test requirements for *hurricane shelters* provided the components meet the structural design load requirements for *hurricane shelters*.

306.3 Roof and wall assemblies. Roof and wall assemblies shall meet the impact criteria of Section 305.1, and the *design tornado pressure* and *design wind pressure* in accordance with Section 304.

IS-STM 03-06-23 AM

306.4.1 Impact-protective systems. *Impact-protective systems* for use in the *storm shelter envelope* shall be tested, listed and labeled for impact in accordance with Section 803 and static and cyclic pressure in accordance with Sections 804 and 805. Any changes to *listed impact-protective systems,* such as a change of glazing, shall require evaluation by the listing agency or retesting of the entire assembly.

Exceptions:

1. Window assemblies and other glazed openings where the opening is protected on the exterior side by an *impact-protective system* are not required to be tested for impact.
2. Window assemblies and other glazed openings where the opening is protected on the interior side by an *impact-protective system* are not required to be tested for impact and static and cyclic pressure.
3. Nonoperable, permanently affixed shields or cowlings designed to resist the *design tornado pressure* or *design wind pressures* are not required to be tested for static and cyclic pressure in accordance with Sections 804 and 805.

IS-STM 01-11-23 AM relocated

306.4.1.1.1 ~~112.1.1~~ Marking. The following function and performance characteristics shall be provided on the *label* for each *impact-protective system* tested:

1. Manufacturer's identification reference or listing number for the assembly

Report for *03-02– 23*

2. Type of *impact-protective system,* such as window assembly, door assembly, shutter assembly or louver.
3. Hazard: hurricane, tornado or both.
4. Missile weight and speed.
5. *Design tornado pressure, design wind pressure,* or both.
6. Edition of ICC 500.

IS-STM 03-05-23 AM; IS-STM 03-06-23 AM

306.4.1.2 ~~306.4.1.3~~ Alternate anchorage ~~Anchorage~~ for impact-protective systems. Where anchorage of *impact-protective systems* to the *storm shelter* structure is required by means other than those provided in the manufacturer's listed system ~~listing in accordance with Section 112~~, anchorage shall be designed for pull-out and shear to resist the tornado and wind loads in accordance with Section 304.

SECTION 307
CONNECTION OF STORM SHELTERS TO FOUNDATIONS OR SLABS

307.1.1 Calculation of resistance. Structural stability of *storm shelters* shall be determined by engineering calculations for design tornado and wind loads. Where *storm shelters* are anchored to ~~foundations~~ foundation systems and such top surfaces extending outward from the *storm shelter* walls are at grade, the top surfaces of the foundation systems shall not be considered to have tornado and wind uplift forces acting on them.

307.1.2 Elevated storm shelter foundation systems. Where *storm shelters* are constructed with the top of the supporting foundation system located at an elevation higher than the surrounding finished grade level, the structural stability of the *storm shelter* and elevated supporting foundation system shall be computed assuming that both are fully exposed to the *storm shelter* design tornado, wind and flood loads. Where applicable, and in accordance with the *applicable code*, the impacts of flood-borne debris on stability of the foundation system shall be considered.

307.2 Slabs-on-ground. Where slabs-on-ground are serving as part of the foundation system for the *storm shelter*, the slabs-on-ground shall be designed in accordance with ACI 318 to resist all loads specified in Chapter 3 and to transfer the resultant forces into the ground.

Exceptions:

1. Slabs-on-ground within a *storm shelter* not utilized to transfer tornado and wind forces acting on the *storm shelter* to the ground or to a foundation system supporting the storm shelter shall be designed in accordance with the *applicable code*.
2. Slabs-on-ground within a one- or two-family dwelling and supporting a *residential storm shelter* shall be designed in accordance with ACI 318 or ACI 332.

CHAPTER 5

IS-STM 05-01-23 AS; IS-STM 05-06-23 AM

~~OCCUPANCY~~ OCCUPANT DENSITY, ~~ACCESS~~ ENTRY, ACCESSIBILITY, EGRESS AND SIGNAGE

SECTION 508
SIGNAGE

IS-STM 05-16-23 AS

508.2 Design information signage. All *storm shelters* shall have a sign on or within the *storm shelter* with all of the following:

1. ~~The *design*~~ *Design occupant capacity*.
2. ~~The storm~~ Storm type.
3. ~~The *design*~~ Design tornado and wind speed.
4. ~~The edition~~ Edition of the ICC 500 used for the design.
5. ~~The name~~ Name of the manufacturer or builder of the *storm shelter*.

CHAPTER 6
FIRE SAFETY

SECTION 602
FIRE PROTECTION SYSTEMS

602.1 Fire protection system. Fire protection systems shall be provided within the *storm shelter* where required by the *applicable code* for the normal use of the space. These systems are not required to remain functional for the design storm event and minimum period of shelter occupancy (24 hours for *hurricane shelters*,

Report for *03-02– 23*

2 hours for *tornado shelters*) or to be protected from the tornado and wind load and impact requirements of Chapter 3 or the flood-resistance requirements of Chapter 4.

CHAPTER 7

IS-STM 07-01-23 AS

~~STORM SHELTER~~ ESSENTIAL FEATURES AND ACCESSORIES

SECTION 701
GENERAL

701.2 Protection of storm shelter critical support systems. *Storm shelter critical support systems* shall remain functional for the design storm event and minimum period of *storm shelter* occupancy (24 hours for hurricane shelters, 2 hours for tornado shelters). *Storm shelter critical support systems* located outside of the *storm shelter* areas shall be protected by a means that meets the tornado and wind load and impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4.

CHAPTER 8
TEST METHODS FOR IMPACT AND PRESSURE TESTING

SECTION 802
TEST SPECIMENS

802.1 Test assembly. All parts of the test *specimen* shall be full size, using the same materials, details, methods of construction and methods of attachment as proposed for actual use. Testing of components consisting of wall assemblies, roof assemblies, or *impact-protective systems* shall be allowed in lieu of testing entire *storm shelters*.

Where failure of framing members controls the impact performance, wall and roof assemblies subjected to impact testing shall be a minimum of 4 feet (1219 mm) wide and the full length of the span of the wall or roof section from support to support. Where failure of framing members has been shown through testing to not control the impact performance, wall and roof sections subjected to debris impact testing shall be a minimum of 4 feet (1219 mm) wide by 4 feet (1219 mm) high unless dimensions of the actual assembly are less than these dimensions.

Impact-protective systems shall be impact tested and cyclic pressure tested where applicable, at the maximum and minimum size *listed* for use. Static pressure testing shall be conducted on the maximum size *listed* for use. Operable door assemblies and window assemblies shall be tested for the conditions of swing and latching including inward or outward swing separately as specified for use of the product. *Impact-protective systems* shall be static pressure tested in both directions unless a clear worst-case direction is determined by the *test laboratory*. Paired doors and their latching hardware shall be tested independently from single doors. The *specimen* shall consist of the entire assembled unit and shall, where practical, be mounted as it will be installed in a *storm shelter*, and shall contain all devices used to resist tornado and wind forces and wind-borne debris. Where it is not practical to install for testing door assemblies and window assemblies as they will be mounted in a *storm shelter*, then the unit or assembly shall be mounted in a test buck to connect the *specimen* to the test frame, stand or *test chamber*. Details of the mounting shall be described in the test report.

SECTION 803
IMPACT TESTING

803.9.7.1 Alcove or baffled storm shelter entry systems for which no testing is required. *Storm shelter* entrances, whether provided with a door assembly or not, that are protected by an alcove or baffled *storm shelter* entry system that require missiles to impact at least two surfaces meeting the requirements of Section 306.3 prior to arriving at the protected occupant area shall not be required to undergo impact testing. See Figure 803.9.7.1 for an example. Where a solid door assembly is installed as a closure for this type of entry system or to meet the fire-resistance requirements in Section 603, the door assembly need not meet the tornado and wind load requirements of Section 304.

803.9.7.2 Door assembly subject to rebound impact. Where the *alcove or baffled storm shelter entry system* prevents a first impact of the missile on the door assembly but the door assembly is subject to a *rebound impact* of the missile after it has impacted one surface meeting the requirements of Section 306.3 (see Figure 803.9.7.2 for an example), then a door assembly shall meet the tornado and wind load requirements of Section 304 and the impact requirements of Section 305 except that the missile shall be, at a minimum, a 9-pound (4.1 kg) sawn lumber 2 by 4 traveling at 50 feet per second (15.2 m/s). Entry systems having door assemblies that are protected from the initial and first *rebound impacts* of missile shall comply with the requirements of Section 803.9.7.1.

IS-STM 08-12-23 AS

803.9.7.3 Door assemblies subject to first impact. Where a first-strike angle missile will impact on the door assembly (see Figure 803.9.7.3 for an example) the door assembly shall meet the tornado or wind load requirements of Section 306.3, the fire-resistance requirements of Section 603, and ~~meets~~ meet one of the following debris impact criteria:

Report for *03-02– 23*

1. The door assembly withstands the impact of a missile striking the door assembly at an angle closest to perpendicular to the plane of the door.
2. The door assembly withstands missile impacts by the design missile striking perpendicular to the surface with speed equal to or greater than the *storm shelter* design missile's velocity component perpendicular to the door assembly for the most critical angle that can occur in the application.

The minimum debris impact criterion for the door assembly shall be an impact perpendicular to the door assembly of a 9-pound sawn lumber 2 by 4 traveling at 50 feet per second [34 mph (15.2 m/s)].

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.1 Pressure testing procedures. For wall assemblies, roof assemblies and *impact-protective systems* that are components of the s*torm shelter envelope,* static or cyclic pressure testing shall be in accordance with Sections 805.2 and 805.3, as applicable. *Design tornado pressure* and *design wind pressures* used for static or cyclic pressure testing of the *storm shelter envelope* shall be in accordance with Section 304.

805.2 Wall assemblies and roof assemblies. Where testing of wall assemblies and roof assemblies is required, such assemblies shall be static pressure tested in the as-supplied condition. Static pressure testing of roof assemblies shall be conducted in accordance with FM 4474, ASTM E1592, UL 1897 or ASTM E330, whichever is applicable, to a static pressure 1.2 times the *design tornado pressure* and *design wind pressure* or greater. Static pressure testing of wall assemblies shall be conducted in accordance with ASTM E330 to 1.2 times the *design tornado pressure* and *design wind pressure* or greater.

805.3.1 Tornado shelters. Impact-protective systems for use in tornado shelters shall be tested for static pressure to a pressure of 1.2 times the *design* tornado ~~*wind*~~ *pressure* or greater in accordance with ASTM E330.

CHAPTER 9

REFERENCED STANDARDS

ASCE
7-~~16~~ 22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures with Supplement No. 1.

Committee Reason:
Part A – Update referenced standard to ASCE7 -22 including supplement 1 (which updates referenced standards) and to incorporate the relevant components of the new ASCE 7 tornado loads. Need to coordinate with terminology in other chapters of the standard (e.g. 'wind loads' in chapter 8).

Part B – Approval of 301.4 and 301.5 performance options provides a clarification of the shelter application of ASCE 7-22 specifically permitted performance-based wind and tornado design procedures. The option in Section 304 and 305 was disapproved because this would generally lower wind speeds for tornado shelters.

Reconsideration: This change is for coordination with terminology throughout the standard with the changes in 03-02-23 for tornado loads.

BALLOT COMMENT 1- FIRST DRAFT:
Proponent: Gary Ehrlich

Desired Action: **Affirmative with comment**

Modification:

Reason: In the load combinations (302.2 and 302.3) snow was deliberately excluded as it was considered highly unlikely an intense tornado or hurricane would happen concurrently with a significant snow event; the respective seasons for such events just don't line up. I am not certain that applies to Alaska; a quick glance at historic data (https://akclimate.org/data/) suggests it is possible high winds and heavy snowfall could happen concurrently. Is a special set of load combinations for Alaska needed?
I'm not voting negative but remain disappointed there was not consensus to modify the bounds of Zone IV on the current deterministic Figure 304.2(1) to reflect what appears to be a reduced tornado hazard in portions of the zone, particularly towards the northeastern areas of the zone covering portions of Ohio and Pennsylvania, based on the probabilistic hazard analysis in ASCE 7-22.

BALLOT COMMENT 2- FIRST DRAFT:
Proponent: Marc Leviton

Desired Action: Affirmative with comment

Modification:

Further modify as follows:
Introduction

Report for *03-02– 23*

In May of 2002 the International Code Council (ICC) and the National Storm Shelter Association (NSSA) initiated a joint project to write a standard for the design and construction of storm shelters. A standard development committee was created, and the first meeting of that committee was in May of 2003. The scope of the standard is to provide minimum design and construction requirements for storm shelters that provide a safe refuge from storms that produce high winds, hurricanes and tornadoes. Hurricanes and tornadoes generate high winds that produce wind pressures on buildings and structures and that create flying debris at levels and intensities that are higher than those for which most commercial buildings and residences are designed. The magnitude of the ~~tornado and~~ wind speeds associated with these storms are such that building occupants and residents are required to evacuate the area or seek protection in a shelter designed for resistance to extraordinary loads and flying debris.

Reason: While we make technical distinction between tornado and wind speeds and pressures in the body of the standard, it is not needed in this introduction and the original sentence indicates 'wind speeds associated with these storms' , referring to the previous sentence which indicated "hurricanes and tornadoes".

BALLOT COMMENT 3- FIRST DRAFT:
Proponent: Marc Leviton

Desired Action: Affirmative with comment

Modification:

Further modify as follows:

SECTION 106
SUBMITTAL DOCUMENTS

106.2 Design Information. The following information applicable to the design, construction, and operation of the storm shelter shall be documented or explicitly referenced on a single sheet within the construction documents.

1. Type of *storm shelter*: Residential or community and tornado, hurricane or a combination of both.
2. Use of *community storm shelter*: use by the general public, building occupants or a combination of both.
3. A statement that the design conforms to the provisions of the ICC 500 *Standard for the Design and Construction of Storm Shelters*, with the edition year specified.
4. The *storm shelter* design tornado speed, V_T or design wind speed, V_H, or both, mph (m/s).
5. The ~~tornado and~~ wind exposure category (indicate all where more than one is used).

~~6.~~8. The directionality factor, K_d ~~and~~ or K_{dt} or both.

7. The topographic factor, K_{zt}.

~~8.~~6. The internal pressure coefficient, GC_{pi} ~~and~~ or GC_{piT} or both.

9. *Design* tornado ~~and~~ or *wind pressures* and their applicable zones with dimensions needed for the specification of the components and cladding of the *storm shelter envelope*, psf (kN/m^2) or both.
10. Where the *storm shelter* is subject to the requirements of Section 402.1, a statement that the *storm shelter* has or has not been constructed in accordance with Chapter 4.
11. Where the *storm shelter* is subject to the requirements of Section 402.1, the minimum elevation of the lowest floor required by the *authority having jurisdiction* for the location where the *storm shelter* is installed; the *base flood elevation, 500-year flood elevation* and *storm surge flood elevation* where applicable; and the *storm shelter* floor elevation. Where the National Hurricane Center's Sea, Lake and Overland Surges from Hurricanes (SLOSH) or other approved source is utilized for data, the construction documents shall indicate the version, date and the source of the maps.
12. Documentation showing that components of the *storm shelter envelope* will meet the static and cyclic pressure and impact test requirements identified in Chapters 3 and 8.
13. A floor plan drawing or image indicating location of the *storm shelter* on a site or within a building or facility; including a drawing or image indicating the entire facility.
14. A *storm shelter* section or elevation indicating the height of the *storm shelter* relative to the finished grade, finished floor and the *host building*, where applicable.
15. The lowest *storm shelter* floor elevation and corresponding datum, except for *residential tornado shelters* outside of special *flood hazard areas*.
16. The *design occupant capacity.*
17. Calculations for the *usable floor area,* in square feet (m^2).
18. Calculations for the venting area provided and the locations in the *storm shelter*.
19. Calculations for the number of sanitation facilities for *community storm shelters.*
20. Minimum foundation capacity requirements including foundation thickness, steel reinforcement and concrete cover.
21. Installation requirements for prefabricated *storm shelters, storm shelter* structural components, and *impact protective systems*, including anchor location, minimum edge and end distance and minimum required capacity for all post-installed anchors.
22. For *hurricane shelters*, the rainfall rate of the roof primary drainage system.
23. For *hurricane shelters*, the rainfall rate of the roof secondary (overflow) drainage system where required.

Report for *03-02– 23*

24. For *hurricane shelters*, the rainwater drainage design rainfall rate for facilities subject to rainwater impoundment.

Reason:

5. In 106.2 item 4, add 'design' as shown for consistency with Section 203 and 304.2
6. In 106.2 item 5, delete the new 'tornado and' text because exposure category is not used for tornado loads
7. In 106.2 items 6, 8 and 9, they read as requiring both tornado and wind directionality factors and pressures, which would only apply for combined tornado and hurricane shelters. Revise to language like item 4, which indicates reporting design speed requirements for tornado or hurricane or both.
8. Also, rearrange order of terms in items 6 and 8 to put tornado first, for consistency with the rest of the list

BALLOT COMMENT 4- FIRST DRAFT:
Proponent: Marc Leviton

Desired Action: Affirmative with comment

Modification:

Further modify as follows:

SECTION 508
SIGNAGE

508.2 Design information signage. All *storm shelters* shall have a sign on or within the *storm shelter* with all of the following:

1. *Design occupant capacity.*
2. Storm type.
3. Design tornado speed, ~~and~~ design wind speed, or both.
4. Edition of the ICC 500 used for the design.
5. Name of the manufacturer or builder of the *storm shelter*.

Reason: Revise for consistency with presentation in similar sections (e.g., 106.2 item 4).

PUBLIC COMMENT 5- FIRST DRAFT:
Proponent: Work Group 8

Desired Action: AFM

Modification:
Further revise as follows:

Staff note: Section number is what is shown in draft for clarity of revision location.

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.1.1 Marking. The following function and performance characteristics shall be provided on the *label* for each *impact-protective system* tested:

1. Manufacturer's identification reference or listing number for the assembly
2. Type of *impact-protective system,* such as window assembly, door assembly, shutter assembly or louver.
3. Hazard: hurricane, tornado or both.
4. Missile weight and speed.
5. *Design tornado pressure~~, design wind pressure,~~* ~~or both~~.
6. Edition of ICC 500.

Reason: only show "Design Pressure" since manufacturing tested pressure does not distinguish between tornado or wind (Hazard in #3 will specify)

PUBLIC COMMENT 6- FIRST DRAFT:
Proponent: Timothy L Gettelfinger

Desired Action: AFM

Modification:
Further revise as follows:

Report for *03-02– 23*

SECTION 305
DEBRIS HAZARDS

305.3.3 Impact Loads. Impact loads from laydown and falling debris hazards shall be determined using a minimum impact factor of 2.0 times the estimated weight of the debris hazard. Each laydown and falling debris hazard load shall be considered one at a time, applied simultaneously with the uniform live loads on the roof of the shelter in accordance with Section 303.3. Impact and falling debris hazard loads shall be combined with roof live loads for load combinations including wind indicated in Section 302.

Reason: It is not clear if impact loads are to be combined with roof live loads for load combinations that include wind. Where impact loads exist, these load combinations will likely control the design of roof frame members and this should be clearly stated.

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT:		
Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION:		
Modification (if any):		
Committee Reason:		

IS-STM 03-08-23

306.4.1.1, 306.5

Proponent: Andrew Holstein, Ph.D., P.E., representing Intertek

Revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

~~**306.4.1.1 Door undercut.** Door assemblies for use in the storm shelter envelope with a threshold at the level of exit discharge shall be limited to a 3/4-inch (19.1 mm) maximum undercut.~~

306.5 Joints, gaps or voids in storm shelter envelope. Joints, gaps or voids in a storm shelter envelope that open ~~opens~~ into the protected occupant area similar to masonry control joints, expansion joints, opening protective device shim spaces, air louver blades, grates, grilles, screens or precast panel joints shall be considered openings and shall be protected in accordance with Section ~~Sections~~ 306.4.1.

Exceptions:

1. Masonry control joints and masonry or concrete expansion joints 3/8-inch (9.5 mm) or less in width, sealed with joint material in accordance with TMS 602 for masonry or ASTM C920 for concrete.
2. Precast concrete panel joints in accordance with one of the following:
   2.1 For wall panels 6 inches (152 mm) in thickness or greater where the joint is a maximum of 3/4 inches (19 mm) in width and sealed on each face with a Type S joint material in accordance with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.
   2.2 For roof panels 4 inches (102 mm) in thickness or greater where the joint is a maximum of 3/4 inches (19 mm) and sealed with a Type S joint material in accordance with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.
3. Joints, gaps or voids that will not allow a direct debris path through the storm shelter envelope into the protected occupant area. Debris particles shall impact at least two surfaces meeting the impact criteria of Section 305.1 prior to arriving at the protected occupant area. Straight missile paths and elastic impacts are assumed in determining missile trajectories.
4. Door undercut 3/4-inch or less in height in door assemblies with a threshold at the level of exit discharge.
5. A joint 3/16-inch or less in width at the meeting edge of a pair of doors.

Reason:
1) Two editorial corrections are recommended where singular/plural agreement is currently incorrect.

2) Door undercut is a permitted joint in the shelter envelope and therefore is more logically located in Section 306.5. The section has been relocated from 306.4.1.1 to 306.5 Exception 4 without alteration of the original requirements except that "in the storm shelter envelope" has been removed because the scope of 306.5 is already specified as joints, gaps, and voids *in the storm shelter envelope*.

3) An exposed joint is typically found at the meeting edge of pair door assemblies, but the current language in 306.5 could be read to require that this joint be "protected" by an astragal or mullion. Astragals and mullions are not always feasible in shelter design and so this joint has been added to the list of exceptions in 306.5 to clarify its allowance and establish a maximum permitted size. The 3/16 inch maximum width is aligned with the requirements of NFPA 80 for fire doors, which requires that the clearance at the meeting edge of pair door assemblies be 1/8" +/- 1/6". This addition to 306.5 is intended to provide clarity regarding the allowance of a meeting edge joint but does not remove the meeting edge impact required by Section 803.9.4.1. This required impact evaluates the ability of the meeting edge joint to protect against debris impact.

Staff suggestion: To address three questions:
Is a threshold required?
Height of undercut above threshold? Or above the floor and the threshold is assumed to fill the undercut?
Hazard below the level of exit discharge?

4. For doors located at or below the level of exit discharge, a door undercut of 3/4-inch or less in height measured from the finished floor or top of the threshold to the bottom of the door.

Notes: 4-6-2023 hold for Work Group 3 meeting; see notes on 03-07

IS-STM 03-08-23 Replacement

306.4.1.1, 306.5

Proponent: ICC 500 Work Group 3

Replace and revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.1 Door ~~undercut~~ clearance. Floor clearance for door ~~Door~~ assemblies ~~for use~~ in the storm shelter envelope ~~with a threshold at the level of exit discharge~~ shall be ~~limited to a~~ 3/4-inch (19.1 mm) maximum, ~~undercut~~ measured from the top of the threshold or finished floor. (See example in Figure 306.4.1.1).

The joint clearance at the meeting edge of a pair of side-swinging doors in the storm shelter envelope shall be 3/16-inch (4.8 mm) maximum.

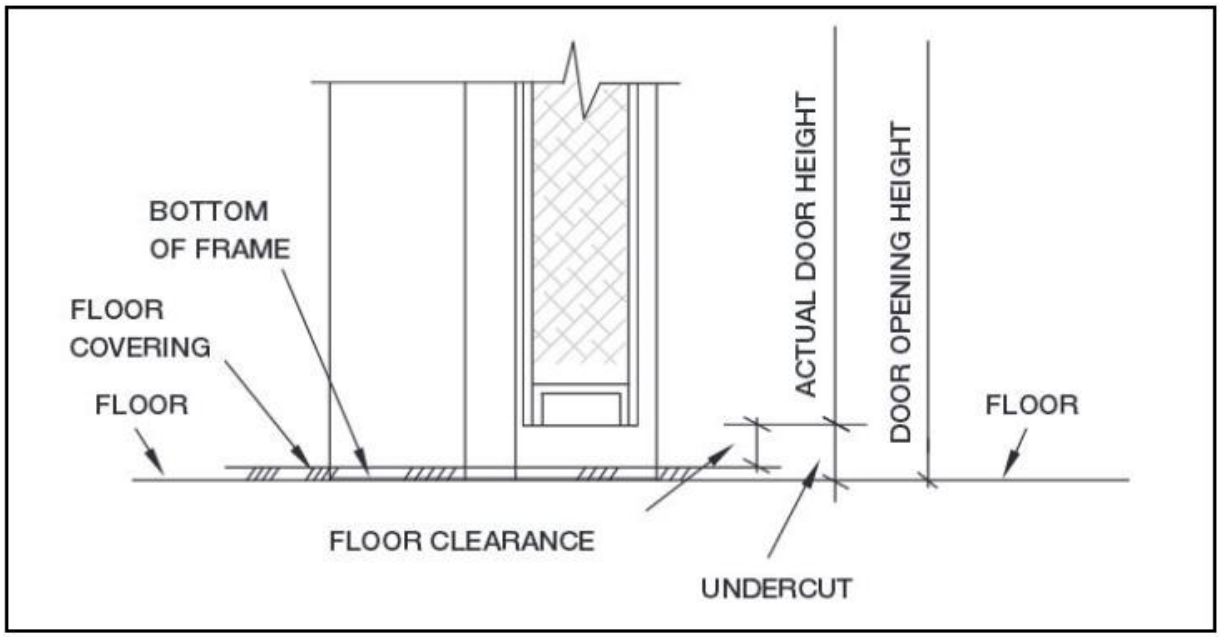


Figure 306.4.1.1
Door clearance

From NFPA 80 – need new figure similar to this, but add threshold, change verbiage to match text.

Reason: Moving this section as originally proposed would not work with the revised text in IS-STM 03-11. The main text in 306.5 does reference 306.4.1, which would include this subsection as a type of joint.

The clearances are consistent with NFPA 80 for smoke intrusion.

Additional criteria may be needed for the bottom edge of sectional or rolling doors later, but there is no guidance right now for what that should be. So this proposal is keeping this general for all doors until that is determined.

Committee Action: Approval as Modified (Vote: 7-4-0)

Modification (if any):

Replace and revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.1 Door ~~undercut~~ clearance. Floor clearance for door ~~Door~~ assemblies ~~for use~~ in the storm shelter envelope ~~with a threshold at the level of exit discharge~~ shall be ~~limited to a~~ 3/4-inch (19.1 mm) maximum, ~~undercut~~ measured from the top of the threshold or finished floor. (See example in Figure 306.4.1.1).

The joint clearance at the meeting edge of a pair of side-swinging doors in the storm shelter envelope shall be 3/16-inch (4.8 mm) maximum.

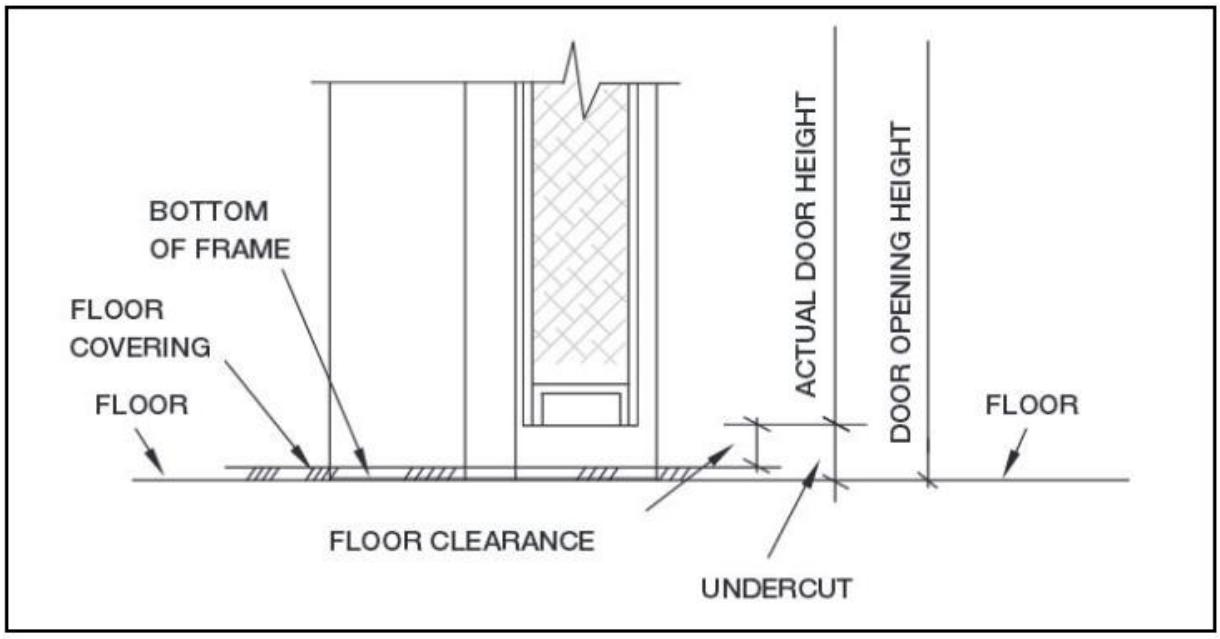


Figure 306.4.1.1
Door clearance

From NFPA 80 – need new figure similar to this, but add threshold, change verbiage to match text.

Committee Reason: This addresses floor clearance at the bottom of the door and the joint between doors. Using 'floor clearance' would allow for field verification without knowing the thickness of floor finishes or thresholds. There was concern expressed with not using the industry term 'door undercut' vs. 'floor clearance'.

IS-STM 03-08-23 Ballot Comment 1

306.4.1.4

Proponent: Corey Schultz

Further revise as follows:

306.4.1.4 Door undercut ~~clearance~~. ~~Floor clearance for door~~ Door assemblies in the storm shelter envelope shall be limited to a 3/4-inch (19.1 mm) maximum undercut ~~measured from the top of the threshold or finished floor~~. (See example in Figure 306.4.1.4).

The joint clearance at the meeting edge of a pair of side-swinging doors in the storm shelter envelope shall be 3/16-inch (4.8 mm) maximum.

Reason: The undercut on storm shelter doors is measured as indicated on the proposed graphic. The undercut is the dimension the bottom latches and latch bolts are typically based upon for testing. It is anticipated changing this requirement to be the floor clearance is going to create a lot of unnecessary confusion between designers, peer reviewers, and manufacturers and will result in doors that do not

comply with the tested assembly. As an example, this provision as written would allow a designer to believe that they could have a ½" floor finish thickness plus a ½" threshold then the ¾" floor clearance dimension above the threshold. This would put the door and latching hardware at least 1" higher than the specimens tested which would not be allowed.

The reason for this change in the original proposal is to allow for variation in floor finishes and/or heights of thresholds. Storm shelter doors similar to fire rated doors cannot be adjusted in the field to account for unknown finish and threshold heights. The height of the floor finish and threshold need to match the tested door assembly, not the storm shelter door matching the height of the floor finish and threshold.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *03-08– 23*		
Committee decision: AM	***Committee Vote at Meeting: 7-4-0***	***Committee Vote on Ballot:***

REPORT OF HEARING:

Modification (if any):

Replace and revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.1 Door ~~undercut~~ clearance. Floor clearance for door ~~Door~~ assemblies ~~for use~~ in the storm shelter envelope ~~with a threshold at the level of exit discharge~~ shall be ~~limited to a~~ 3/4-inch (19.1 mm) maximum, ~~undercut~~ measured from the top of the threshold or finished floor. (See example in Figure 306.4.1.1).

The joint clearance at the meeting edge of a pair of side-swinging doors in the storm shelter envelope shall be 3/16-inch (4.8 mm) maximum.

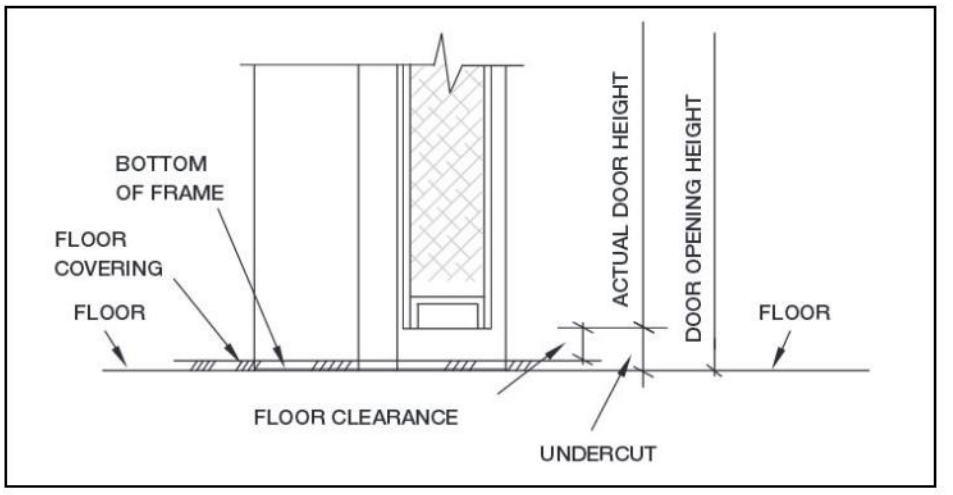


Figure 306.4.1.1
Door clearance

From NFPA 80 – need new figure similar to this, but add threshold, change verbiage to match text.

Committee Reason: This addresses floor clearance at the bottom of the door and the joint between doors. Using 'floor clearance' would allow for field verification without knowing the thickness of floor finishes or thresholds. There was concern expressed with not using the industry term 'door undercut' vs. 'floor clearance'.

BALLOT COMMENT 1- FIRST DRAFT:

Proponent: Corey Schultz

Desired Action: **Negative with comment**

Modification:

Further modify the proposal:

Report for *03-08– 23*
306.4.1.4 Door undercut ~~clearance~~. ~~Floor clearance for door~~ Door assemblies in the storm shelter envelope shall be limited to a 3/4-inch (19.1 mm) maximum undercut ~~measured from the top of the threshold or finished floor~~. (See example in Figure 306.4.1.4). The joint clearance at the meeting edge of a pair of side-swinging doors in the storm shelter envelope shall be 3/16-inch (4.8 mm) maximum.
Reason: The undercut on storm shelter doors is measured as indicated on the proposed graphic. The undercut is the dimension the bottom latches and latch bolts are typically based upon for testing. It is anticipated changing this requirement to be the floor clearance is going to create a lot of unnecessary confusion between designers, peer reviewers, and manufacturers and will result in doors that do not comply with the tested assembly. As an example, this provision as written would allow a designer to believe that they could have a ½" floor finish thickness plus a ½" threshold then the ¾" floor clearance dimension above the threshold. This would put the door and latching hardware at least 1" higher than the specimens tested which would not be allowed. The reason for this change in the original proposal is to allow for variation in floor finishes and/or heights of thresholds. Storm shelter doors similar to fire rated doors cannot be adjusted in the field to account for unknown finish and threshold heights. The height of the floor finish and threshold need to match the tested door assembly, not the storm shelter door matching the height of the floor finish and threshold.

PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 03-10- 23

306.4.1.5(New)

Proponent: ICC 500 Work Group 3

Revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.5 Louvers. Louvers shall be tested in accordance with Section 803.9.6 and shall be designed or configured such that debris particles shall impact at least two surfaces before passing through the *storm shelter envelope* into the *protected occupant area*. Straight missile paths and elastic impacts are assumed in determining missile trajectories.

Reason: Louvers are a type of opening protective that was not previously addressed. Louvers are needed for natural ventilation.

IS-STM 03-10- 23 Modification

306.4.1.5(New)

Proponent: ICC 500 Work Group 3

Further revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.5 Louvers. Louvers shall be tested in accordance with Section 803.9.6 and shall be designed or configured such that debris particles shall impact at least two surfaces of the louver before passing through the *storm shelter envelope* and into the *protected occupant area*. Straight ~~missile~~ debris particle paths and elastic impacts are assumed in determining ~~missile~~ debris particle trajectories.

Reason:
[1] The phrase “of the louver” was added as some interpretations of previous ICC-500 resulted in two independent louvers being installed back to back to meet the debris impacting “two surfaces”, where a single louver was only considered a single “surface”. I believe the intent is for only a single louver to be required as long as the particles hit two surfaces of that one louver.
[2] The word “and” was added.
[3] In 2 places, update "missile" to "debris particle" as debris particle was used in the first part of the section, and we are not talking about a complete missile.

Committee Action: Approval as Modified (Vote:7-1-0)

Modification (if any):

Further revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.5 Louvers. Louvers shall be tested in accordance with Section 803.9.6 and shall be designed or configured such that debris particles shall impact at least two surfaces of the louver before passing through the *storm shelter envelope* and into the *protected occupant area*. Straight ~~missile~~ debris particle paths and elastic impacts are assumed in determining ~~missile~~ debris particle trajectories.

Committee Reason: There was concern about the use of the word 'particle'. Should there be a requirement for debris particles on a louver if we do not test for these for other openings? Should there be a size/type limitation for what a particle is? Is this straight line testing of particles (similar to rebound testing) vs. particles that follow the wind path through the louver. This proposal is addressing straight particles moving through gaps in a louver. This is design criteria – text criteria will be defined in Chapter 8. 'Missile' does not work because we define a much larger size than this is trying to address. 'Debris particle' is currently used in the text.

IS-STM 03-10-23 Ballot Comment 1

803.9.6

Proponent: Mike Steele, representing Greenheck Fan Corporation

Further revise as follows:

Staff Note: Section 803.9.6 was revised by 08-10-23 AM. It is shown here as revised.

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts….

803.9.6 Other impact-protective systems. All other impact-protective systems shall be impacted in the center of the test specimen, and at a corner within 6 inches (152 mm) from each edge. Where a lock/latch is provided on the test specimen, the corner impact shall occur nearest the lock/latch. See example in Figure 803.9.6(1).

Panels and interface joints shall be additionally impacted on the same test specimen centered at a seam or lap and at the center of a panel element. See example in Figure 803.9.6(2).

Where an interior stud or support is present, additional impacts onto the same test *specimen* shall be performed within 3 inches (76 mm) of the stud or support, and directly on the stud or support. See examples in Figures 803.9.2(1) or 803.9.2(2).

All impact-protective systems that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4.

Louvers shall be additionally impacted at mid-span of the blade's longest free-span of each test *specimen* and the impact shall be permitted be non-centered when measured perpendicular to the blade span. Where an impact location is on the blade of a louver, the leading face of the test missile shall impact the exterior face or edge of at least one blade prior to proceeding deeper into the louver (see Figure 803.9.6(3) for an example).

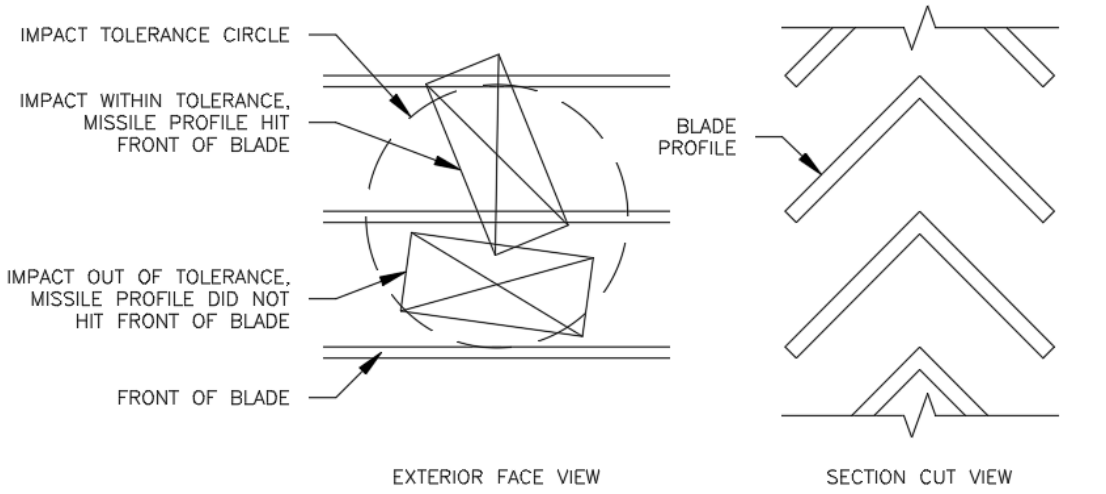


Figure 803.9.6(3) LOUVER IMPACT TOLERANCE

Reason: First sentence: Due to the draft's new section 306.4.1.5 "Louvers" and its test requirements for louvers to be tested per the IPS section, the IPS impact section needs to add a vulnerable impact location of a louver, which is at mid-span of the louver blade's free span. This is similar to impacting at the center of a glazed opening (required in section 803.9.5) and impacting centered between wall supports (required in section 803.9.1).

Second Sentence:
Was added to reincorporate a small portion of a disapproved proposal of an entire new section regarding louver specific test requirements (IS-STM 08-08-23). Now being proposed is only a single sentence instead of an entire new section. The sentence was modified form the original IS-STM 08-08-23 proposal. The sentence ensures the missile makes initial impact on the front of a louver blade, which prevents an impact failure due to the test missile sneaking between two blades and making first impact at a location mid-depth within the louver. Similar language is in AMCA Standard 540, "Test Method for Louvers Impacted by Wind Borne Debris", which has been accepted by Miami-Dade County, the Florida Building Code, and the IBC. A new figure is proposed to assist in the understanding, which is modified from a figure in AMCA 540 (shown below).

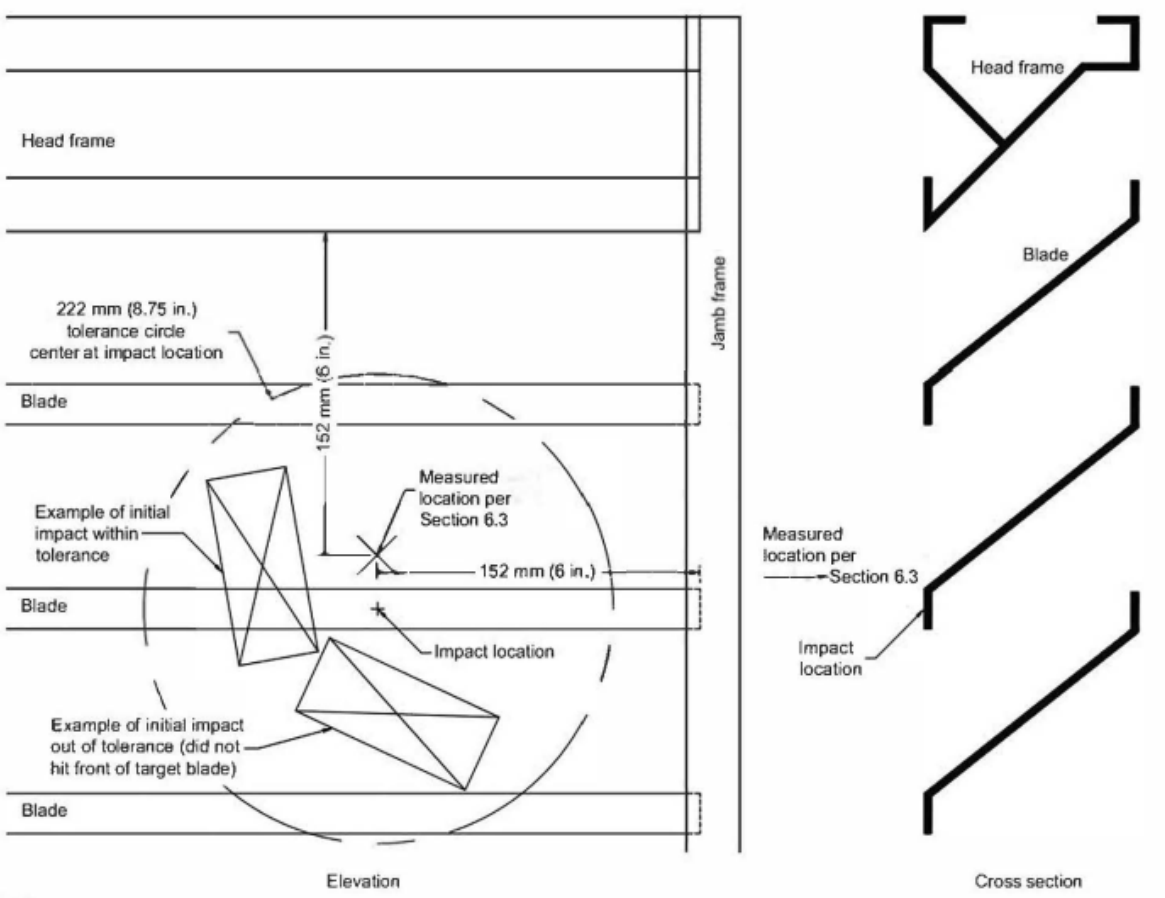


Figure 6.1 — Impact Location Tolerance

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *03-10– 23*		
Committee decision: AM	***Committee Vote at Meeting: 7-1-0***	***Committee Vote on Ballot:***

REPORT OF HEARING:

Modification (if any):

Further revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.5 Louvers. Louvers shall be tested in accordance with Section 803.9.6 and shall be designed or configured such that debris particles shall impact at least two surfaces of the louver before passing through the *storm shelter envelope* and into the *protected occupant area*. Straight ~~missile~~ debris particle paths and elastic impacts are assumed in determining ~~missile~~ debris particle trajectories.

Committee Reason: There was concern about the use of the word 'particle'. Should there be a requirement for debris particles on a louver if we do not test for these for other openings? Should there be a size/type limitation for what a particle is? Is this straight line testing of particles (similar to rebound testing) vs. particles that follow the wind path through the louver. This proposal is addressing straight particles moving through gaps in a louver. This is design criteria – text criteria will be defined in Chapter 8. 'Missile' does not work because we define a much larger size than this is trying to address. 'Debris particle' is currently used in the text.

PUBLIC COMMENT 1- FIRST DRAFT:

Proponent: Mike Steele, representing Greenheck Fan Corporation

Report for *03-10– 23*

Desired Action: AFM

Modification:
Further modify as follows:

Staff Note: Section 803.9.6 was revised by 08-10-23 AM. It is shown here as revised.

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts….

803.9.6 Other impact-protective systems. All other impact-protective systems shall be impacted in the center of the test specimen, and at a corner within 6 inches (152 mm) from each edge. Where a lock/latch is provided on the test specimen, the corner impact shall occur nearest the lock/latch. See example in Figure 803.9.6(1).

Panels and interface joints shall be additionally impacted on the same test specimen centered at a seam or lap and at the center of a panel element. See example in Figure 803.9.6(2).

Where an interior stud or support is present, additional impacts onto the same test *specimen* shall be performed within 3 inches (76 mm) of the stud or support, and directly on the stud or support. See examples in Figures 803.9.2(1) or 803.9.2(2).

All impact-protective systems that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4.

Louvers shall be additionally impacted at mid-span of the blade's longest free-span of each test *specimen* and the impact shall be permitted be non-centered when measured perpendicular to the blade span. Where an impact location is on the blade of a louver, the leading face of the test missile shall impact the exterior face or edge of at least one blade prior to proceeding deeper into the louver (see Figure 803.9.6(3) for an example).

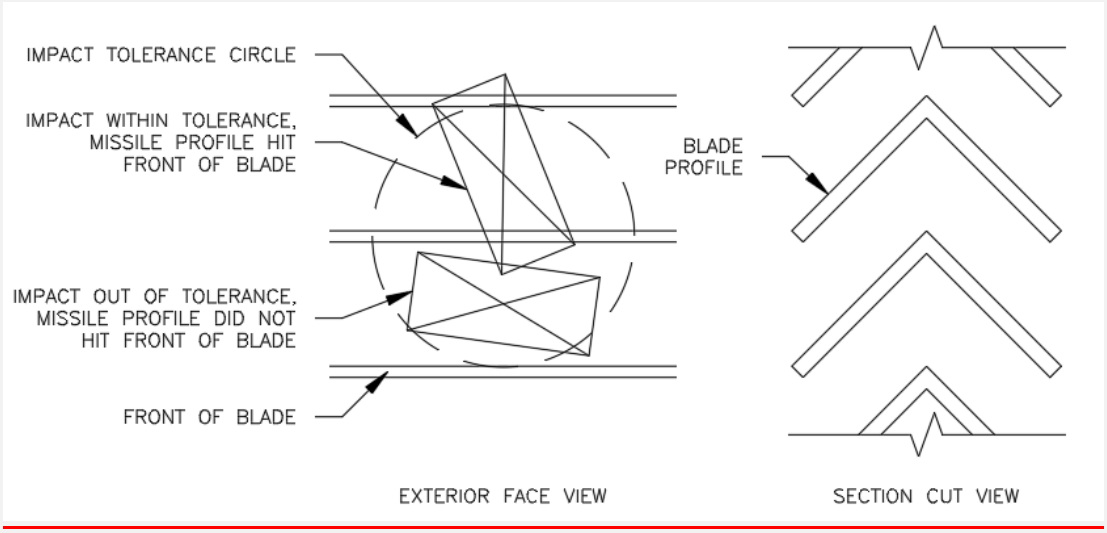


Figure 803.9.6(3) LOUVER IMPACT TOLERANCE

Reason: First sentence: Due to the draft's new section 306.4.1.5 "Louvers" and its test requirements for louvers to be tested per the IPS section, the IPS impact section needs to add a vulnerable impact location of a louver, which is at mid-span of the louver blade's free span. This is similar to impacting at the center of a glazed opening (required in section 803.9.5) and impacting centered between wall supports (required in section 803.9.1).

Second Sentence:
Was added to reincorporate a small portion of a disapproved proposal of an entire new section regarding louver specific test requirements (IS-STM 08-08-23). Now being proposed is only a single sentence instead of an entire new section. The sentence was modified form the original IS-STM 08-08-23 proposal. The sentence ensures the missile makes initial impact on the front of a louver blade, which prevents an impact failure due to the test missile sneaking between two blades and making first impact at a location mid-depth within the louver. Similar language is in AMCA Standard 540, "Test Method for Louvers Impacted by Wind Borne Debris", which has been accepted by Miami-Dade County, the Florida Building Code, and the IBC. A new figure is proposed to assist in the understanding, which is modified from a figure in AMCA 540 (shown below).

Report for *03-10– 23*

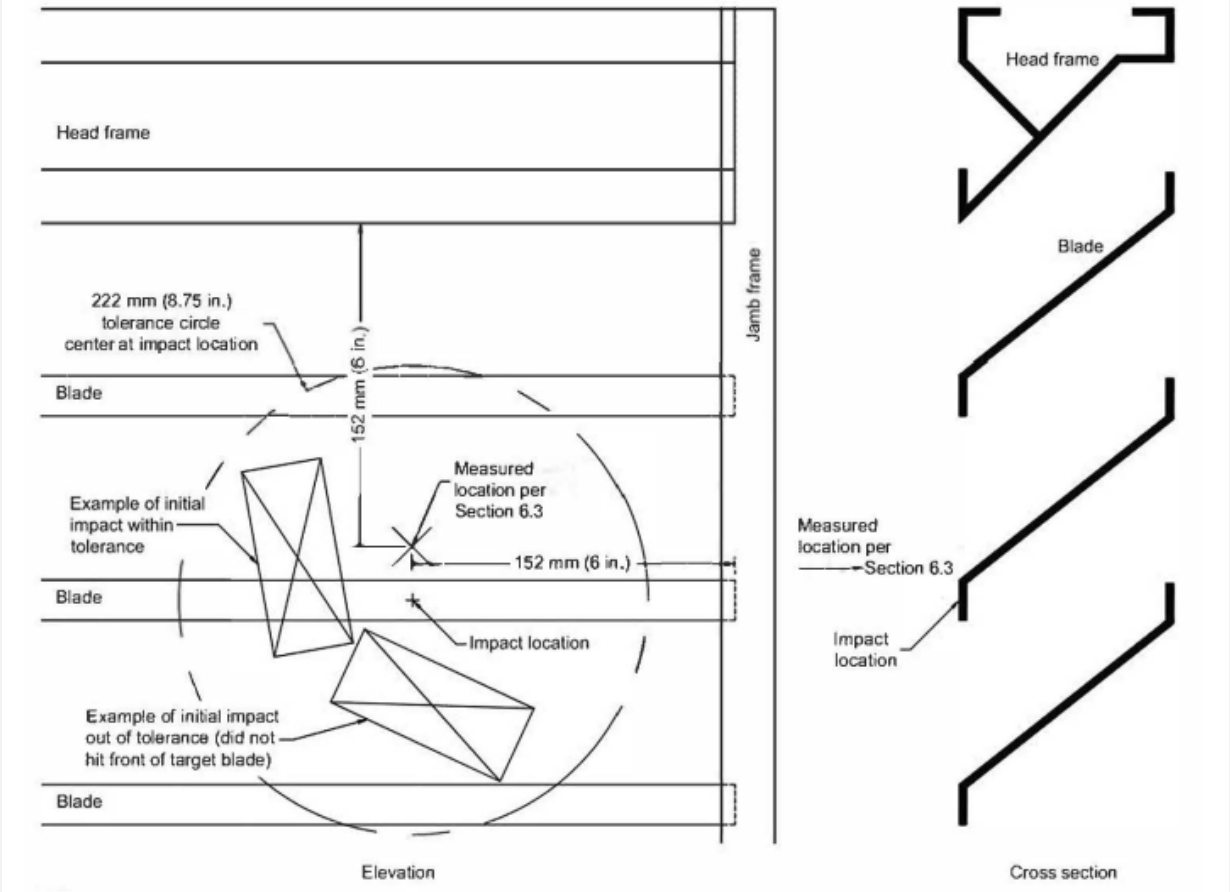


Figure 6.1 — Impact Location Tolerance

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 03-11- 23

306.5, 306.5.1(New), 306.5.2(New), 306.5.2.1(New), 306.5.2.2(New)

Proponent: ICC 300 Work Group 3

Revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.5 Joints, gaps or voids in storm shelter envelope. Joints, gaps or voids in a *storm shelter envelope* that opens into the *protected occupant area* ~~similar to masonry control joints, expansion joints, opening protective device shim spaces, air louver blades, grates, grilles, screens or precast panel joints~~ shall be considered openings and shall ~~be protected in accordance with Sections 306.4.1~~ comply with the following:.

~~**Exceptions:**~~

~~1. Masonry control joints and masonry or concrete expansion joints $^3/_8$ inch (9.5 mm) or less in width, sealed with joint material in accordance with TMS 602 for masonry or ASTM C920 for concrete.~~

~~2. Precast concrete panel joints in accordance with one of the following:~~

~~2.1. For wall panels 6 inches (152 mm) in thickness or greater where the joint is a maximum of $^3/_4$ inches (19 mm) in width and sealed on each face with a Type S joint material in accordance ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.~~

~~2.2. For roof panels 4 inches (102 mm) in thickness or greater where the joint is a maximum of $^3/_4$ inches (19 mm) and sealed with a Type S joint material in accordance with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.~~

1. Joints, gaps or voids shall be protected by permanent opening protection as approved by the engineer or record and the authority having jurisdiction.

2.~~3.~~ Joints, gaps or voids shall ~~that will~~ not allow a direct debris path through the *storm shelter envelope* into the *protected occupant area*. Debris particles shall impact at least two surfaces meeting the impact criteria of Section 305.1 prior to arriving at the *protected occupant area*. Straight missile paths and elastic impacts are assumed in determining missile trajectories.

3. Joints, gaps or voids that do not meet Item 1 or 2 shall comply with Section 306.5.1.1 or 306.5.1.2.

306.5.1 Masonry control and expansion joints. Masonry control and expansion joints 3/8-inch (9.5 mm) or less in width shall be permitted where sealed with joint material in accordance with TMS 602 for masonry or ASTM C920 for concrete.

306.5.2 Precast Concrete construction joints. Precast concrete panel joints shall comply Section 306.5.2.1 or 306.5.2.2, as applicable.

306.5.2.1. Precast concrete wall panels. For wall panels 6 inches (152 mm) in thickness or greater where the joint is a maximum of $^3/_4$ inches (19 mm) in width and sealed on each face with a Type S joint material in accordance ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

306.5.2.2 Precast concrete roof panels. For roof panels 4 inches (102 mm) in thickness or greater where the joint is a maximum of $^3/_4$ inches (19 mm) and sealed with a Type S joint material in accordance with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

Reason: This is a rearrangement of current requirements for joints, gaps and voids.

IS-STM 03-11- 23 Modification 1

306.5, 306.5.1(New), 306.5.2(New), 306.5.2.1(New), 306.5.2.2(New)

Proponent: ICC 300 Work Group 3

Further revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.5 Joints, gaps or voids in storm shelter envelope. Joints, gaps or voids in a *storm shelter envelope* that opens into the *protected occupant area* shall be considered openings and shall comply with the following:

1. Joints, gaps or voids shall be protected by permanent opening protection as approved by the engineer ~~or~~ of record and the authority having jurisdiction.
2. Joints, gaps or voids shall not allow a direct debris path through the *storm shelter envelope* into the *protected occupant area*. Debris particles shall impact at least two surfaces meeting the impact criteria of Section 305.1 prior to arriving at the *protected occupant area*. Straight ~~missile~~ debris particle paths and elastic impacts are assumed in determining ~~missile~~ debris particle trajectories.
3. Joints, gaps or voids that do not meet Item 1 or 2 shall comply with Section ~~306.5.1.1~~ 306.5.1 or ~~306.5.1.2~~ 306.5.2.

306.5.1 Masonry control and expansion joints. Masonry control and expansion joints 3/8-inch (9.5 mm) or less in width shall be ~~permitted where~~ sealed with joint material ~~in accordance~~ that complies with TMS 602 for masonry or ASTM C920 for concrete.

306.5.2 Precast Concrete construction joints. Precast concrete panel joints shall comply with Section 306.5.2.1 or 306.5.2.2~~, as applicable~~.

306.5.2.1. Precast concrete wall panels. For wall panels 6 inches (152 mm) in thickness or greater where the joint is ~~a maximum of~~ 3/4 inches (19 mm) or less in width, joints shall be ~~and~~ sealed on each face with a Type S joint material ~~in accordance~~ that complies with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

306.5.2.2 Precast concrete roof panels. For roof panels 4 inches (102 mm) in thickness or greater where the joint is ~~a maximum of~~ 3/4 inches (19 mm) or less in width, joints shall be ~~and~~ sealed on each face with a Type S joint material ~~in accordance~~ that complies with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

Reason: Editorial modifications to correct spelling and numbering errors. This also coordinates the terminology between sections and modification to IS-STM 03-10-23.
The overall proposal impro

IS-STM 03-11- 23 Modification 2

306.5, 306.5.1(New), 306.5.2(New), 306.5.2.1(New), 306.5.2.2(New)

Proponent: ICC 300 Work Group 3

Further revise as follows:

103.1 Dimensions. Dimensions stated as “maximum” or “minimum” are actual limits. ~~All~~ Dimensions that are not stated as “maximum” or “minimum” are nominal. Nominal ~~All~~ dimensions are subject to conventional industry tolerances unless otherwise noted.

306.5 Joints, gaps or voids in storm shelter envelope. Joints, gaps or voids in a *storm shelter envelope* that opens into the *protected occupant area* shall be considered openings and shall comply with the following:

1. Joints, gaps or voids shall be protected by permanent opening protection as approved by the engineer ~~or~~ of record and the authority having jurisdiction.
2. Joints, gaps or voids shall not allow a direct debris path through the *storm shelter envelope* into the *protected occupant area*. Debris particles shall impact at least two surfaces meeting the impact criteria of Section 305.1 prior to arriving at the

protected occupant area. Straight ~~missile~~ debris particle paths and elastic impacts are assumed in determining ~~missile~~ debris particle trajectories.

3. Joints, gaps or voids that do not meet Item 1 or 2 shall comply with Section ~~306.5.1.1~~ 306.5.1 or ~~306.5.1.2~~ 306.5.2.

306.5.1 Masonry control and expansion joints. Masonry control and expansion joints shall be a maximum of ~~3/8~~ 1/2-inch (~~9.5~~ 12.7 mm) ~~or less~~ in width and shall be ~~permitted where~~ sealed with joint material ~~in accordance~~ that complies with TMS 602 for masonry or ASTM C920 for concrete.

306.5.2 Precast Concrete construction joints. Precast concrete panel joints shall comply with Section 306.5.2.1 or 306.5.2.2~~, as applicable~~.

306.5.2.1. Precast concrete wall panels. For wall panels 6 inches (152 mm) in thickness or greater, ~~where the joint is~~ joints shall be a maximum of $^{3}/_{4}$ inches (19 mm) in width and shall be ~~and~~ sealed on each face with a Type S joint material ~~in accordance~~ that complies with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

306.5.2.1. Precast concrete wall panels. For wall panels 6 inches (152 mm) in thickness or greater, ~~where the joint is~~ joints shall be a maximum of $^{3}/_{4}$ inches (19 mm) in width and shall be ~~and~~ sealed on each face with a Type S joint material ~~in accordance~~ that complies with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

Reason: Editorial modifications to correct spelling and numbering errors. This also coordinates the terminology between sections and modification to IS-STM 03-10-23. The change to 103.1 is to emphasize that these dimensions already include industry tolerances.

Committee Action: Approval as Modified (Vote:8-0-0)

Modification (if any):

Further revise as follows:

103.1 Dimensions. Dimensions stated as “maximum” or “minimum” are actual limits. ~~All~~ Dimensions that are not stated as “maximum” or “minimum” are nominal. Nominal ~~All~~ dimensions are subject to conventional industry tolerances unless otherwise noted.

306.5 Joints, gaps or voids in storm shelter envelope. Joints, gaps or voids in a *storm shelter envelope* that opens into the *protected occupant area* shall be considered openings and shall comply with the following:

1. Joints, gaps or voids shall be protected by permanent opening protection as approved by the engineer ~~or~~ of record and the authority having jurisdiction.
2. Joints, gaps or voids shall not allow a direct debris path through the *storm shelter envelope* into the *protected occupant area*. Debris particles shall impact at least two surfaces meeting the impact criteria of Section 305.1 prior to arriving at the *protected occupant area*. Straight ~~missile~~ debris particle paths and elastic impacts are assumed in determining ~~missile~~ debris particle trajectories.
3. Joints, gaps or voids that do not meet Item 1 or 2 shall comply with Section ~~306.5.1.1~~ 306.5.1 or ~~306.5.1.2~~ 306.5.2.

306.5.1 Masonry control and expansion joints. Masonry control and expansion joints shall be a maximum of ~~3/8~~ 1/2-inch (~~9.5~~ 12.7 mm) ~~or less~~ in width and shall be ~~permitted where~~ sealed with joint material ~~in accordance~~ that complies with TMS 602 for masonry or ASTM C920 for concrete.

306.5.2 Precast Concrete construction joints. Precast concrete panel joints shall comply with Section 306.5.2.1 or 306.5.2.2~~, as applicable~~.

306.5.2.1. Precast concrete wall panels. For wall panels 6 inches (152 mm) in thickness or greater, ~~where the joint is~~ joints shall be a maximum of $^{3}/_{4}$ inches (19 mm) in width and shall be ~~and~~ sealed on each face with a Type S joint material ~~in accordance~~ that complies with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

306.5.2.1. Precast concrete wall panels. For wall panels 6 inches (152 mm) in thickness or greater, ~~where the joint is~~ joints shall be a maximum of $^{3}/_{4}$ inches (19 mm) in width and shall be ~~and~~ sealed on each face with a Type S joint material ~~in accordance~~ that complies with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

Committee Reason: The changes to Section 103.1 were to clarify that the dimensions shown for joints in masonry and concrete do not allow for any additional construction tolerances. The other revisions are for consistent language between the two materials.
The overall proposal improves the standard by moving the exceptions to specific requirements.

Notes 5-18-2023 – Take back to work group 3. Provide a precise measurement for maximum or nominal with a tolerance (see Section 103.1). Consider same format with 'opening' limitations.
6-5-2023 – return to committee.

IS-STM 03-11-23 Ballot Comment 1

106.1

Proponent: Andrew Holstein

Further revise as follows:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.4 Joints, gaps or voids in storm shelter envelope. Joints, gaps or voids in a *storm shelter envelope* that open into the *protected occupant area* shall be considered openings and comply with the following:

1. Joints, gaps or voids shall be protected by permanent opening protection as approved by the engineer of record and the authority having jurisdiction.
2. Joints, gaps or voids shall not allow a direct debris path through the *storm shelter envelope* into the *protected occupant area*. Debris particles shall impact at least two surfaces meeting the impact criteria of Section 305.1 prior to arriving at the *protected occupant area*. Straight debris particle paths and elastic impacts are assumed in determining debris particle trajectories.
3. Joints, gaps or voids that do not meet Item 1 or 2 shall comply with Section 306.4.1.4, 306.5.1 or 306.5.2.

Reason: It is my belief that the committee intended clearances at the bottom and/or meeting edges of doors (as detailed in Section 306.4.1.4) to be permitted without permanent opening protection. The meeting edge clearance in a pair of doors is evaluated for impact resistance in accordance with 803.9.4.1, and the clearance at the bottom of doors has been deemed by the committee to be less susceptible to debris intrusion. Adding a reference to 306.4.1.4 in Item 3 of 306.4.4 will clarify this permission/exemption.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 03-11-23 Public Comment 2

306.4.1.1.1

Proponent: Work Group 8

Further revise as follows:

Staff note: Section number is what is shown in draft for clarity of revision location This was in 112.1.1.

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.1.1 Marking. The following function and performance characteristics shall be provided on the *label* for each *impact-protective system* tested:

1. Manufacturer's identification reference or listing number for the assembly
2. Type of *impact-protective system,* such as window assembly, door assembly, shutter assembly or louver.
3. Hazard: hurricane, tornado or both.
4. Missile weight and speed.
5. *Design tornado pressure~~, design wind pressure, or both~~*.
6. Edition of ICC 500.

Reason: Only show "Design Pressure" since manufacturing tested pressure does not distinguish between tornado or wind (Hazard in #3 will specify)

Committee Action for PC2: (Vote:)

Modification (if any):

Committee Reason:

Report for *03-11– 23*		
Committee decision: AM	***Committee Vote at Meeting: 8-0-0***	***Committee Vote on Ballot:***

REPORT OF HEARING:
Modification (if any):
Further revise as follows:

103.1 Dimensions. Dimensions stated as "maximum" or "minimum" are actual limits. ~~All~~ Dimensions that are not stated as "maximum" or "minimum" are nominal. Nominal ~~All~~ dimensions are subject to conventional industry tolerances unless otherwise noted.

306.5 Joints, gaps or voids in storm shelter envelope. Joints, gaps or voids in a *storm shelter envelope* that opens into the *protected occupant area* shall be considered openings and shall comply with the following:

1. Joints, gaps or voids shall be protected by permanent opening protection as approved by the engineer ~~or~~ of record and the authority having jurisdiction.
2. Joints, gaps or voids shall not allow a direct debris path through the *storm shelter envelope* into the *protected occupant area*. Debris particles shall impact at least two surfaces meeting the impact criteria of Section 305.1 prior to arriving at the *protected occupant area*. Straight ~~missile~~ debris particle paths and elastic impacts are assumed in determining ~~missile~~ debris particle trajectories.
3. Joints, gaps or voids that do not meet Item 1 or 2 shall comply with Section ~~306.5.1.1~~ 306.5.1 or ~~306.5.1.2~~ 306.5.2.

306.5.1 Masonry control and expansion joints. Masonry control and expansion joints shall be a maximum of ~~3/8~~ 1/2-inch (~~9.5~~ 12.7 mm) ~~or less~~ in width and shall be ~~permitted where~~ sealed with joint material ~~in accordance~~ that complies with TMS 602 for masonry or ASTM C920 for concrete.

306.5.2 Precast Concrete construction joints. Precast concrete panel joints shall comply with Section 306.5.2.1 or 306.5.2.2~~, as applicable~~.

306.5.2.1. Precast concrete wall panels. For wall panels 6 inches (152 mm) in thickness or greater, ~~where the joint is~~ joints shall be a maximum of $^3/_4$ inches (19 mm) in width and shall be ~~and~~ sealed on each face with a Type S joint material ~~in accordance~~ that complies with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

306.5.2.1. Precast concrete wall panels. For wall panels 6 inches (152 mm) in thickness or greater, ~~where the joint is~~ joints shall be a maximum of $^3/_4$ inches (19 mm) in width and shall be ~~and~~ sealed on each face with a Type S joint material ~~in accordance~~ that complies with ASTM C920. The panel thickness shall be measured perpendicular to the joint and at 1 inch (25 mm) or less from the joint center.

Report for *03-11– 23*

Committee Reason: The changes to Section 103.1 were to clarify that the dimensions shown for joints in masonry and concrete do not allow for any additional construction tolerances. The other revisions are for consistent language between the two materials.
The overall proposal improves the standard by moving the exceptions to specific requirements.

BALLOT COMMENT 1- FIRST DRAFT:
Proponent: Andrew Holstein

Desired Action: Negative with comment

Modification:
Further modify as:

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.4 Joints, gaps or voids in storm shelter envelope. Joints, gaps or voids in a *storm shelter envelope* that open into the *protected occupant area* shall be considered openings and comply with the following:

1. Joints, gaps or voids shall be protected by permanent opening protection as approved by the engineer of record and the authority having jurisdiction.
2. Joints, gaps or voids shall not allow a direct debris path through the *storm shelter envelope* into the *protected occupant area*. Debris particles shall impact at least two surfaces meeting the impact criteria of Section 305.1 prior to arriving at the *protected occupant area*. Straight debris particle paths and elastic impacts are assumed in determining debris particle trajectories.
3. Joints, gaps or voids that do not meet Item 1 or 2 shall comply with Section 306.4.1.4, 306.5.1 or 306.5.2.

Reason:
It is my belief that the committee intended clearances at the bottom and/or meeting edges of doors (as detailed in Section 306.4.1.4) to be permitted without permanent opening protection. The meeting edge clearance in a pair of doors is evaluated for impact resistance in accordance with 803.9.4.1, and the clearance at the bottom of doors has been deemed by the committee to be less susceptible to debris intrusion. Adding a reference to 306.4.1.4 in Item 3 of 306.4.4 will clarify this permission/exemption.

PUBLIC COMMENT 2- FIRST DRAFT:
Proponent: Work Group 8

Desired Action: AFM

Modification:
Further revise as follows:

Staff note: Section number is what is shown in draft for clarity of revision location. This was in 112.1.1.

SECTION 306
STORM SHELTER ENVELOPE COMPONENT DESIGN AND TESTING

306.4.1.1.1 Marking. The following function and performance characteristics shall be provided on the *label* for each *impact-protective system* tested:

1. Manufacturer's identification reference or listing number for the assembly
2. Type of *impact-protective system,* such as window assembly, door assembly, shutter assembly or louver.
3. Hazard: hurricane, tornado or both.
4. Missile weight and speed.
5. *Design tornado pressure*~~, design wind pressure, or both~~.
6. Edition of ICC 500.

Reason: only show "Design Pressure" since manufacturing tested pressure does not distinguish between tornado or wind (Hazard in #3 will specify)

PUBLIC COMMENT- FIRST DRAFT:
Proponent:

Desired Action:

Modification:

Reason:

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

REPORT OF HEARING – FIRST DRAFT

Modification (if any):

Committee Reason:

PUBLIC COMMENT- SECOND DRAFT:
Proponent:

Report for *03-11– 23*		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

Chapter 4
SITING

No proposal to Chapter 4 at this time.

Chapter 5
OCCUPANCY, MEANS OF EGRESS, ACCESS AND ACCESSIBILITY

IS-STM 05-06-23

504.1, 504.3, 504.4, 504.5, 505.2, 505.3, 505.3.1, 506.1, 506.3, 506.3.1, 506.5

Proponent: ICC 500 Work Group 5

Revise as follows:

SECTION 504
ACCESS AND EGRESS IN COMMUNITY STORM SHELTERS

504.1 General. A *community storm shelter* shall comply with the access and egress requirements of Sections 504.2 through ~~504.6~~ 504.7. All community storm shelters shall be provided with a minimum of one opening that provides access and egress. Egress shall be provided by a means of egress door complying with 504.4. Where required or provided, emergency escape openings shall comply with Section 504.5, and overhead hatches shall comply with Section 504.6.*Community storm shelters* shall also comply with Section 603, as applicable.

504.2 ~~504.3~~ Accessibility. Buildings and space used as *community storm shelters* shall be accessible for persons with disabilities in accordance with the *applicable code*.

504.3 ~~504.2~~ Wall and roof openings-All access openings, means of egress doors, emergency escape openings and overhead hatches in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4

504.4 Egress doors. The means of egress doors in the *storm shelter envelope* shall be determined based upon the occupant load for the normal occupancy of the space in accordance with the *applicable code*. The number of doors shall also comply with Section 603.

Where the *applicable code* requires only one means of egress door from the *storm shelter*, the storm shelter shall also provide an emergency escape opening ~~in accordance with Section 504.5~~ or an overhead hatch ~~accessed by an emergency stair, ladder or alternating tread device in accordance with Section 506~~.

Exception: Storm shelters having a *design occupant capacity* not exceeding 16 are not required to provide an emergency escape opening or an overhead hatch.

504.5 Emergency escape opening. ~~The emergency~~ Emergency escape ~~opening~~ openings shall be an additional door or an opening that complies with the following:

1. Has a minimum net clear opening of 5.7 square feet (0.530 m^2).
2. Has a minimum net clear opening height of 24 inches (610 mm) and a minimum net clear opening width of 20 inches (508 mm).
3. Shall be operable from the inside without the use of tools or special knowledge.
4. Where the bottom of the clear opening is located more than 44 inches (1118 mm) above the floor, vertical access to the opening shall be provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.
5. The emergency escape opening shall be arranged a reasonable distance apart from the means of egress door, and where practicable, located on a opposite or perpendicular wall, roof or floor of the shelter envelope so that if one becomes blocked, the others will be available.

Exception: The minimum net clear opening shall be permitted to be 5 square feet (0.46 m^2) where the bottom of the emergency escape opening is not more than 44 inches (1118 mm) above or below finished grade.

504.6 ~~506.5~~ Overhead hatches. Where provided, overhead hatches ~~at the tops of~~ shall be accessed by emergency stairs, ladders or alternating tread devices complying with Section 506, as applicable. The overhead hatch shall comply with the following:

1. A minimum clear dimension of 24 inches by 30 inches (610 mm by 762 mm).
2. A clear opening of 24 inches (610 mm) minimum from the face of the top tread or rung ~~of the emergency stairs, ladders or alternating tread devices~~ on the climbing side of the emergency stairs, ladders or alternating tread devices.
3. A minimum of 15 inches (372 mm) on either side of the centerline of the top tread or rungs.
4. Where the access opening is located on a vertical surface in accordance with Section 305.2, the height of the opening shall be 30 inches (762 mm) minimum.
5. Overhead Hatches shall open a minimum of 60 degrees (1.04 rad) from the closed position.
6. Overhead Hatches shall be counterweighted or otherwise held in the open position when opened.
7. The overhead hatch shall be located a reasonable distance apart from the means of egress door, so that if one becomes blocked, the other will be available.

504.7 ~~504.6~~ Multistory shelter. *Storm shelters* with multiple stories shall be required to have one emergency means of vertical access and egress provided within the *storm shelter* to a level of exit discharge provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.

Exception: Provide an emergency escape opening or overhead hatch to allow for emergency vertical access and egress to the roof.

SECTION 505
ACCESS AND EGRESS IN RESIDENTIAL STORM SHELTERS

505.1 General. A *residential storm shelter* shall comply with the access and egress requirements of Sections 505.2 through 505.4.

505.2 ~~505.3~~ Access and egress. A *residential storm shelter* shall be provided with a method of access and egress by a means of egress door, or an access and egress opening with a clear of 24 inches by 30 inches (610 mm by 762 mm) minimum ~~complying with Section 505.3.1 or an overhead hatch complying with Section 506.5.~~

~~**505.3.1 Access and egress openings.** Access and egress openings shall have a clear opening of 24 inches by 30 inches (610 mm by 762 mm) minimum.~~

505.3 ~~505.2~~ Wall and roof openings. All access and egress openings~~,~~ and means of egress doors ~~and overhead hatches~~ in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4.

505.4 Vertical access and egress. Where provided, vertical access and egress to a *residential storm shelter* shall be by an emergency stair complying with Section 506.2, or by a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.

SECTION 506
VERTICAL ACCESS AND EGRESS DEVICES

506.1 General. ~~Where stairways are required for means of egress for normal use of the space, they shall comply with the *applicable code*. An emergency stair~~ Emergency stairs shall comply with Section 506.2. ~~A ladder~~ Ladders shall comply with Section 506.3. ~~An alternating tread device~~ Alternating tread devices shall comply with Section 506.4. ~~Overhead hatches shall comply with Section 506.5. Where stairways are~~ Stairways required for means of egress for normal use of the space, they shall comply with the *applicable code*.

506.2 Emergency stairs. Emergency stairs shall comply with all of the following:

1. Treads shall have a minimum depth of 8 inches (203 mm).
2. Treads shall not be required to have a nosing.
3. Surfaces or treads shall be slip resistant.
4. The maximum height of risers shall be 9 $^{9}/_{16}$ inches (243 mm).
5. The minimum width of the emergency stairs shall be 22 inches (559 mm).
6. The angle of the emergency stair from horizontal shall be a maximum of 50 degrees (0.87 rad).

Exception: For *residential storm shelters*, which have a rise between the *storm shelter* floor level and *storm shelter entrance* level of 70 inches (1778 mm), maximum, the maximum height of risers shall be 10 inches (254 mm).

506.2.1 Headroom. The minimum headroom clearance shall be 80 inches (2032 mm), measured vertically from a line connecting the edge of the nosing.

Exceptions:

1. The minimum headroom clearance is permitted to be reduced to 60 inches (1524 mm) where signage is provided at the top and bottom of the emergency stair conspicuously warning the user of low headroom.
2. Entrances that are entered by persons seated on the entrance threshold and that are not high enough for a person to enter standing erect shall not be required to provide minimum headroom clearance provided there is no more than two risers leading into the *storm shelter*.

506.2.2 Handrails. A continuous handrail shall be located on one side of an emergency stair having more than three risers. Handrail extensions are not required.

506.3 Ladders. Ladders shall comply with the all of the following:

1. The clear width between rails shall be not less than 16 inches (406 mm).
2. Rungs shall be a minimum of $^{3}/_{4}$ inch (19 mm) in diameter.
3. Rungs or treads shall be capable of withstanding a 300 pound (136 kg) load.
4. Rungs or treads shall be spaced uniformly at not greater than 12 inches (305 mm).
5. The minimum clearance between the centerline of the rungs or treads to the nearest permanent object in back of the ladder on the toe side shall be no less than 7 inches (178 mm).
6. Ladders shall have a maximum slope of 90 degrees (1.57 rad) from horizontal and a minimum slope of 75 degrees (1.31 rad) from horizontal where measured on the toe side of the ladder.
7. Where provided, ladders providing access to an emergency escape opening or overhead hatch shall have a minimum of 15 inches (381 mm) clear on either side of the centerline of the ladder and a minimum of 27 inches (686 mm) clear from the centerline of the rungs to an obstruction on the climbing side of the ladder.

Exception: A minimum clearance is not required on the back side of the ladder where there is no obstruction on the climbing side of the ladder, and where ladder treads of 11 inches (279 mm) or greater in depth are molded or fabricated in a continuous series of treads and risers as detailed in Figure 506.3.

~~**506.3.1 Ladder wells.** Ladder wells where provided shall have a minimum of 15 inches (381 mm) clear on either side of the centerline of the ladder and a minimum of 27 inches (686 mm) clear from the centerline of the rungs to a ladder well or obstruction on the climbing side of the ladder.~~

506.4 Alternating tread devices. Alternating tread devices shall comply with the applicable requirements listed in the *applicable code*.

Reason: Need reason

The purpose is some reorganization of this section for additional clarity.

Existing 504.2 – add phrase “persons with disabilities” to clearly separate accessibility from access.

Existing 505.3 and 505.3.1 – The hatch in a residential shelter should meet the same requirements regardless of location. It should not have to meet the more restrictive overhead hatch requirement.

Existing 504.5, Item 5 and 506.5, Item 7 – separation language is similar to IBC Section 1007.1.2. This will assure that both ways out will not be blocked. IBC has separation for doors, but other openings might not be able to be separated because best options would be outside rather than into the building. These are single exit shelters, so the best shelter protection would limit opening and probably locate the shelter away from most outside walls.

Existing 506.3 and 506.3.1 – Ladder wells are not defined. The criteria for adequate space to get out of the hatch is moved to from 506.3.1 to Item 506.3, Item 7.

Existing 506.1 – editorial coordination

Existing 506.5 – Relocate overhead hatch to openings. Require access by an emergency stair, ladder or alternating tread device.

IS-STM 05-06-23 Replacement – Item 1

504.1, 504.3, 504.4, 504.5, 505.2, 505.3, 505.3.1, 506.1, 506.3, 506.3.1, 506.5

Proponent: ICC 500 Work Group 5

Replace and revise as follows:

SECTION 504
ACCESS AND EGRESS IN COMMUNITY STORM SHELTERS

504.1 General. A *community storm shelter* shall comply with the access and egress requirements of Sections 504.2 through ~~504.6~~ 504.7. *Community storm shelters* shall also comply with Section 603, as applicable.

504.2 ~~504.3~~ Accessibility. Buildings and space used as *community storm shelters* shall be accessible for persons with disabilities in accordance with the *applicable code*.

504.3 ~~504.2~~ Wall and roof openings. All access openings, means of egress doors, emergency escape openings and overhead hatches in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4

504.4 Egress doors. The means of egress doors in the *storm shelter envelope* shall be determined based upon the occupant load for the normal occupancy of the space in accordance with the *applicable code*. The number of doors shall also comply with Section 603.

Where the *applicable code* requires only one means of egress door from the *storm shelter*, the storm shelter shall also provide an emergency escape opening ~~in accordance with Section 504.5~~ or an overhead hatch ~~accessed by an emergency stair, ladder or alternating tread device in accordance with Section 506~~.

Exception: Storm shelters having a *design occupant capacity* not exceeding 16 are not required to provide an emergency escape opening or an overhead hatch.

504.5 Emergency escape opening. ~~The emergency~~ Emergency escape ~~opening~~ openings shall be an additional door or an opening that complies with the following:

1. Has a minimum net clear opening of 5.7 square feet (0.530 m^2).
2. Has a minimum net clear opening height of 24 inches (610 mm) and a minimum net clear opening width of 20 inches (508 mm).
3. Shall be operable from the inside without the use of tools or special knowledge.
4. Where the bottom of the clear opening is located more than 44 inches (1118 mm) above the floor, vertical access to the opening shall be provided by an emergency stair, ~~complying with Section 506.2 or~~ a ladder ~~complying with Section 506.3,~~ or an alternating tread device complying with Section ~~506.4~~ 506.

Exception: The minimum net clear opening shall be permitted to be 5 square feet (0.46 m^2) where the bottom of the emergency escape opening is not more than 44 inches (1118 mm) above or below finished grade.

504.6 ~~506.5~~ Overhead hatches. Where provided, overhead hatches ~~at the tops of emergency stairs, ladders or alternating tread devices~~ shall comply with the following:

1. A minimum clear dimension of 24 inches by 30 inches (610 mm by 762 mm).
2. A clear opening of 24 inches (610 mm) minimum from the face of the top tread or rung ~~of the emergency stairs, ladders or alternating tread devices~~ on the climbing side of the emergency stairs, ladders or alternating tread devices.
3. A minimum of 15 inches (372 mm) on either side of the centerline of the top tread or rungs.
4. Where the access opening is located on a vertical surface in accordance with Section 305.2, the height of the opening shall be 30 inches (762 mm) minimum.
5. Overhead Hatches shall open a minimum of 60 degrees (1.04 rad) from the closed position.
6. Overhead Hatches shall be counterweighted or otherwise held in the open position when opened.
7. Vertical access to the overhead hatch shall be provided by an emergency stair, a ladder or an alternating tread device complying with Section 506.

504.7 ~~504.6~~ Multistory shelter. *Storm shelters* with multiple stories shall be required to have one emergency means of vertical access and egress provided within the *storm shelter* to a level of exit discharge provided by an emergency stair, ~~complying with Section 506.2 or~~ a ladder ~~complying with Section 506.3,~~ or an alternating tread device complying with Section ~~506.4~~ 506.

Exception: Provide an emergency escape opening or overhead hatch to allow for emergency vertical access and egress to the roof.

SECTION 505
ACCESS AND EGRESS IN RESIDENTIAL STORM SHELTERS

505.1 General. A *residential storm shelter* shall comply with the access and egress requirements of Sections 505.2 through 505.4.

505.2 Wall and roof openings. All access and egress openings~~,~~ and means of egress doors ~~and overhead hatches~~ in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4.

505.3 Access and egress. A *residential storm shelter* shall be provided with a method of access and egress by a means of egress door, or an access and egress opening with a clear opening of 24 inches by 30 inches (610 mm by 762 mm) minimum ~~complying with Section 505.3.1 or an overhead hatch complying with Section 506.5.~~

~~**505.3.1 Access and egress openings.** Access and egress openings shall have a clear opening of 24 inches by 30 inches (610 mm by 762 mm) minimum.~~

505.4 Vertical access and egress. Where provided, vertical access and egress to a *residential storm shelter* shall be by an emergency stair ~~complying with Section 506.2~~, ~~or by~~ a ladder ~~complying with Section 506.3,~~ or an alternating tread device complying with Section ~~506.4~~ 506.

SECTION 506
VERTICAL ACCESS AND EGRESS

506.1 General. ~~Where stairways are~~ Stairways required for means of egress for normal use of the space, ~~they~~ shall comply with the *applicable code*. ~~An emergency stair~~ Emergency stairs shall comply with Section 506.2. ~~A ladder~~ Ladders shall comply with Section 506.3. ~~An alternating tread device~~ Alternating tread devices shall comply with Section 506.4. ~~Overhead hatches shall comply with Section 506.5.~~

506.2 Emergency stairs. Emergency stairs shall comply with all of the following:

1. Treads shall have a minimum depth of 8 inches (203 mm).
2. Treads shall not be required to have a nosing.
3. Surfaces or treads shall be slip resistant.
4. The maximum height of risers shall be 9 $^{9}/_{16}$ inches (243 mm).
5. The minimum width of the emergency stairs shall be 22 inches (559 mm).
6. The angle of the emergency stair from horizontal shall be a maximum of 50 degrees (0.87 rad).

Exception: For *residential storm shelters*, which have a rise between the *storm shelter* floor level and *storm shelter entrance* level of 70 inches (1778 mm), maximum, the maximum height of risers shall be 10 inches (254 mm).

506.2.1 Headroom. The minimum headroom clearance shall be 80 inches (2032 mm), measured vertically from a line connecting the edge of the nosing.

Exceptions:

1. The minimum headroom clearance is permitted to be reduced to 60 inches (1524 mm) where signage is provided at the top and bottom of the emergency stair conspicuously warning the user of low headroom.
2. Entrances that are entered by persons seated on the entrance threshold and that are not high enough for a person to enter standing erect shall not be required to

provide minimum headroom clearance provided there is no more than two risers leading into the *storm shelter*.

506.2.2 Handrails. A continuous handrail shall be located on one side of an emergency stair having more than three risers. Handrail extensions are not required.

506.3 Ladders. Ladders shall comply with the all of the following:

1. The clear width between rails shall be not less than 16 inches (406 mm).
2. Rungs shall be a minimum of $^3/_4$ inch (19 mm) in diameter.
3. Rungs or treads shall be capable of withstanding a 300 pound (136 kg) load.
4. Rungs or treads shall be spaced uniformly at not greater than 12 inches (305 mm).
5. The minimum clearance between the centerline of the rungs or treads to the nearest permanent object in back of the ladder on the toe side shall be no less than 7 inches (178 mm).
6. Ladders shall have a maximum slope of 90 degrees (1.57 rad) from horizontal and a minimum slope of 75 degrees (1.31 rad) from horizontal where measured on the toe side of the ladder.
7. Ladders shall have a minimum of 15 inches (381 mm) clear on either side of the centerline of the ladder and a minimum of 27 inches (686 mm) clear from the centerline of the rungs to an obstruction on the climbing side of the ladder.

Exception: A minimum clearance is not required on the back side of the ladder where there is no obstruction on the climbing side of the ladder, and where ladder treads of 11 inches (279 mm) or greater in depth are molded or fabricated in a continuous series of treads and risers as detailed in Figure 506.3.

~~**506.3.1 Ladder wells.** Ladder wells where provided shall have a minimum of 15 inches (381 mm) clear on either side of the centerline of the ladder and a minimum of 27 inches (686 mm) clear from the centerline of the rungs to a ladder well or obstruction on the climbing side of the ladder.~~

506.4 Alternating tread devices. Alternating tread devices shall comply with the applicable requirements listed in the *applicable code*.

Reason: The intent of this modification is to address some reorganization and coordination.
Section 504 will include all openings – so overhead hatches has been moved to 504.6.
Section 504.2 and 504.3 are switched to group opening requirements together.
504.5, 504.5, 504.7 have coordinated the references for emergency stairways, ladders and alternating tread devices.
504.5 – coordinates formatting between emergency escape opening and overhead hatches – 504.6 Item 7 is similar to 504.4 Item 4.
505.3.1 moved into 505.3.
506.3.1 moves into 506.3

IS-STM 05-06-23 Replacement – Item 2

504.1, 504.3, 504.4, 504.5, 505.2, 505.3, 505.3.1, 506.1, 506.3, 506.3.1, 506.5

Proponent: ICC 500 Work Group 5

Replace and revise as follows:

CHAPTER 5
OCCUPANT DENSITY, ~~ACCESS~~ ENTRY, ACCESSIBILITY, EGRESS AND SIGNAGE

SECTION 501
GENERAL

501.1 Scope. The requirements of this chapter shall govern the occupant density, ~~access~~ entry, accessibility, egress and signage for *storm shelters*.

SECTION 504
~~ACCESS~~ ENTRY AND EGRESS IN COMMUNITY STORM SHELTERS

504.1 General. A *community storm shelter* shall comply with the ~~access~~ entry and egress requirements of Sections 504.2 through 504.6. *Community storm shelters* shall also comply with Section 603, as applicable.

504.2 Wall and roof openings. All ~~access~~ entry openings, means of egress doors, emergency escape openings and overhead hatches in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4.

504.3 Accessibility. Buildings and space used as *community storm shelters* shall be accessible in accordance with the *applicable code*.

504.4 Egress doors. The means of egress doors in the *storm shelter envelope* shall be determined based upon the occupant load for the normal occupancy of the space in accordance with the *applicable code*. The number of doors shall also comply with Section 603.

Where the *applicable code* requires only one means of egress door from the *storm shelter*, the storm shelter shall also provide an emergency escape opening in accordance with Section 504.5 or an overhead hatch accessed by an emergency stair, ladder or alternating tread device in accordance with Section 506.

Exception: Storm shelters having a *design occupant capacity* not exceeding 16 are not required to provide an emergency escape opening or an overhead hatch.

504.5 Emergency escape opening. The emergency escape opening shall be an additional door or an opening that complies with the following:

1. Has a minimum net clear opening of 5.7 square feet (0.530 m^2).
2. Has a minimum net clear opening height of 24 inches (610 mm) and a minimum net clear opening width of 20 inches (508 mm).
3. Shall be operable from the inside without the use of tools or special knowledge.
4. Where the bottom of the clear opening is located more than 44 inches (1118 mm) above the floor, vertical access to the opening shall be provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.

Exception: The minimum net clear opening shall be permitted to be 5 square feet (0.46 m^2) where the bottom of the emergency escape opening is not more than 44 inches (1118 mm) above or below finished grade.

504.6 Multistory shelter. *Storm shelters* with multiple stories shall be required to have one emergency means of vertical access ~~and~~ for emergency egress provided within the *storm shelter* to a level of exit discharge provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.

Exception: Provide an emergency escape opening or overhead hatch to allow for emergency vertical access ~~and~~ for emergency egress to the roof.

SECTION 505
~~ACCESS~~ ENTRY AND EGRESS IN RESIDENTIAL STORM SHELTERS

505.1 General. A *residential storm shelter* shall comply with the ~~access~~ entry and egress requirements of Sections 505.2 through 505.4.

505.2 Wall and roof openings. All ~~access~~ entry and egress openings, means of egress doors and overhead hatches in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4.

505.3 ~~Access~~ Entry and egress. A *residential storm shelter* shall be provided with a method of ~~access~~ entry and egress by a means of egress door, an ~~access~~ entry and egress opening complying with Section 505.3.1 or an overhead hatch complying with Section 506.5.

505.3.1 ~~Access~~ Entry and egress openings. ~~Access~~ Entry and egress openings shall have a clear opening of 24 inches by 30 inches (610 mm by 762 mm) minimum.

505.4 Vertical access ~~and egress~~. Where provided, vertical access ~~and egress~~ to a entry and egress opening in a *residential storm shelter* shall be by an emergency stair complying with Section 506.2, or by a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.

SECTION 506
VERTICAL ACCESS AND EGRESS

506.1 General. Where stairways are required for means of egress for normal use of the space, they shall comply with the *applicable code*. Vertical access for emergency egress shall be provide by An emergency stair ~~shall comply~~ complying with Section 506.2~~.~~; A ladder ~~shall comply~~ complying with Section 506.3~~.~~or An alternating tread device shall ~~shall comply~~ complying Section 506.4. ~~Overhead hatches shall comply with Section 506.5.~~

506.2 Emergency stairs. Emergency stairs shall comply with all of the following:

1. Treads shall have a minimum depth of 8 inches (203 mm).
2. Treads shall not be required to have a nosing.
3. Surfaces or treads shall be slip resistant.
4. The maximum height of risers shall be 9 $^{9}/_{16}$ inches (243 mm).
5. The minimum width of the emergency stairs shall be 22 inches (559 mm).
6. The angle of the emergency stair from horizontal shall be a maximum of 50 degrees (0.87 rad).

Exception: For *residential storm shelters*, which have a rise between the *storm shelter* floor level and *storm shelter entrance* level of 70 inches (1778 mm), maximum, the maximum height of risers shall be 10 inches (254 mm).

506.2.1 Headroom. The minimum headroom clearance shall be 80 inches (2032 mm), measured vertically from a line connecting the edge of the nosing.

Exceptions:

1. The minimum headroom clearance is permitted to be reduced to 60 inches (1524 mm) where signage is provided at the top and bottom of the emergency stair conspicuously warning the user of low headroom.
2. Entrances that are entered by persons seated on the entrance threshold and that are not high enough for a person to enter standing erect shall not be required to provide minimum headroom clearance provided there is no more than two risers leading into the *storm shelter*.

506.2.2 Handrails. A continuous handrail shall be located on one side of an emergency stair having more than three risers. Handrail extensions are not required.

506.3 Ladders. Ladders shall comply with the all of the following:

1. The clear width between rails shall be not less than 16 inches (406 mm).
2. Rungs shall be a minimum of $^{3}/_{4}$ inch (19 mm) in diameter.
3. Rungs or treads shall be capable of withstanding a 300 pound (136 kg) load.
4. Rungs or treads shall be spaced uniformly at not greater than 12 inches (305 mm).
5. The minimum clearance between the centerline of the rungs or treads to the nearest permanent object in back of the ladder on the toe side shall be no less than 7 inches (178 mm).
6. Ladders shall have a maximum slope of 90 degrees (1.57 rad) from horizontal and a minimum slope of 75 degrees (1.31 rad) from horizontal where measured on the toe side of the ladder.

Exception: A minimum clearance is not required on the back side of the ladder where there is no obstruction on the climbing side of the ladder, and where ladder treads of

11 inches (279 mm) or greater in depth are molded or fabricated in a continuous series of treads and risers as detailed in Figure 506.3.

506.3.1 Ladder wells. Ladder wells where provided shall have a minimum of 15 inches (381 mm) clear on either side of the centerline of the ladder and a minimum of 27 inches (686 mm) clear from the centerline of the rungs to a ladder well or obstruction on the climbing side of the ladder.

506.4 Alternating tread devices. Alternating tread devices shall comply with the applicable requirements listed in the *applicable code*.

506.5 Overhead hatches. Where provided, overhead hatches ~~at the tops of emergency stairs, ladders or alternating tread devices~~ shall comply with the following:

1. A minimum clear dimension of 24 inches by 30 inches (610 mm by 762 mm).
2. A clear opening of 24 inches (610 mm) minimum from the face of the top tread or rung ~~of the emergency stairs, ladders or alternating tread devices~~ on the climbing side-of the emergency stairs, ladders or alternating tread devices.
3. A minimum of 15 inches (372 mm) on either side of the centerline of the top tread or rungs.
4. Where the access opening is located on a vertical surface in accordance with Section 305.2, the height of the opening shall be 30 inches (762 mm) minimum.
5. Overhead Hatches shall open a minimum of 60 degrees (1.04 rad) from the closed position.
6. Overhead Hatches shall be counterweighted or otherwise held in the open position when opened.
7. Vertical access to the overhead hatch shall be provided by an emergency stair, a ladder or an alternating tread device complying with Section 506.

SECTION 508
SIGNAGE

508.6 Entry signage. Signage indicating “Tornado Shelter,” or “Hurricane Shelter,” and appropriate symbols as applicable, shall be installed on the outside of the *storm shelter*, adjacent to every ~~access~~ entry opening intended to provide entry for occupants into the *storm shelter*.

508.7 Perimeter signage. Signs shall be installed inside of the *storm shelter* adjacent to every ~~access~~ entry or egress opening, which access nonprotected areas located outside of the *storm shelter*. For example, signage indicating “Notice: Now leaving the Tornado Shelter,” or “Notice: Now leaving the Hurricane Shelter.”

Appendix

A104.4.1 Storm shelter floor plans. A storm shelter floor plan shall be provided. The plan shall indicate the following:

1. ~~Access~~ Entry and means of egress doors.
2. Emergency escape openings, where provided.

3. *Impact-protective systems* that need to be secured in place.
4. Layout and function of *occupant support areas*.
5. Mechanical vents or mechanical ventilation systems that need to be activated, where provided.
6. Water closet and lavatory locations, including locations for set up of temporary water closets and lavatories, where provided.
7. Standby power supply, where provided.
8. Storage of required supplies such as first aid kits and flashlights.
9. Location of fire extinguishers.

Reason: The intent of this proposal is for coordination with ICC 500 terminology for entry/access throughout the standard and terminology in the I-codes. This should improve understanding of the intent.

In the I-codes, because of confusion between accessibility for persons with physical limitations and for access/accessibility to mechanical equipment, shut offs and inspection requirements, the codes have all adopted the following definitions:

[BE] ACCESSIBLE. A site, *building*, *facility* or portion thereof that complies with Chapter 11.

[M] ACCESS (TO). That which enables a fixture, appliance or equipment to be reached by *ready access* or by a means that first requires the removal or movement of a panel,

[M] READY ACCESS. That which enables a fixture, appliance or equipment to be directly reached without requiring the removal or movement of any panel, door or similar obstruction and without the use of a portable ladder, step stool or similar device. Door or similar obstruction (see "*Ready access*").

These definitions coming from the codes may cause confusion within 'access' in Section 504. 505 and 506.
The ICC 500 already has requirements for entry signage and entrances. Entry system is used in 803.9.7. Entrance is used in 303.4, 305.2.2, 403.1, 506.2, 506.2.1, A104.4.3, A104.4.4 and A105.3.
In community shelters, emergency escape openings and roof hatches are not ways occupant enter/access the shelter.
However, emergency escape openings and emergency stairs already imply 'emergency egress'.
Stairways, ladders and alternating tread devices provide 'vertical access' to openings.
The change to 506.5 is the same as in Item 1.

IS-STM 05-06-23 Replacement – Item 3

504.1, 504.2, 504.4, 505.2

Proponent: ICC 500 Work Group 5

Replace and revise as follows:

SECTION 504
ACCESS AND EGRESS IN COMMUNITY STORM SHELTERS

504.1 General. A *community storm shelter* shall comply with the access and egress requirements of Sections 504.2 through 504.6. ~~*Community storm shelters* shall also comply with Section 603, as applicable.~~

504.2 ~~Wall and roof~~ Entry and egress openings. All ~~access~~ entry and egress openings, means of egress doors, emergency escape openings and overhead hatches in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4. Such openings shall also comply with the requirements in Section 402.6.1 and 603, as applicable.

504.3 Accessibility. Buildings and space used as *community storm shelters* shall be accessible in accordance with the *applicable code*.

504.4 Egress doors. The means of egress doors in the *storm shelter envelope* shall be determined based upon the occupant load for the normal occupancy of the space in accordance with the *applicable code*. ~~The number of doors shall also comply with Section 603.~~

Where the *applicable code* requires only one means of egress door from the *storm shelter*, the storm shelter shall also provide an emergency escape opening in accordance with Section 504.5 or an overhead hatch accessed by an emergency stair, ladder or alternating tread device in accordance with Section 506.

Exception: Storm shelters having a *design occupant capacity* not exceeding 16 are not required to provide an emergency escape opening or an overhead hatch.

SECTION 505
ACCESS AND EGRESS IN RESIDENTIAL STORM SHELTERS

505.2 Wall and roof openings. All access and egress openings, means of egress doors and overhead hatches in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4.

Reason: For community shelters, there are requirements for placement and protection for openings in 306.4, 402.6.1 and 603. While 504.2 is a pointer, it brings the requirements together in one place. Residential shelters do not have egress requirements in the flood or fire resistance requirements.

IS-STM 05-06-23 Replacement – Item 4

504.1, 504.2, 504.4, 505.2

Proponent: ICC 500 Work Group 5

Replace and revise as follows:

SECTION 504
ACCESS AND EGRESS IN COMMUNITY STORM SHELTERS

504.5 Emergency escape opening. The emergency escape opening shall be an additional door or an opening that complies with the following:

1. Has a minimum net clear opening of 5.7 square feet (0.530 m^2).
2. Has a minimum net clear opening height of 24 inches (610 mm) and a minimum net clear opening width of 20 inches (508 mm).
3. Shall be operable from the inside without the use of tools or special knowledge.
4. Where the bottom of the clear opening is located more than 44 inches (1118 mm) above the floor, vertical access to the opening shall be provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.
5. To decrease the probability of both the emergency escape opening and the egress door being blocked by debris comply with the following:
   - 5.1. Where practicable, the emergency escape opening shall be located on an opposite wall, ~~or~~ perpendicular wall, roof, or floor of the shelter envelope from the means of egress door.
   - 5.2 The emergency escape opening shall be separated from the means of egress door by a distance not less ~~the~~ than 1/3 of the overall diagonal dimension of the storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.

Exception: The minimum net clear opening shall be permitted to be 5 square feet (0.46 m^2) where the bottom of the emergency escape opening is not more than 44 inches (1118 mm) above or below finished grade.

506.5 Overhead hatches. Where provided, hatches at the tops of emergency stairs, ladders or alternating tread devices shall comply with the following:

1. A minimum clear dimension of 24 inches by 30 inches (610 mm by 762 mm).
2. A clear opening of 24 inches (610 mm) minimum from the face of the top tread or rung of the emergency stairs, ladders or alternating tread devices on the climbing side.
3. A minimum of 15 inches (372 mm) on either side of the centerline of the top tread or rungs.
4. Where the access opening is located on a vertical surface in accordance with Section 305.2, the height of the opening shall be 30 inches (762 mm) minimum.
5. Hatches shall open a minimum of 60 degrees (1.04 rad) from the closed position.

6. Hatches shall be counterweighted or otherwise held in the open position when opened.
7. To decrease the probability of both the overhead hatch and the egress door being blocked by debris comply with the following:
   7.1. Where practicable, the overhead hatch shall be located on an opposite wall, ~~or~~ perpendicular wall, ~~or~~ roof, or floor of the shelter envelope from the means of egress door.
   7.2 The overhead hatch shall be separated from the means of egress door by a distance not less ~~the~~ than 1/3 of the overall diagonal dimension of the storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.

Reason: This modification is a replacement for the last item proposed for Section 504.5 and 506.5 in the original proposal. The intent is to address concerns that both ways our of the shelter may be blocked.
The text in the initial proposal matches the performance language in the IBC for the third exit. This modification provides more precise measurement requirements.

IS-STM 05-06-23 Replacement – Item 5

504.5.1

Proponent: ICC 500 Work Group 5

Replace and revise as follows:

SECTION 504
ACCESS AND EGRESS IN COMMUNITY STORM SHELTERS

504.5.1 Area Wells. Where provided, area~~s~~ wells at emergency escape openings shall comply with the International Building Code, Section 1031.5.

Reason: This addresses a missing piece for evacuation for where opening are below grade. The reference to the IBC will avoid conflicts over time for area wells. The specific reference is to not allow for the argument than EERO requirements in IBC are not the same as EEO in ICC 500. Commentary should emphasize that doors that are required for means of egress, they have to have stairways; and the door can be an EEO under the ICC 500.

2024 IBC Text –

1031.5 **Area wells.** An *emergency escape and rescue opening* with the bottom of the clear opening below the adjacent grade shall be provided with an area well in accordance with Sections 1031.5.1 through 1031.5.3.

1031.5.1 **Minimum size.** The minimum horizontal area of the area well shall be 9 square feet (0.84 m^2), with a horizontal projection and width of not less than 36 inches (914 mm). The area well shall allow the *emergency escape and rescue opening* to be fully opened.

Exception: The ladder or steps required by Section 1031.5.2 shall be permitted to encroach not more than 6 inches (152 mm) into the required dimensions of the area well.

1031.5.2 **Ladders or steps.** Area wells with a vertical depth of more than 44 inches (1118 mm) shall be equipped with an *approved* permanently affixed ladder or steps. The ladder or steps shall not be obstructed by the *emergency escape and rescue opening* when the window or door is in the open position. Ladders or steps required by this section shall not be required to comply with Section 1011.

1031.5.2.1 Ladders. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center (o.c.) vertically for the full height of the area well.

1031.5.2.2 Steps. Steps shall have an inside width of not less than 12 inches (305 mm), shall have treads greater than 5 inches (127 mm) in depth and a riser height not greater than 18 inches (457 mm) for the full height of the area well.

1031.5.3 Drainage. Area wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section 1805.

Exception: A drainage system for area wells is not required where the foundation is on well-drained soil or sand-gravel mixture soils in accordance with the United Soil Classification System, Group I Soils, in accordance with Section 1803.5.1.

1031.6 **Bars, grilles, covers and screens.** Where bars, grilles, covers, screens or similar devices are placed over *emergency escape and rescue openings* or area wells that serve such openings, the minimum net clear opening size shall comply with Sections 1031.3 and 1031.5. Such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the *emergency escape and rescue opening*.

Committee Action: Approval/Approval as Modified/Disapproval

Vote:

Item 1 – AM 10-0-0
Item 2 - AM 10-0-0
Item 3 – AM 10-0-0
Item 4 – AM 9-0-0
Item 5 – AM 10-0-0

Modification (if any):

IS-STM 05-01-23 AS

CHAPTER 5
~~OCCUPANCY~~ OCCUPANT DENSITY, ~~ACCESS~~ ENTRY, ACCESSIBILITY, EGRESS AND SIGNAGE

SECTION 501
GENERAL

501.1 Scope. The requirements of this chapter shall govern the occupant density, ~~access~~ entry, accessibility, egress and signage for *storm shelters*.

SECTION 504
~~ACCESS~~ ENTRY AND EGRESS IN COMMUNITY STORM SHELTERS

504.1 General. A *community storm shelter* shall comply with the ~~access~~ entry and egress requirements of Sections 504.2 through ~~504.6~~ 504.7. ~~*Community storm shelters* shall also comply with Section 603, as applicable.~~

~~504.2~~ ~~504.3~~ Accessibility. Buildings and space used as *community storm shelters* shall be accessible for persons with disabilities in accordance with the *applicable code*.

~~504.3~~ ~~504.2 Wall and roof~~ Entry and egress openings. All ~~access~~ entry and egress openings, means of egress doors, emergency escape openings and overhead hatches in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4. Such openings shall also comply with the requirements in Section 402.6.1 and 603, as applicable.

504.4 Egress doors. The means of egress doors in the *storm shelter envelope* shall be determined based upon the occupant load for the normal occupancy of the space in accordance with the *applicable code*. ~~The number of doors shall also comply with Section 603.~~

Where the *applicable code* requires only one means of egress door from the *storm shelter*, the storm shelter shall also provide an emergency escape opening ~~in accordance with Section 504.5 or~~ an overhead hatch ~~accessed by an emergency stair, ladder or alternating tread device in accordance with Section 506~~.

Exception: Storm shelters having a *design occupant capacity* not exceeding 16 are not required to provide an emergency escape opening or an overhead hatch.

504.5 Emergency escape opening. ~~The emergency~~ Emergency escape ~~opening~~ openings shall be an additional door or an opening that complies with the following:

1. Has a minimum net clear opening of 5.7 square feet (0.530 m^2).
2. Has a minimum net clear opening height of 24 inches (610 mm) and a minimum net clear opening width of 20 inches (508 mm).
3. Shall be operable from the inside without the use of tools or special knowledge.
4. Where the bottom of the clear opening is located more than 44 inches (1118 mm) above the floor, vertical access to the opening shall be provided by an emergency stair, ~~complying with Section 506.2 or~~ a ladder ~~complying with Section 506.3,~~ or an alternating tread device complying with Section ~~506.4~~ 506.
5. To decrease the probability of both the emergency escape opening and the egress door being blocked by debris comply with the following:
   - 5.1. Where practicable, the emergency escape opening shall be located on an opposite wall, perpendicular wall, roof, or floor of the shelter envelope from the means of egress door.
   - 5.2 The emergency escape opening shall be separated from the means of egress door by a distance not less than 1/3 of the overall diagonal dimension of the

storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.

Exception: The minimum net clear opening shall be permitted to be 5 square feet (0.46 m^2) where the bottom of the emergency escape opening is not more than 44 inches (1118 mm) above or below finished grade.

504.5.1 Area Wells. Where provided, area wells at emergency escape openings shall comply with the International Building Code, Section 1031.5.

504.6 ~~**506.5**~~ **Overhead hatches.** Where provided, overhead hatches ~~at the tops of emergency stairs, ladders or alternating tread devices~~ shall comply with the following:

1. A minimum clear dimension of 24 inches by 30 inches (610 mm by 762 mm).
2. A clear opening of 24 inches (610 mm) minimum from the face of the top tread or rung ~~of the emergency stairs, ladders or alternating tread devices~~ on the climbing side of the emergency stairs, ladders or alternating tread devices.
3. A minimum of 15 inches (372 mm) on either side of the centerline of the top tread or rungs.
4. Where the access opening is located on a vertical surface in accordance with Section 305.2, the height of the opening shall be 30 inches (762 mm) minimum.
5. Overhead Hatches shall open a minimum of 60 degrees (1.04 rad) from the closed position.
6. Overhead Hatches shall be counterweighted or otherwise held in the open position when opened.
7. Vertical access to the overhead hatch shall be provided by an emergency stair, a ladder or an alternating tread device complying with Section 506.
8. To decrease the probability of both the overhead hatch and the egress door being blocked by debris comply with the following:
   - 8.1. Where practicable, the overhead hatch shall be located on an opposite wall, perpendicular wall, roof, or floor of the shelter envelope from the means of egress door.
   - 8.2 The overhead hatch shall be separated from the means of egress door by a distance not less than 1/3 of the overall diagonal dimension of the storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.

504.7 ~~**504.6**~~ **Multistory shelter.** *Storm shelters* with multiple stories shall be required to have one emergency means of vertical access ~~and~~ for emergency egress provided within the *storm shelter* to a level of exit discharge provided by an emergency stair, ~~complying with Section 506.2~~ ~~or~~ a ladder ~~complying with Section 506.3,~~ or an alternating tread device complying with Section ~~506.4~~ 506.

Exception: Provide an emergency escape opening or overhead hatch to allow for emergency vertical access ~~and~~ for emergency egress to the roof.

SECTION 505
~~ACCESS~~ ENTRY AND EGRESS IN RESIDENTIAL STORM SHELTERS

505.1 General. A *residential storm shelter* shall comply with the ~~access~~ entry and egress requirements of Sections 505.2 through 505.4.

505.2 Wall and roof openings. All ~~access~~ entry and egress openings~~,~~ and means of egress doors ~~and overhead hatches~~ in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4.

505.3 ~~Access~~ Entry and egress. A *residential storm shelter* shall be provided with a method of ~~access~~ entry and egress by a means of egress door, or an ~~access~~ entry and egress opening with a clear opening of 24 inches by 30 inches (610 mm by 762 mm) minimum ~~complying with Section 505.3.1 or an overhead hatch complying with Section 506.5.~~

~~**505.3.1 Access and egress openings.** Access and egress openings shall have a clear opening of 24 inches by 30 inches (610 mm by 762 mm) minimum.~~

505.4 Vertical access ~~and egress~~. Where provided, vertical access ~~and egress~~ to a entry and egress opening in a *residential storm shelter* shall be by an emergency stair ~~complying with Section 506.2~~, ~~or by~~ a ladder ~~complying with Section 506.3,~~ or an alternating tread device complying with Section ~~506.4~~ 506.

SECTION 506
VERTICAL ACCESS AND EGRESS

506.1 General. ~~Where stairways are~~ Stairways required for means of egress for normal use of the space, ~~they~~ shall comply with the *applicable code*. Vertical access for emergency egress shall be provide by an ~~An~~ emergency stair ~~shall comply~~ complying with Section 506.2~~.~~; ~~A~~ a ladder ~~shall comply~~ complying with Section 506.3~~.~~or ~~An~~ an alternating tread device shall ~~shall comply~~ complying Section 506.4. ~~Overhead hatches shall comply with Section 506.5.~~

506.2 Emergency stairs. Emergency stairs shall comply with all of the following:

1. Treads shall have a minimum depth of 8 inches (203 mm).
2. Treads shall not be required to have a nosing.
3. Surfaces or treads shall be slip resistant.
4. The maximum height of risers shall be 9 $^{9}/_{16}$ inches (243 mm).
5. The minimum width of the emergency stairs shall be 22 inches (559 mm).
6. The angle of the emergency stair from horizontal shall be a maximum of 50 degrees (0.87 rad).

Exception: For *residential storm shelters*, which have a rise between the *storm shelter* floor level and *storm shelter entrance* level of 70 inches (1778 mm), maximum, the maximum height of risers shall be 10 inches (254 mm).

506.2.1 Headroom. The minimum headroom clearance shall be 80 inches (2032 mm), measured vertically from a line connecting the edge of the nosing.

Exceptions:

1. The minimum headroom clearance is permitted to be reduced to 60 inches (1524 mm) where signage is provided at the top and bottom of the emergency stair conspicuously warning the user of low headroom.
2. Entrances that are entered by persons seated on the entrance threshold and that are not high enough for a person to enter standing erect shall not be required to provide minimum headroom clearance provided there is no more than two risers leading into the *storm shelter*.

506.2.2 Handrails. A continuous handrail shall be located on one side of an emergency stair having more than three risers. Handrail extensions are not required.

506.3 Ladders. Ladders shall comply with the all of the following:

1. The clear width between rails shall be not less than 16 inches (406 mm).
2. Rungs shall be a minimum of $^{3}/_{4}$ inch (19 mm) in diameter.
3. Rungs or treads shall be capable of withstanding a 300 pound (136 kg) load.
4. Rungs or treads shall be spaced uniformly at not greater than 12 inches (305 mm).
5. The minimum clearance between the centerline of the rungs or treads to the nearest permanent object in back of the ladder on the toe side shall be no less than 7 inches (178 mm).
6. Ladders shall have a maximum slope of 90 degrees (1.57 rad) from horizontal and a minimum slope of 75 degrees (1.31 rad) from horizontal where measured on the toe side of the ladder.
7. Ladders shall have a minimum of 15 inches (381 mm) clear on either side of the centerline of the ladder and a minimum of 27 inches (686 mm) clear from the centerline of the rungs to an obstruction on the climbing side of the ladder.

Exception: A minimum clearance is not required on the back side of the ladder where there is no obstruction on the climbing side of the ladder, and where ladder treads of 11 inches (279 mm) or greater in depth are molded or fabricated in a continuous series of treads and risers as detailed in Figure 506.3.

~~**506.3.1 Ladder wells.** Ladder wells where provided shall have a minimum of 15 inches (381 mm) clear on either side of the centerline of the ladder and a minimum of 27 inches (686 mm) clear from the centerline of the rungs to a ladder well or obstruction on the climbing side of the ladder.~~

506.4 Alternating tread devices. Alternating tread devices shall comply with the applicable requirements listed in the *applicable code*.

SECTION 508
SIGNAGE

IS-STM 05-18-23 AS

508.6 Entry signage. Signage indicating "Tornado Shelter," ~~or~~ "Hurricane Shelter," or "Hurricane and Tornado Shelter", and appropriate symbols as applicable, shall be installed on the outside of the *storm shelter*, adjacent to every ~~access~~ entry opening intended to provide entry for occupants into the *storm shelter*.

508.7 Perimeter signage. Signs shall be installed inside of the *storm shelter* adjacent to every ~~access~~ entry or egress opening, which access nonprotected areas located outside of the *storm shelter*. For example, signage indicating "Notice: Now leaving the Tornado Shelter," or "Notice: Now leaving the Hurricane Shelter."

Appendix

A104.4.1 Storm shelter floor plans. A storm shelter floor plan shall be provided. The plan shall indicate the following:

1. ~~Access~~ Entry and means of egress doors.
2. Emergency escape openings, where provided.
3. *Impact-protective systems* that need to be secured in place.
4. Layout and function of *occupant support areas*.
5. Mechanical vents or mechanical ventilation systems that need to be activated, where provided.
6. Water closet and lavatory locations, including locations for set up of temporary water closets and lavatories, where provided.
7. Standby power supply, where provided.
8. Storage of required supplies such as first aid kits and flashlights.
9. Location of fire extinguishers.

Committee Reason:
Item 1: The committee agreed with the intent of the reorganization and simplification of the requirements.
Item 2: The change from 'access' to 'entry' coordinates terminology within the standard and provides clarification.
Item 3: The modification brought relevant pointers for entry and egress openings together in one section.
Item 4: The intent of the proposal is to separate the emergency escape opening and roof hatches the same as egress doors. The building code has requirements for separation of the egress doors, so this would put in the same requirements for emergency escape openings and overhead hatches. There were some concerns about the implementation of the 1/3 separation depending on the occupancy above (e.g. basement shelter for an apartment building).
Item 5: This provides criteria for emergency escape and rescue opening located below grade to have sufficient space for emergency evacuation.

IS-STM 05-06-23 Ballot Comment 1

504.5, 504.6

Proponent: Gary Ehrlich

Further revise as follows:

Staff note: Modification to 2020 edition, Section 504.6 Multistory shelters in IS-STM 05-06-23 AM was replace by IS-STM 05-07-23 AM; 05-08-23 AM; 05-09-23 AM

SECTION 504
ENTRY AND EGRESS IN COMMUNITY STORM SHELTERS

504.5 Emergency escape opening. Emergency escape openings shall be an additional door or an opening that complies with the following:

1. Has a minimum net clear opening of 5.7 square feet (0.530 m^2).
2. Has a minimum net clear opening height of 24 inches (610 mm) and a minimum net clear opening width of 20 inches (508 mm).
3. Shall be operable from the inside without the use of tools or special knowledge.
4. Where the bottom of the clear opening is located more than 44 inches (1118 mm) above the floor, vertical access to the opening shall be provided by an emergency stair, a ladder or an alternating tread device complying with Section 506.
5. To decrease the probability of both the emergency escape opening and the egress door being blocked by debris ~~comply with the following:~~
   ~~5.1.~~ Where practicable, the emergency escape opening shall be located on an opposite wall, perpendicular wall, roof, or floor of the shelter envelope from the means of egress door.
   ~~5.2 The emergency escape opening shall be separated from the means of egress door by a distance not less than 1/3 of the overall diagonal dimension of the storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.~~

Exception: The minimum net clear opening shall be permitted to be 5 square feet (0.46 m^2) where the bottom of the emergency escape opening is not more than 44 inches (1118 mm) above or below finished grade.

504.6 Overhead hatches. Where provided, overhead hatches shall comply with the following:

1. A minimum clear dimension of 24 inches by 30 inches (610 mm by 762 mm).
2. A clear opening of 24 inches (610 mm) minimum from the face of the top tread or rung on the climbing side–of the emergency stairs, ladders or alternating tread devices.
3. A minimum of 15 inches (372 mm) on either side of the centerline of the top tread or rungs.
4. Where the access opening is located on a vertical surface in accordance with Section 305.2, the height of the opening shall be 30 inches (762 mm) minimum.
5. Overhead hatches shall open a minimum of 60 degrees (1.04 rad) from the closed position.
6. Overhead hatches shall be counterweighted or otherwise held in the open position when opened.
7. Vertical access to the overhead hatch shall be provided by an emergency stair, a ladder or an alternating tread device complying with Section 506.
8. To decrease the probability of both the overhead hatch and the egress door being blocked by debris ~~comply with the following:~~
   ~~8.1.~~ Where practicable, the overhead hatch shall be located on an opposite wall, perpendicular wall, roof, or floor of the shelter envelope from the means of egress door.

~~8.2 The overhead hatch shall be separated from the means of egress door by a distance not less than 1/3 of the overall diagonal dimension of the storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.~~

504.7 Vertical Access Within the Storm Shelter. All storm shelter occupants shall have vertical access within the *storm shelter* to the level of exit discharge or to the roof of the *storm shelter*. Vertical access within the *storm shelter* shall be provided by a stairway, or by an emergency stair, ladder or alternating tread device complying with Section 506.

Exception: *Storm shelters* having a *design occupant capacity* not exceeding 16 are not required to provide vertical access within the *storm shelter*.

Reason: I am OK with putting the overhead hatch on an opposite or perpendicular wall, in the roof, or in the floor/ceiling assembly above. I am concerned about the practical impact of the 1/3 overall diagonal distance separation requirement. For long, narrow shelters this significantly increases the potential of requiring the overhead hatch be placed in an inconvenient location, perhaps forcing the design team to expand the shelter envelope outside the desired footprint of the building to include an enclosed, protected stair or an enclosed, protected area well. This sort of constraint or limitation will result in some users opting not to construct a fully ICC-500 compliant storm shelter. They may still design a space structurally to resist a 250mph tornado wind speed and debris impact loads, they'll just call the space a "severe weather refuge" or something to avoid triggering the non-structural implications.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *05-06– 23*

Committee decision: AM	*Committee Vote at Meeting: 10-0-0*	*Committee Vote on Ballot:*

REPORT OF HEARING:

Modification (if any):

IS-STM 05-01-23 AS

CHAPTER 5
~~OCCUPANCY~~ OCCUPANT DENSITY, ~~ACCESS~~ ENTRY, ACCESSIBILITY, EGRESS AND SIGNAGE

SECTION 501
GENERAL

501.1 Scope. The requirements of this chapter shall govern the occupant density, ~~access~~ entry, accessibility, egress and signage for *storm shelters*.

SECTION 504
~~ACCESS~~ ENTRY AND EGRESS IN COMMUNITY STORM SHELTERS

504.1 General. A *community storm shelter* shall comply with the ~~access~~ entry and egress requirements of Sections 504.2 through ~~504.6~~ 504.7. ~~*Community storm shelters* shall also comply with Section 603, as applicable.~~

~~504.2~~ ~~504.3~~ Accessibility. Buildings and space used as *community storm shelters* shall be accessible for persons with disabilities in accordance with the *applicable code*.

~~504.3~~ ~~504.2 Wall and roof~~ Entry and egress openings. All ~~access~~ entry and egress openings, means of egress doors, emergency escape openings and overhead hatches in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4. Such openings shall also comply with the requirements in Section 402.6.1 and 603, as applicable.

504.4 Egress doors. The means of egress doors in the *storm shelter envelope* shall be determined based upon the occupant load for the normal occupancy of the space in accordance with the *applicable code*. ~~The number of doors shall also comply with Section 603.~~

Report for *05-06– 23*

Where the *applicable code* requires only one means of egress door from the *storm shelter*, the storm shelter shall also provide an emergency escape opening ~~in accordance with Section 504.5 or~~ an overhead hatch ~~accessed by an emergency stair, ladder or alternating tread device in accordance with Section 506~~.

Exception: Storm shelters having a *design occupant capacity* not exceeding 16 are not required to provide an emergency escape opening or an overhead hatch.

504.5 Emergency escape opening. ~~The emergency~~ Emergency escape ~~opening~~ openings shall be an additional door or an opening that complies with the following:

1. Has a minimum net clear opening of 5.7 square feet (0.530 m^2).
2. Has a minimum net clear opening height of 24 inches (610 mm) and a minimum net clear opening width of 20 inches (508 mm).
3. Shall be operable from the inside without the use of tools or special knowledge.
4. Where the bottom of the clear opening is located more than 44 inches (1118 mm) above the floor, vertical access to the opening shall be provided by an emergency stair, ~~complying with Section 506.2 or~~ a ladder ~~complying with Section 506.3,~~ or an alternating tread device complying with Section ~~506.4~~ 506.

5. To decrease the probability of both the emergency escape opening and the egress door being blocked by debris comply with the following:
   5.1. Where practicable, the emergency escape opening shall be located on an opposite or perpendicular wall, roof, or floor of the shelter envelope from the means of egress door.
   5.2 The emergency escape opening shall be separated from the means of egress door by a distance not less the 1/3 of the overall diagonal dimension of the storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.

Exception: The minimum net clear opening shall be permitted to be 5 square feet (0.46 m^2) where the bottom of the emergency escape opening is not more than 44 inches (1118 mm) above or below finished grade.

504.5.1 Area Wells. Where provided, areas wells at emergency escape openings shall comply with the International Building Code, Section 1031.5.

504.6 ~~506.5~~ Overhead hatches. Where provided, overhead hatches ~~at the tops of emergency stairs, ladders or alternating tread devices~~ shall comply with the following:

1. A minimum clear dimension of 24 inches by 30 inches (610 mm by 762 mm).
2. A clear opening of 24 inches (610 mm) minimum from the face of the top tread or rung ~~of the emergency stairs, ladders or alternating tread devices~~ on the climbing side ~~of the emergency stairs, ladders or alternating tread devices~~.
3. A minimum of 15 inches (372 mm) on either side of the centerline of the top tread or rungs.
4. Where the access opening is located on a vertical surface in accordance with Section 305.2, the height of the opening shall be 30 inches (762 mm) minimum.
5. Overhead Hatches shall open a minimum of 60 degrees (1.04 rad) from the closed position.
6. Overhead Hatches shall be counterweighted or otherwise held in the open position when opened.
7. Vertical access to the overhead hatch shall be provided by an emergency stair, a ladder or an alternating tread device complying with Section 506.
8. To decrease the probability of both the overhead hatch and the egress door being blocked by debris comply with the following:
   8.1. Where practicable, the overhead hatch shall be located on an opposite or perpendicular wall, or roof, or floor of the shelter envelope from the means of egress door.
   8.2 The overhead hatch shall be separated from the means of egress door by a distance not less the 1/3 of the overall diagonal dimension of the storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.

504.7 ~~504.6~~ Multistory shelter. *Storm shelters* with multiple stories shall be required to have one emergency means of vertical access ~~and~~ for emergency egress provided within the *storm shelter* to a level of exit discharge provided by an emergency stair, ~~complying with Section 506.2 or~~ a ladder ~~complying with Section 506.3,~~ or an alternating tread device complying with Section ~~506.4~~ 506.

Exception: Provide an emergency escape opening or overhead hatch to allow for emergency vertical access ~~and~~ for emergency egress to the roof.

SECTION 505
~~ACCESS~~ ENTRY AND EGRESS IN RESIDENTIAL STORM SHELTERS

5.1 General. A *residential storm shelter* shall comply with the ~~access~~ entry and egress requirements of Sections 505.2 ough 505.4.

505.2 Wall and roof openings. All ~~access~~ entry and egress openings~~,~~ and means of egress doors ~~and overhead hatches~~ in the *storm shelter envelope* shall be considered openings and shall be protected in accordance with Section 306.4.

505.3 ~~Access~~ Entry and egress. A *residential storm shelter* shall be provided with a method of ~~access~~ entry and egress by a means of egress door, or an ~~access~~ entry and egress opening with a clear opening of 24 inches by 30 inches (610 mm by 762 mm) minimum ~~complying with Section 505.3.1 or an overhead hatch complying with Section 506.5.~~

~~**505.3.1 Access and egress openings.** Access and egress openings shall have a clear opening of 24 inches by 30 inches (610 mm by 762 mm) minimum.~~

Report for *05-06– 23*

505.4 Vertical access ~~and egress~~. Where provided, vertical access ~~and egress~~ to a entry and egress opening in a *residential storm shelter* shall be by an emergency stair ~~complying with Section 506.2~~, ~~or by~~ a ladder ~~complying with Section 506.3,~~ or an alternating tread device complying with Section ~~506.4~~ 506.

SECTION 506
VERTICAL ACCESS AND EGRESS

506.1 General. ~~Where stairways are~~ Stairways required for means of egress for normal use of the space, ~~they~~ shall comply with the *applicable code*. Vertical access for emergency egress shall be provide by an ~~An~~ emergency stair ~~shall comply~~ complying with Section 506.2~~.~~; ~~A~~ a ladder ~~shall comply~~ complying with Section 506.3~~.~~or ~~An~~ an alternating tread device shall ~~shall comply~~ complying Section 506.4. ~~Overhead hatches shall comply with Section 506.5.~~

506.2 Emergency stairs. Emergency stairs shall comply with all of the following:

1. Treads shall have a minimum depth of 8 inches (203 mm).
2. Treads shall not be required to have a nosing.
3. Surfaces or treads shall be slip resistant.
4. The maximum height of risers shall be 9 $^{9}/_{16}$ inches (243 mm).
5. The minimum width of the emergency stairs shall be 22 inches (559 mm).
6. The angle of the emergency stair from horizontal shall be a maximum of 50 degrees (0.87 rad).

Exception: For *residential storm shelters*, which have a rise between the *storm shelter* floor level and *storm shelter entrance* level of 70 inches (1778 mm), maximum, the maximum height of risers shall be 10 inches (254 mm).

506.2.1 Headroom. The minimum headroom clearance shall be 80 inches (2032 mm), measured vertically from a line connecting the edge of the nosing.

Exceptions:

1. The minimum headroom clearance is permitted to be reduced to 60 inches (1524 mm) where signage is provided at the top and bottom of the emergency stair conspicuously warning the user of low headroom.
2. Entrances that are entered by persons seated on the entrance threshold and that are not high enough for a person to enter standing erect shall not be required to provide minimum headroom clearance provided there is no more than two risers leading into the *storm shelter*.

506.2.2 Handrails. A continuous handrail shall be located on one side of an emergency stair having more than three risers. Handrail extensions are not required.

506.3 Ladders. Ladders shall comply with the all of the following:

1. The clear width between rails shall be not less than 16 inches (406 mm).
2. Rungs shall be a minimum of $^{3}/_{4}$ inch (19 mm) in diameter.
3. Rungs or treads shall be capable of withstanding a 300 pound (136 kg) load.
4. Rungs or treads shall be spaced uniformly at not greater than 12 inches (305 mm).
5. The minimum clearance between the centerline of the rungs or treads to the nearest permanent object in back of the ladder on the toe side shall be no less than 7 inches (178 mm).
6. Ladders shall have a maximum slope of 90 degrees (1.57 rad) from horizontal and a minimum slope of 75 degrees (1.31 rad) from horizontal where measured on the toe side of the ladder.
7. Ladders shall have a minimum of 15 inches (381 mm) clear on either side of the centerline of the ladder and a minimum of 27 inches (686 mm) clear from the centerline of the rungs to an obstruction on the climbing side of the ladder.

Exception: A minimum clearance is not required on the back side of the ladder where there is no obstruction on the climbing side of the ladder, and where ladder treads of 11 inches (279 mm) or greater in depth are molded or fabricated in a continuous series of treads and risers as detailed in Figure 506.3.

~~**506.3.1 Ladder wells.** Ladder wells where provided shall have a minimum of 15 inches (381 mm) clear on either side of the centerline of the ladder and a minimum of 27 inches (686 mm) clear from the centerline of the rungs to a ladder well or obstruction on the climbing side of the ladder.~~

506.4 Alternating tread devices. Alternating tread devices shall comply with the applicable requirements listed in the *applicable code*.

SECTION 508
SIGNAGE

IS-STM 05-18-23 AS

508.6 Entry signage. Signage indicating “Tornado Shelter,” ~~or~~ “Hurricane Shelter,” or “Hurricane and Tornado Shelter”, and appropriate symbols as applicable, shall be installed on the outside of the *storm shelter*, adjacent to every ~~access~~ entry opening intended to provide entry for occupants into the *storm shelter*.

508.7 Perimeter signage. Signs shall be installed inside of the *storm shelter* adjacent to every ~~access~~ entry or egress opening, which access nonprotected areas located outside of the *storm shelter*. For example, signage indicating “Notice: Now leaving the Tornado Shelter,” or “Notice: Now leaving the Hurricane Shelter.”

Appendix

A104.4.1 Storm shelter floor plans. A storm shelter floor plan shall be provided. The plan shall indicate the following:

1. ~~Access~~ Entry and means of egress doors.
2. Emergency escape openings, where provided.
3. *Impact-protective systems* that need to be secured in place.
4. Layout and function of *occupant support areas*.
5. Mechanical vents or mechanical ventilation systems that need to be activated, where provided.
6. Water closet and lavatory locations, including locations for set up of temporary water closets and lavatories, where provided.

Report for *05-06– 23*

7. Standby power supply, where provided.
8. Storage of required supplies such as first aid kits and flashlights.
9. Location of fire extinguishers.

Committee Reason:

Item 1: The committee agreed with the intent of the reorganization and simplification of the requirements.
Item 2: The change from 'access' to 'entry' coordinates terminology within the standard and provides clarification.
Item 3: The modification brought relevant pointers for entry and egress openings together in one section.
Item 4: The intent of the proposal is to separate the emergency escape opening and roof hatches the same as egress doors. The building code has requirements for separation of the egress doors, so this would put in the same requirements for emergency escape openings and overhead hatches. There were some concerns about the implementation of the 1/3 separation depending on the occupancy above (e.g. basement shelter for an apartment building).
Item 5: This provides criteria for emergency escape and rescue opening located below grade to have sufficient space for emergency evacuation.

BALLOT COMMENT 1- FIRST DRAFT:
Proponent: Gary Ehrlich

Desired Action: **Negative with comment**

Modification:

Further revise as follows:

Staff note: Modification to 2020 edition, Section 504.6 Multistory shelters in IS-STM 05-06-23 AM was replace by IS-STM 05-07-23 AM; 05-08-23 AM; 05-09-23 AM

SECTION 504
ENTRY AND EGRESS IN COMMUNITY STORM SHELTERS

504.5 Emergency escape opening. Emergency escape openings shall be an additional door or an opening that complies with the following:

1. Has a minimum net clear opening of 5.7 square feet (0.530 m^2).
2. Has a minimum net clear opening height of 24 inches (610 mm) and a minimum net clear opening width of 20 inches (508 mm).
3. Shall be operable from the inside without the use of tools or special knowledge.
4. Where the bottom of the clear opening is located more than 44 inches (1118 mm) above the floor, vertical access to the opening shall be provided by an emergency stair, a ladder or an alternating tread device complying with Section 506.
5. To decrease the probability of both the emergency escape opening and the egress door being blocked by debris ~~comply with the following:~~
   - ~~5.1.~~ Where practicable, the emergency escape opening shall be located on an opposite wall, perpendicular wall, roof, or floor of the shelter envelope from the means of egress door.
   - ~~5.2 The emergency escape opening shall be separated from the means of egress door by a distance not less than 1/3 of the overall diagonal dimension of the storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.~~

Exception: The minimum net clear opening shall be permitted to be 5 square feet (0.46 m^2) where the bottom of the emergency escape opening is not more than 44 inches (1118 mm) above or below finished grade.

504.6 Overhead hatches. Where provided, overhead hatches shall comply with the following:

1. A minimum clear dimension of 24 inches by 30 inches (610 mm by 762 mm).
2. A clear opening of 24 inches (610 mm) minimum from the face of the top tread or rung on the climbing side of the emergency stairs, ladders or alternating tread devices.
3. A minimum of 15 inches (372 mm) on either side of the centerline of the top tread or rungs.
4. Where the access opening is located on a vertical surface in accordance with Section 305.2, the height of the opening shall be 30 inches (762 mm) minimum.
5. Overhead hatches shall open a minimum of 60 degrees (1.04 rad) from the closed position.
6. Overhead hatches shall be counterweighted or otherwise held in the open position when opened.
7. Vertical access to the overhead hatch shall be provided by an emergency stair, a ladder or an alternating tread device complying with Section 506.
8. To decrease the probability of both the overhead hatch and the egress door being blocked by debris ~~comply with the following:~~
   - ~~8.1.~~ Where practicable, the overhead hatch shall be located on an opposite wall, perpendicular wall, roof, or floor of the shelter envelope from the means of egress door.
   - ~~8.2 The overhead hatch shall be separated from the means of egress door by a distance not less than 1/3 of the overall diagonal dimension of the storm shelter. The distance shall be measured horizontally in a straight line between any point along the openings.~~

504.7 Vertical Access Within the Storm Shelter. All storm shelter occupants shall have vertical access within the *storm shelter* to the level of exit discharge or to the roof of the *storm shelter*. Vertical access within the *storm shelter* shall be provided by a stairway, or by an emergency stair, ladder or alternating tread device complying with Section 506.

Report for *05-06– 23*		
Exception: *Storm shelters* having a *design occupant capacity* not exceeding 16 are not required to provide vertical access within the *storm shelter*.		
Reason: I am OK with putting the overhead hatch on an opposite or perpendicular wall, in the roof, or in the floor/ceiling assembly above. I am concerned about the practical impact of the 1/3 overall diagonal distance separation requirement. For long, narrow shelters this significantly increases the potential of requiring the overhead hatch be placed in an inconvenient location, perhaps forcing the design team to expand the shelter envelope outside the desired footprint of the building to include an enclosed, protected stair or an enclosed, protected area well. This sort of constraint or limitation will result in some users opting not to construct a fully ICC-500 compliant storm shelter. They may still design a space structurally to resist a 250mph tornado wind speed and debris impact loads, they'll just call the space a "severe weather refuge" or something to avoid triggering the non-structural implications.		
PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 05-07-23

504.6

Proponent: Pataya Scott, representing FEMA

Revise as follows:

SECTION 504
ACCESS AND EGRESS IN COMMUNITY STORM SHELTERS

504.6 Multistory shelter. *Storm shelters* with multiple stories shall be required to have one emergency means of vertical access and egress provided within the *storm shelter* to a level of exit discharge or to the roof provided by an emergency stair com- plying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.

~~**Exception:** Provide an emergency escape opening or overhead hatch to allow for emergency vertical access and egress to the roof.~~

Reason: Alternate approach eliminates the exception. Should we also clarify that provision only applies to upper stories of the multistory shelter?

Staff note: 05-07 and 05-08 were submitted as alternatives.

Committee Action: Approval as Modified (Vote: 8-0-1)

Modification (if any): See IS-STM 05-09-2023 for Replacement

Committee Reason: The committee felt that the replacement modification to IS-STM 05-09-23 met the same intent as this proposal to address clarification of vertical access in multi-story shelters.

IS-STM 05-07-23 Ballot Comment 1

504.5, 504.6

Proponent: Gary Ehrlich

Further revise as follows: See Comment 05-06-23

Reason: I am OK with putting the overhead hatch on an opposite or perpendicular wall, in the roof, or in the floor/ceiling assembly above. I am concerned about the practical impact of extending the vertical access requirement to all storm shelters. While I understand the concern about debris blockage, for basement shelters where an overhead hatch would end up in an inconvenient location this could force the design team to expand the shelter envelope within the building to include portions of an egress corridor and exit stair that would normally not be included, or to expand the shelter envelope outside the desired footprint of the building to include an enclosed, protected stair or an enclosed, protected area well. This sort of constraint or limitation will result in some users opting not to construct a fully ICC-500 compliant storm shelter. They may still design a space structurally to resist a 250mph tornado wind speed and debris impact loads, they'll just call the space a "severe weather refuge" or something to avoid triggering the non-structural implications.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *05-07– 23*		
Committee decision: AM	***Committee Vote at Meeting: 8-0-1***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any): **See IS-STM 05-09-2023 for Replacement**		
Committee Reason: The committee felt that the replacement modification to IS-STM 05-09-23 met the same intent as this proposal to address clarification of vertical access in multi-story shelters.		
BALLOT COMMENT 1- FIRST DRAFT: Proponent: Gary Ehrlich		
Desired Action: **Negative with comment**		
Modification: See Comment 05-06-23		
Reason: I am OK with putting the overhead hatch on an opposite or perpendicular wall, in the roof, or in the floor/ceiling assembly above. I am concerned about the practical impact of extending the vertical access requirement to all storm shelters. While I understand the concern about debris blockage, for basement shelters where an overhead hatch would end up in an inconvenient location this could force the design team to expand the shelter envelope within the building to include portions of an egress corridor and exit stair that would normally not be included, or to expand the shelter envelope outside the desired footprint of the building to include an enclosed, protected stair or an enclosed, protected area well. This sort of constraint or limitation will result in some users opting not to construct a fully ICC-500 compliant storm shelter. They may still design a space structurally to resist a 250mph tornado wind speed and debris impact loads, they'll just call the space a "severe weather refuge" or something to avoid triggering the non-structural implications.		
PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 05-08-23

504.6

Proponent: Pataya Scott, representing FEMA

Revise as follows:

SECTION 504
ACCESS AND EGRESS IN COMMUNITY STORM SHELTERS

504.6 Multistory shelter. *Storm shelters* with multiple stories shall be required to have one emergency means of vertical access and egress provided within the *storm shelter* to a level of exit discharge provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.

Exception: Where ~~Provide~~ an emergency escape opening in accordance with Section 504.5 is provided or overhead hatch accessed by an emergency stair, ladder or alternating tread device in accordance with Section 506, to allow for emergency vertical access and egress to the roof, access and egress within the shelter to a level of exit discharge is not required.

Reason: As written, exception text doesn't read like an exception, but maybe we can avoid repetition through alternate proposal?

Staff note: 05-07 and 05-08 were submitted as alternatives.

Committee Action: Approval as Modified (Vote: 8-0-1)

Modification (if any): See IS-STM 05-09-23 for Replacement

Committee Reason: The committee felt that the replacement modification to IS-STM 05-09-23 met the same intent as this proposal to address clarification of vertical access in multi-story shelters.

IS-STM 05-08-23 Ballot Comment 1

504.5, 504.6

Proponent: Gary Ehrlich

Further revise as follows: See Comment 05-06-23

Reason: I am OK with putting the overhead hatch on an opposite or perpendicular wall, in the roof, or in the floor/ceiling assembly above. I am concerned about the practical impact of extending the vertical access requirement to all storm shelters. While I understand the concern about debris blockage, for basement shelters where an overhead hatch would end up in an inconvenient location this could force the design team to expand the shelter envelope within the building to include portions of an egress corridor and exit stair that would normally not be included, or to expand the shelter envelope outside the desired footprint of the building to include an enclosed, protected stair or an enclosed, protected area well. This

sort of constraint or limitation will result in some users opting not to construct a fully ICC-500 compliant storm shelter. They may still design a space structurally to resist a 250mph tornado wind speed and debris impact loads, they'll just call the space a "severe weather refuge" or something to avoid triggering the non-structural implications.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *05-08– 23*		
Committee decision: AM	***Committee Vote at Meeting: 8-0-1***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any): **See IS-STM 05-09-2023 for Replacement**		
Committee Reason: The committee felt that the replacement modification to IS-STM 05-09-23 met the same intent as this proposal to address clarification of vertical access in multi-story shelters.		
BALLOT COMMENT 1- FIRST DRAFT: Proponent: Gary Ehrlich		
Desired Action: **Negative with comment**		
Modification: See Comment 05-06-23		
Reason: I am OK with putting the overhead hatch on an opposite or perpendicular wall, in the roof, or in the floor/ceiling assembly above. I am concerned about the practical impact of extending the vertical access requirement to all storm shelters. While I understand the concern about debris blockage, for basement shelters where an overhead hatch would end up in an inconvenient location this could force the design team to expand the shelter envelope within the building to include portions of an egress corridor and exit stair that would normally not be included, or to expand the shelter envelope outside the desired footprint of the building to include an enclosed, protected stair or an enclosed, protected area well. This sort of constraint or limitation will result in some users opting not to construct a fully ICC-500 compliant storm shelter. They may still design a space structurally to resist a 250mph tornado wind speed and debris impact loads, they'll just call the space a "severe weather refuge" or something to avoid triggering the non-structural implications.		
PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 05-09-23

504.6

Proponent: ICC Work Group 5

Revise as follows:

~~**504.6 Multistory shelter.** Storm shelters with multiple stories shall be required to have one emergency means of vertical access and egress provided within the storm shelter to a level of exit discharge provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.~~

~~**Exception:** Provide an emergency escape opening or overhead hatch to allow for emergency vertical access and egress to the roof.~~

504.6 Vertical access and egress. Where an occupied floor level of a community storm shelter is not at a level of exit discharge, one means of vertical access and egress shall be provided within the storm shelter from each area or level to a level of exit discharge or emergency escape opening or overhead hatch, accessed by a stairway, an emergency stair complying with Section 506.2, a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4

Reason: Need reason.

Staff Note: The revised text would not allow for shelter occupant to exit the shelter and use the building stairways for egress. This would be a big change for basement shelters.

IS-STM 05-09-23 Replacement

504.6

Proponent: ICC Work Group 5

Replace and revise as follows:

~~**504.6 Multistory shelter.** Storm shelters with multiple stories shall be required to have one emergency means of vertical access and egress provided within the storm shelter to a level of exit discharge provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.~~

~~**Exception:** Provide an emergency escape opening or overhead hatch to allow for emergency vertical access and egress to the roof.~~

504.6 Vertical Access Within the Storm Shelter. All storm shelter occupants shall have access within the *storm shelter* to the level of exit discharge or to the roof of the

storm shelter. Vertical access within the *storm shelter* shall be provided by a stairway, or by an emergency stair, ladder or alternating tread device complying with Section 506.

Exception: *Storm shelters* having a *design occupant capacity* not exceeding 16 are not required to provide vertical access within the *storm shelter*.

Reason: The purpose of this requirement is to minimize the chance of entrapment due to falling debris or access to the exit stairways within the building being unavailable. This would include 2nd story shelters (which were previously addressed) and adds basement or elevated shelters. The revised language would address the question of subdivided shelters (e.g. adjacent bathrooms or locker rooms) to require access to the level of exit discharge either through another portion of a storm shelter or directly to the vertical access.

The purpose of the exception is consistency with the exception in Section 504.4.

Committee Action: Approval as Modified (Vote: 8-1-0)

Modification (if any):

Replace and revise as follows:

~~**504.6 Multistory shelter.** Storm shelters with multiple stories shall be required to have one emergency means of vertical access and egress provided within the storm shelter to a level of exit discharge provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.~~

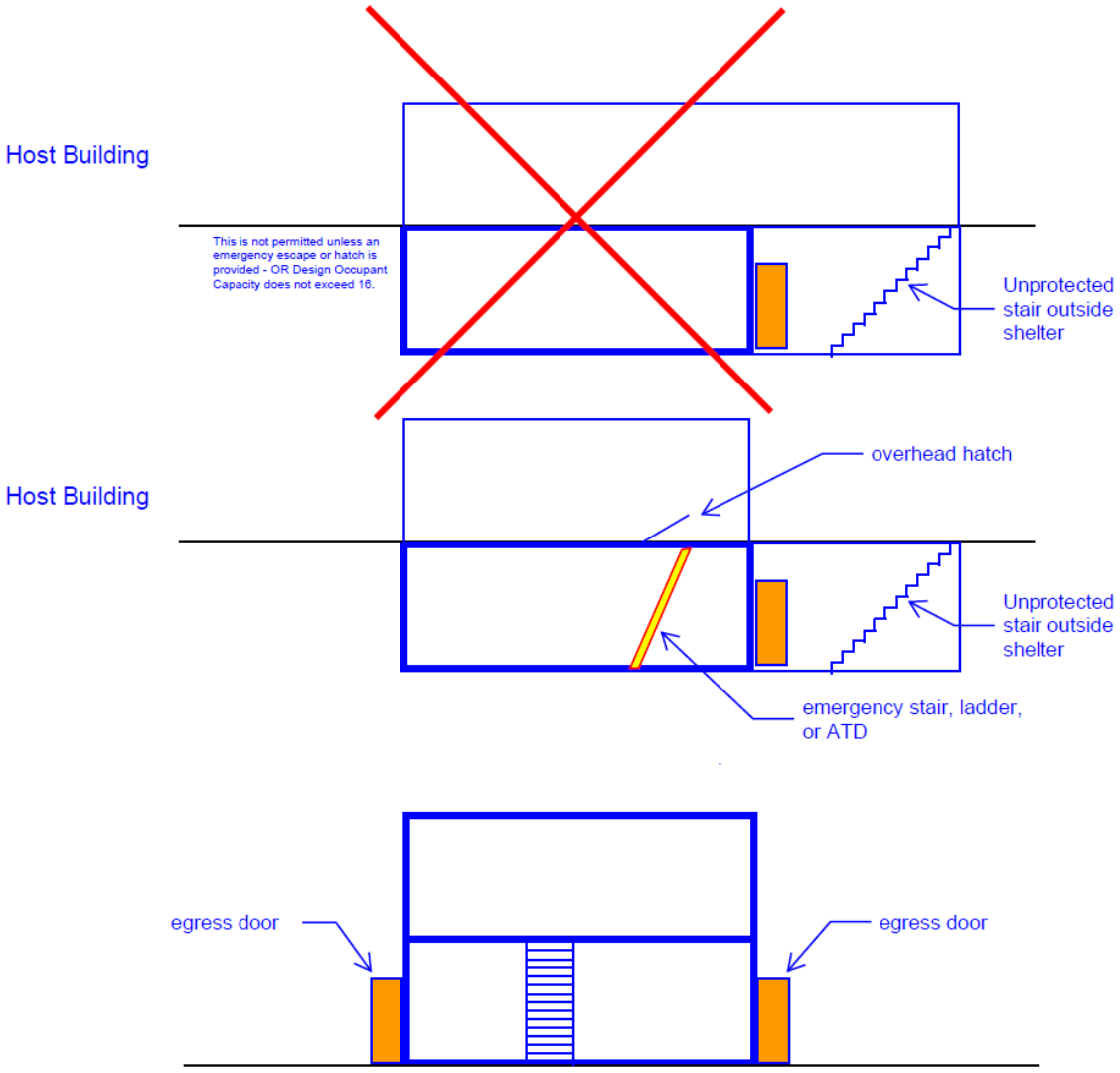
~~**Exception:** Provide an emergency escape opening or overhead hatch to allow for emergency vertical access and egress to the roof.~~

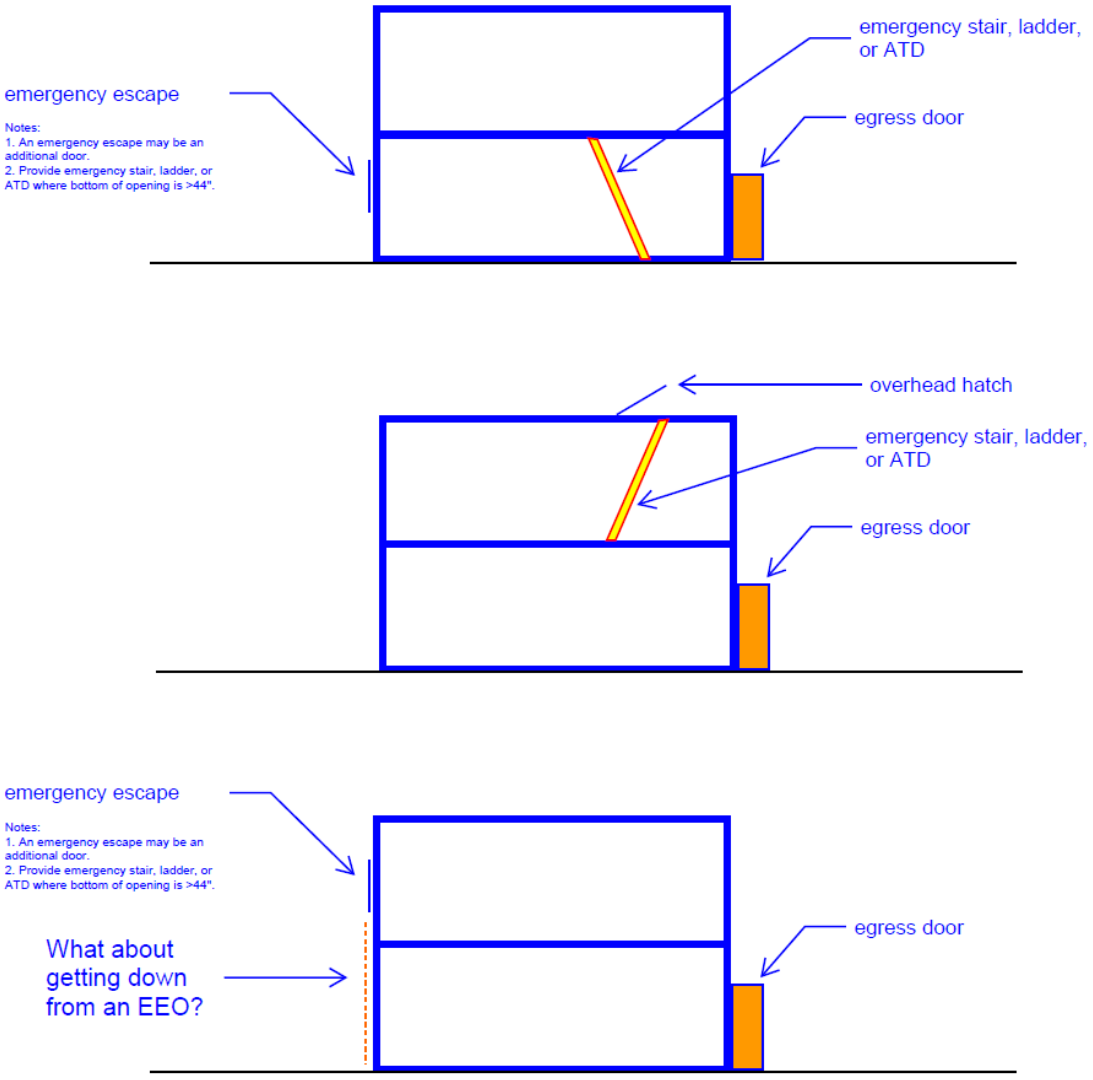
504.6 Vertical Access Within the Storm Shelter. All storm shelter occupants shall have access within the *storm shelter* to the level of exit discharge or to the roof of the *storm shelter*. Vertical access within the *storm shelter* shall be provided by a stairway, or by an emergency stair, ladder or alternating tread device complying with Section 506.

Exception: *Storm shelters* having a *design occupant capacity* not exceeding 16 are not required to provide vertical access within the *storm shelter*.

Committee Reason: The purpose of this requirement is to minimize the chance of entrapment due to falling debris or access to the exit stairways within the building being unavailable. This encompasses basements and 2nd story levels of shelters.

The following diagrams where shown during the meeting to explain the change.





IS-STM 05-09-23 Reconsideration

504.6

Proponent: ICC Work Group 5

Reconsideration IS-STM 05-09-23

5-30-2023 meeting

Further modify as follows:

504.6 Vertical Access Within the Storm Shelter. All storm shelter occupants shall have vertical access within the storm shelter to the level of exit discharge or to the roof

of the storm shelter. Vertical access within the storm shelter shall be provided by a stairway, or by an emergency stair, ladder or alternating tread device complying with Section 506.

Exception: Storm shelters having a design occupant capacity not exceeding 16 are not required to provide vertical access within the storm shelter.

Reason: The added word clarifies this provision is vertical access, not just access.

Committee Reason: Clarification that this is vertical access. Vote: As Modified (10-1-0)

IS-STM 05-09-23 Ballot Comment 1

504.5, 504.6

Proponent: Gary Ehrlich

Further revise as follows: See Comment 05-06-23

Reason: I am OK with putting the overhead hatch on an opposite or perpendicular wall, in the roof, or in the floor/ceiling assembly above. I am concerned about the practical impact of extending the vertical access requirement to all storm shelters. While I understand the concern about debris blockage, for basement shelters where an overhead hatch would end up in an inconvenient location this could force the design team to expand the shelter envelope within the building to include portions of an egress corridor and exit stair that would normally not be included, or to expand the shelter envelope outside the desired footprint of the building to include an enclosed, protected stair or an enclosed, protected area well. This sort of constraint or limitation will result in some users opting not to construct a fully ICC-500 compliant storm shelter. They may still design a space structurally to resist a 250mph tornado wind speed and debris impact loads, they'll just call the space a "severe weather refuge" or something to avoid triggering the non-structural implications.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *05-09– 23*		
Committee decision: AM	***Committee Vote at Meeting: 8-1-0***	***Committee Vote on Ballot:***

REPORT OF HEARING:
Modification (if any):
Replace and revise as follows:

~~**504.6 Multistory shelter.** Storm shelters with multiple stories shall be required to have one emergency means of vertical access and egress provided within the storm shelter to a level of exit discharge provided by an emergency stair complying with Section 506.2 or a ladder complying with Section 506.3, or an alternating tread device complying with Section 506.4.~~

~~**Exception:** Provide an emergency escape opening or overhead hatch to allow for emergency vertical access and egress to the roof.~~

504.6 Vertical Access Within the Storm Shelter. All storm shelter occupants shall have vertical access within the *storm shelter* to the level of exit discharge or to the roof of the *storm shelter*. Vertical access within the *storm shelter* shall be provided by a stairway, or by an emergency stair, ladder or alternating tread device complying with Section 506.

Exception: *Storm shelters* having a *design occupant capacity* not exceeding 16 are not required to provide vertical access within the *storm shelter*.

Committee Reason: The purpose of this requirement is to minimize the chance of entrapment due to falling debris or access to the exit stairways within the building being unavailable. This encompasses basements and 2nd story levels of shelters.

BALLOT COMMENT 1- FIRST DRAFT:

Report for *05-09– 23*		
Proponent: Gary Ehrlich		
Desired Action: **Negative with comment**		
Modification: See Comment 05-06-23		
Reason: I am OK with putting the overhead hatch on an opposite or perpendicular wall, in the roof, or in the floor/ceiling assembly above. I am concerned about the practical impact of extending the vertical access requirement to all storm shelters. While I understand the concern about debris blockage, for basement shelters where an overhead hatch would end up in an inconvenient location this could force the design team to expand the shelter envelope within the building to include portions of an egress corridor and exit stair that would normally not be included, or to expand the shelter envelope outside the desired footprint of the building to include an enclosed, protected stair or an enclosed, protected area well. This sort of constraint or limitation will result in some users opting not to construct a fully ICC-500 compliant storm shelter. They may still design a space structurally to resist a 250mph tornado wind speed and debris impact loads, they'll just call the space a "severe weather refuge" or something to avoid triggering the non-structural implications.		
PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

Chapter 6
FIRE SAFETY

Chapter 7
SHELTER ESSENTIAL FEATURES AND ACCESSORIES

IS-STM 07-02-23
701.2 (twice), 702.1, 703.1

Proponent: ICC 500 Work Group 7

Revise as follows:

SECTION 702
TORNADO SHELTERS

702.1 General. *Tornado shelters* shall comply with the requirements of Sections 702.2 through ~~702.9~~ 702.10.

702.2 ~~701.2~~ Protection of tornado ~~storm~~ shelter critical support systems. ~~*Storm*~~ *Tornado shelter critical support systems* shall remain functional for the design storm event and a minimum period of two hours ~~*storm shelter* occupancy (24 hours for hurricane shelters, 2 hours for tornado shelters)~~. ~~*Storm*~~ *Tornado shelter critical support systems* located outside of the ~~*storm*~~ *tornado shelter* areas shall be protected by a means that meets the wind load and impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4.

Exception: The water supply system and waste water system for water closets and lavatories are not required to comply with this section.

(Renumber following sections)

SECTION 703
HURRICANE SHELTERS

703.1 General. *Hurricane shelters* shall comply with the requirements of Sections 703.2 through ~~703.11~~ 703.12.

703.2 ~~701.2~~ Protection of hurricane ~~storm~~ shelter critical support systems. ~~*Storm*~~ *Hurricane shelter critical support systems* shall remain functional for the design storm event and a minimum period of ~~*storm shelter* occupancy (~~24 hours ~~for hurricane shelters, 2 hours for tornado shelters)~~. ~~*Storm*~~ *Hurricane shelter critical support systems* located outside of the ~~*storm*~~ *hurricane shelter* areas shall be protected by a means that meets the wind load and impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4.

(Renumber following sections)

Reason: The definition of critical support system includes supply and waste water. With the duration of time in a tornado shelter - either the system will not go down, or if it does go down, this is not critical to survival. This is consistent with the last cycle where the committee removed the storage capacity requirement for tornado shelters. The supply and waste water for hurricane shelters is addressed in Section 703.

CRITICAL SUPPORT SYSTEMS, STORM SHELTER. Systems and components required to ensure the health, safety and well-being of shelter occupants. Critical support systems include, potable and waste water systems, emergency and standby power and lighting systems and ventilation systems.

IS-STM 07-02-23 replacement (2 options)

701.2 (twice), 702.1, 703.1

Proponent: ICC 500 Work Group 7

Revise as follows:

Alternate 1 – Add to tornado shelters, Rewrite of section to include piping in text

702.3.4 Sanitation support method. A sanitation support method for the water closets or lavatories shall be capable of supplying water and containing waste for the *design occupant capacity* of the *tornado shelter.*

702.3.4.1 Storage capacity for water supply and wastewater. In community shelters with a *design occupant capacity* of 50 or greater the storage capacity of the plumbing system shall comply with both of the following:

1. The water supply system storage capacity, including within the water supply piping, shall be 1 gallon (3.8 L) or greater per 12 occupants.
2. The waste disposal systems storage capacity, including within sanitary drainage piping, shall be 1.5 gallons (5.68 L) or greater per 12 occupants.

   Exception: Where temporary water closets or lavatories are provided that do not require water, the requirement for supply and wastewater storage shall be permitted to be reduced proportional to the total required water closets and lavatories.

703.3.4 Sanitation support method. A sanitation support method for the water closets or lavatories shall be capable of supplying water and containing waste for the *design occupant capacity* of the *hurricane shelter.*

IS-STM 07-03-23 AS

703.3.4.1 Storage capacity for water supply and wastewater. In community shelters with a *design occupant capacity* of 50 or greater the storage capacity of the plumbing system shall comply with both of the following:

1. The water supply system storage capacity, including within the water supply piping, ~~the capacity of plumbing and waste disposal systems to supply water and contain or dispose of wastewater or solid wastes~~ shall be 1 gallon (3.8 L) or greater per occupant of supply water in addition to the drinking water required in Section 703.4
2. ~~and~~ The waste disposal systems storage capacity, including within sanitary drainage piping, shall be 1.5 gallons (5.68 L) ~~capacity~~ or greater per occupant ~~for containment of wastewater~~.

Exception: Where temporary water closets or lavatories are provided that do not require water, the requirement for supply and wastewater storage shall be permitted to be reduced proportional to the total required water closets and lavatories.

Alternate 2 – add to tornado shelters, add new sentence to include piping in text.

702.3.4 Sanitation support method. A sanitation support method for the water closets or lavatories shall be capable of supplying water and containing waste for the *design occupant capacity* of the *tornado shelter.*

703.2.4.1 Storage capacity for water supply and wastewater. In community shelters with a *design occupant capacity* of 50 or greater, the capacity of plumbing and waste disposal systems to supply water and contain or dispose of wastewater or solid wastes shall be 1 gallon (3.8 L) or greater per occupant of supply water and 1.5 gallons (5.68 L) or greater per occupant for containment of wastewater. The capacity of the plumbing system within the pipes shall be considered towards the required water and wastewater storage.

Exception: Where temporary water closets or lavatories are provided that do not require water, the requirement for supply and wastewater storage shall be permitted to be reduced proportional to the total required water closets and lavatories.

703.3.4 Sanitation support method. A sanitation support method for the water closets or lavatories shall be capable of supplying water and containing waste for the *design occupant capacity* of the *hurricane shelter.*

IS-STM 07-03-23 AS

703.3.4.1 Storage capacity for water supply and wastewater. In community shelters with a *design occupant capacity* of 50 or greater, the capacity of plumbing and waste disposal systems to supply water and contain or dispose of wastewater or solid wastes shall be 1 gallon (3.8 L) or greater per occupant of supply water in addition to the drinking water required in Section 703.4 and 1.5 gallons (5.68 L) or greater ~~capacity~~ ~~of~~ per occupant for containment of wastewater. The capacity of the plumbing system

within the pipes shall be considered towards the required supply water and wastewater storage.

Exception: Where temporary water closets or lavatories are provided that do not require water, the requirement for supply and wastewater storage shall be permitted to be reduced proportional to the total required water closets and lavatories.

Reason/Questions:

We took out the bladder storage during the last cycle.

Where does the water amount come from? Is this assuming the water is available for a while? Glen only know about one pump site failure in one hurricane. Maybe you don't loose water and this is just a safety factor?

Committee Action: Approval as Submitted (Vote: 9-1-1)

Modification (if any):

Committee Reason: The definition of critical support system includes supply and waste water. With the duration of time in a tornado shelter - either the system will not go down, or if it does go down, this is not critical to survival. This is consistent with the last cycle where the committee removed the storage capacity requirement for tornado shelters. The supply and waste water for hurricane shelters is addressed in Section 703.

IS-STM 07-02-23 Ballot Comment 1

702.2, 702.4.4(New), 702.4.4.1(New)

Proponent: Corey Schultz

Further revise as follows:

Staff note: *Numbering matches the draft so that placement of the new proposed text in the draft is clearly understood.*

SECTION 702
TORNADO SHELTERS

702.1 General….

702.2 Protection of tornado shelter critical support systems. *Tornado shelter critical support systems* shall remain functional for the design storm event and a minimum period of two hours. *Tornado shelter critical support systems* located outside of the tornado shelter areas shall be protected by a means that meets the wind load and impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4.

Exception: The municipal water supply system and municipal wastewater system for water closets and lavatories are not required to comply with this section.

702.4 Water closets and lavatories….

702.4.1 Minimum number water closets and lavatories.

TABLE 702.4.1
REQUIRED WATER CLOSET AND LAVATORIES
FOR TORNADO SHELTERS

702.4.2 Water closet and lavatory calculations.

702.4.2.1 Urinals….

702.4.3 Water closet privacy….

702.4.4 Sanitation support method. A support method for the sanitation systems shall be capable of providing water and containing waste for the design occupant capacity of the tornado shelter.

702.4.4.1 Storage capacity for water and wastewater. In community shelters with a design occupant capacity of 50 or greater the storage capacity of the sanitation support method shall comply with both of the following:

1. The support method for providing water shall have a storage capacity of 1 gallon (3.8 L) or greater per 12 occupants.
2. The support method for wastewater disposal shall have a storage capacity, including within sanitary drainage piping of 1.5 gallons (5.68 L) or greater per 12 occupants.

Exception: Where temporary water closets or lavatories are provided that do not require water, the requirement for supply and wastewater storage shall be permitted to be reduced proportional to the total required water closets and lavatories.

Reason: By the definition of Critical Support Systems, sanitation facilities are included and therefore support for them should not be excluded in tornado shelters. Shelter occupants may include small children, occupants with medical conditions, occupants on certain prescription medication, and/or the elderly all of which may require use of a toilet facility during the 2-hour duration. Removing the requirement does not appear to support the purpose of this standard which is to “safeguard the public health, safety and general welfare” of storm shelter occupants regardless of the duration. If a storm shelter takes a direct hit in the first 5 minutes of the shelter being occupied, there remains 1 hour 55 minutes of the design duration. There is nothing in the standard that states the duration ends once the event has concluded. All the critical support systems need to remain functional at least in an “emergency” mode.

The proposed language change of 702.2 adds the words “municipal” to the exception for both the water supply and wastewater systems. The intent of protecting a tornado shelter critical support systems would not require the protection of a municipal water tower and/or municipal sewage treatment facility both of which would be impractical.

The addition702.3.4 requires a support method of the sanitation facilities should there be a loss of municipal water. Have communities lost their water tower during an event? Absolutely. Greensburg, Kansas and Mayfield, Kentucky are two examples. Tornado damage to fire hydrants and other water

lines supplying neighboring structures can easily disrupt the water supply to the tornado shelter without the water tower being destroyed.

702.3.4.1 is based on the 1/12th rule which utilizes the water requirements for a hurricane shelter and applies the ratio of duration between a tornado and hurricane shelter. The exception would reduce the amount of water and waste storage if chemical toilets were provided.

The proposal would give tornado shelter owners, managers, and designers several options all with varying degrees of complexity, cost, and maintenance.

One option is providing chemical toilets and hand sanitizers which the standard allows. Obviously, one needs to provide storage for the chemical toilets within the shelter.

Water for flushing toilets can also be provided. This can be as simple as providing 5-gallon containers of fresh water and a bucket to pour water down the toilet, taking advantage of the syphoning action of the toilet design hence providing an emergency method of maintaining a working system. One needs to provide space to store the bottles of water. Unopened containers of water according to suppliers, do not have to be replaced but due to the low cost, could be on a regular basis as established by the operations and maintenance manual.

Another option is to provide a suspended water tank that replaces the bottled water. The tank can be designed to continually be recharged with fresh water, so the tank water does not become stagnant. The water is drained from the tank into a bucket and used similar to the bottled water method above. No additional floor area is required for this method.

One can provide a combination of bottled water with tank type toilets. In case of water loss, the bottled water refills the tank which is ready for normal use. Space is needed for the bottled water. Some facility owners do not want this type of toilet.

Another option is to provide an elevated tank that utilizes gravity and head pressure to operate flush valve toilets. This tank, if designed properly can be continually recharged with fresh water, so the stored water does not become stagnant. The shelter height can be a limiting factor to this method. No additional shelter floor space is required.

One can provide a pressurized system that utilizes a storage tank with an air compressor which is required to have backup power. This system will support flush valve toilets and for shelter occupants, the toilets would flush as normal until the tank is drained. This is an extremely expensive system due to the required components, backup power requirements along with the additional floor space for this system.

There have been a lot of cost figures claiming this requirement is too expensive. Here is an example of how inexpensive a solution can be utilizing one of the methods above.

Example: A medium sized tornado shelter with 960 occupants. Per the proposed requirement, it would need 80 gallons of water (960/12). Here are the costs for that sanitation support.

(16) 5 gal (80 gallons total) bottles of water from Wal-Mart $208
(1) 2'x4' 2-shelf stainless steel wire rack for bottle storage $250
(2) 5-gal plastic buckets $20
8 sf of floor area for shelf (IF additional space is needed) 8 x $500/sf $4,000

For a total of between **$478** and **$4,478** you have enough backup water based on this proposal. A tornado shelter for 960 occupants in today's construction costs could easily run $1.5m-$2m if not more depending on the local. Worst case scenario for this example, 0.03% of the total hard cost of the tornado shelter would be for backup water supply.

Committee Action for BC1: (Vote:)
Modification (if any):
Committee Reason:

IS-STM 07-02-23 Public Comment 2
702.2, 702.4.4(New)

Proponent: Robert Frank

Further revise as follows:
Staff note: *Numbering matches the draft so that placement of the new proposed text in the draft is clearly understood.*

SECTION 702
TORNADO SHELTERS

702.1 General….

702.2 Protection of tornado shelter critical support systems. *Tornado shelter critical support systems* shall remain functional for the design storm event and a minimum period of two hours. *Tornado shelter critical support systems* located outside of the tornado shelter areas shall be protected by a means that meets the wind load and impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4.

~~**Exception:** The water supply system and wastewater system for water closets and lavatories are not required to comply with this section.~~

702.4 Water closets and lavatories….

702.4.1 Minimum number water closets and lavatories.

TABLE 702.4.1
REQUIRED WATER CLOSET AND LAVATORIES
FOR TORNADO SHELTERS

702.4.2 Water closet and lavatory calculations.

702.4.2.1 Urinals….

702.4.3 Water closet privacy….

702.4.4 Storage capacity for water supply. In community shelters with a *design occupant capacity* of 50 or greater, the capacity of plumbing systems to supply water and dispose of wastewater or solid wastes shall be 1/12 gallon (0.32 L) per occupant of supply.

Exception: Where temporary water closets or lavatories are provided that do not require water, the requirement for supply and wastewater storage shall be permitted to be reduced proportional to the total required water closets and lavatories.

Reason: *Critical support system, storm shelter* are the systems and components required to ensure the health, safety and well-being of shelter occupants. This includes systems for sanitation within the storm shelter in the form of either permanent or temporary water closets. Where permanent water closets are installed in a tornado shelter, the standard does not include provisions for functionality of the water closets should the domestic water supply be disrupted.

While some functionality may be available if the water supply is disrupted off-site, a disruption within the host building, as in the case of above ground water lines serving the storm shelter, will immediately limit the ability of the water closets to remove liquid and solid waste. Some ability to move the waste into the sewer lines is desirable for the well-being of the shelter occupants.

Earlier editions of the standard included the use of a bladder or tank to store water for sanitation but did not define the capacity. This revision restores the provision for water storage and defines the quantity of water to be stored. Based on the water storage for a hurricane shelter of 1 gallon (3.8 L) per occupant for sanitation, the amount has been reduced proportionally based on the 2-hour length of stay in a tornado shelter.

This should not create a burden on the shelter owners. Tornado shelters with a small number of occupants could utilize jugs of water that is poured into the water closet, while a larger 1000-person shelter would require less than 100 gallons of storage within the storm shelter. The former may be accomplished with a tank installed in-line of the water supply, with a check valve to prevent reverse flow in the event of loss of pressure.

Committee Action for PC2: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 07-02-23 Public Comment 3

702.2

Proponent: Glen Overcash, AECOM, representing FEMA

Further revise as follows:

SECTION 702
TORNADO SHELTERS

702.1 General….

702.2 Protection of tornado shelter critical support systems. *Tornado shelter critical support systems* shall remain functional for the design storm event and a minimum period of two hours. *Tornado shelter critical support systems* located outside of the tornado shelter areas shall be protected by a means that meets the wind load and

impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4.

Exception: The ~~water supply system and the wastewater system~~ sanitation support systems for water closets and lavatories are not required to comply with this section.

Reason: The updated definition of 'critical support systems, storm shelter' in Chapter 2 has deleted 'water supply system and wastewater system' so they are no longer required to be protected in Chapter 7. They were replaced by 'sanitation support systems' which should be called out here in the exception unless the committee decides to add back requirements for tornado sanitation support systems, in which case updated requirements in 702.4 would replace the exception.

Committee Action for PC3: (Vote:)

Modification (if any):

Committee Reason:

Report for *07-02– 23*		
Committee decision: AS	***Committee Vote at Meeting: 9-1-1***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any):		
Committee Reason: The definition of critical support system includes supply and waste water. With the duration of time in a tornado shelter - either the system will not go down, or if it does go down, this is not critical to survival. This is consistent with the last cycle where the committee removed the storage capacity requirement for tornado shelters. The supply and waste water for hurricane shelters is addressed in Section 703.		
BALLOT COMMENT 1- FIRST DRAFT: Proponent: Corey Schultz		
Desired Action: **Negative with comment**		
Modification: **Further modify the proposal:** ***Staff note:*** *Numbering matches the draft so that placement of the new proposed text in the draft is clearly understood.* **SECTION 702** **TORNADO SHELTERS** **702.1 General….** **702.2 Protection of tornado shelter critical support systems.** *Tornado shelter critical support systems* shall remain functional for the design storm event and a minimum period of two hours. *Tornado shelter critical support systems* located outside of the tornado shelter areas shall be protected by a means that meets the wind load and impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4. **Exception:** The municipal water supply system and municipal wastewater system for water closets and lavatories are not required to comply with this section. **702.4 Water closets and lavatories….** **702.4.1 Minimum number water closets and lavatories.** **TABLE 702.4.1** **REQUIRED WATER CLOSET AND LAVATORIES** **FOR TORNADO SHELTERS** **702.4.2 Water closet and lavatory calculations.** **702.4.2.1 Urinals….** **702.4.3 Water closet privacy….**		

Report for *07-02– 23*

702.4.4 Sanitation support method. A support method for the sanitation systems shall be capable of providing water and containing waste for the design occupant capacity of the tornado shelter.

702.4.4.1 Storage capacity for water and wastewater. In community shelters with a design occupant capacity of 50 or greater the storage capacity of the sanitation support method shall comply with both of the following:

3. The support method for providing water shall have a storage capacity of 1 gallon (3.8 L) or greater per 12 occupants.
4. The support method for wastewater disposal shall have a storage capacity, including within sanitary drainage piping of 1.5 gallons (5.68 L) or greater per 12 occupants.

Exception: Where temporary water closets or lavatories are provided that do not require water, the requirement for supply and wastewater storage shall be permitted to be reduced proportional to the total required water closets and lavatories.

Reason: By the definition of Critical Support Systems, sanitation facilities are included and therefore support for them should not be excluded in tornado shelters. Shelter occupants may include small children, occupants with medical conditions, occupants on certain prescription medication, and/or the elderly all of which may require use of a toilet facility during the 2-hour duration. Removing the requirement does not appear to support the purpose of this standard which is to “safeguard the public health, safety and general welfare” of storm shelter occupants regardless of the duration. If a storm shelter takes a direct hit in the first 5 minutes of the shelter being occupied, there remains 1 hour 55 minutes of the design duration. There is nothing in the standard that states the duration ends once the event has concluded. All the critical support systems need to remain functional at least in an “emergency” mode.

The proposed language change of 702.2 adds the words “municipal” to the exception for both the water supply and wastewater systems. The intent of protecting a tornado shelter critical support systems would not require the protection of a municipal water tower and/or municipal sewage treatment facility both of which would be impractical.

The addition702.3.4 requires a support method of the sanitation facilities should there be a loss of municipal water. Have communities lost their water tower during an event? Absolutely. Greensburg, Kansas and Mayfield, Kentucky are two examples. Tornado damage to fire hydrants and other water lines supplying neighboring structures can easily disrupt the water supply to the tornado shelter without the water tower being destroyed.

702.3.4.1 is based on the 1/12th rule which utilizes the water requirements for a hurricane shelter and applies the ratio of duration between a tornado and hurricane shelter. The exception would reduce the amount of water and waste storage if chemical toilets were provided.

The proposal would give tornado shelter owners, managers, and designers several options all with varying degrees of complexity, cost, and maintenance.

One option is providing chemical toilets and hand sanitizers which the standard allows. Obviously, one needs to provide storage for the chemical toilets within the shelter.

Water for flushing toilets can also be provided. This can be as simple as providing 5-gallon containers of fresh water and a bucket to pour water down the toilet, taking advantage of the syphoning action of the toilet design hence providing an emergency method of maintaining a working system. One needs to provide space to store the bottles of water. Unopened containers of water according to suppliers, do not have to be replaced but due to the low cost, could be on a regular basis as established by the operations and maintenance manual.

Another option is to provide a suspended water tank that replaces the bottled water. The tank can be designed to continually be recharged with fresh water, so the tank water does not become stagnant. The water is drained from the tank into a bucket and used similar to the bottled water method above. No additional floor area is required for this method.

One can provide a combination of bottled water with tank type toilets. In case of water loss, the bottled water refills the tank which is ready for normal use. Space is needed for the bottled water. Some facility owners do not want this type of toilet.

Another option is to provide an elevated tank that utilizes gravity and head pressure to operate flush valve toilets. This tank, if designed properly can be continually recharged with fresh water, so the stored water does not become stagnant. The shelter height can be a limiting factor to this method. No additional shelter floor space is required.

One can provide a pressurized system that utilizes a storage tank with an air compressor which is required to have backup power. This system will support flush valve toilets and for shelter occupants, the toilets would

Report for *07-02– 23*

flush as normal until the tank is drained. This is an extremely expensive system due to the required components, backup power requirements along with the additional floor space for this system.

There have been a lot of cost figures claiming this requirement is too expensive. Here is an example of how inexpensive a solution can be utilizing one of the methods above.

Example: A medium sized tornado shelter with 960 occupants. Per the proposed requirement, it would need 80 gallons of water (960/12). Here are the costs for that sanitation support.

(16) 5 gal (80 gallons total) bottles of water from Wal-Mart $208
(1) 2'x4' 2-shelf stainless steel wire rack for bottle storage $250
(2) 5-gal plastic buckets $20
8 sf of floor area for shelf (IF additional space is needed) 8 x $500/sf $4,000

For a total of between **$478** and **$4,478** you have enough backup water based on this proposal. A tornado shelter for 960 occupants in today's construction costs could easily run $1.5m-$2m if not more depending on the local. Worst case scenario for this example, 0.03% of the total hard cost of the tornado shelter would be for backup water supply.

PUBLIC COMMENT 2- FIRST DRAFT:

Proponent: Robert Frank

Desired Action: AFM

Modification:

Further modify the proposal:

Staff note: *Numbering matches the draft so that placement of the new proposed text in the draft is clearly understood.*

SECTION 702
TORNADO SHELTERS

702.1 General….

702.2 Protection of tornado shelter critical support systems. *Tornado shelter critical support systems* shall remain functional for the design storm event and a minimum period of two hours. *Tornado shelter critical support systems* located outside of the tornado shelter areas shall be protected by a means that meets the wind load and impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4.

~~**Exception:** The water supply system and wastewater system for water closets and lavatories are not required to comply with this section.~~

702.4 Water closets and lavatories….

702.4.1 Minimum number water closets and lavatories.

TABLE 702.4.1
REQUIRED WATER CLOSET AND LAVATORIES
FOR TORNADO SHELTERS

702.4.2 Water closet and lavatory calculations.

702.4.2.1 Urinals….

702.4.3 Water closet privacy….

702.4.4 Storage capacity for water supply. In community shelters with a *design occupant capacity* of 50 or greater, the capacity of plumbing systems to supply water and dispose of wastewater or solid wastes shall be 1/12 gallon (0.32 L) per occupant of supply.

Exception: Where temporary water closets or lavatories are provided that do not require water, the requirement for supply and wastewater storage shall be permitted to be reduced proportional to the total required water closets and lavatories.

Reason: *Critical support system, storm shelter* are the systems and components required to ensure the health, safety and well-being of shelter occupants. This includes systems for sanitation within the storm shelter in the form of either permanent or temporary water closets. Where permanent water closets are installed in a tornado shelter, the standard does not include provisions for functionality of the water closets should the domestic water supply be disrupted.

Report for *07-02– 23*

While some functionality may be available if the water supply is disrupted off-site, a disruption within the host building, as in the case of above ground water lines serving the storm shelter, will immediately limit the ability of the water closets to remove liquid and solid waste. Some ability to move the waste into the sewer lines is desirable for the well-being of the shelter occupants.

Earlier editions of the standard included the use of a bladder or tank to store water for sanitation but did not define the capacity. This revision restores the provision for water storage and defines the quantity of water to be stored. Based on the water storage for a hurricane shelter of 1 gallon (3.8 L) per occupant for sanitation, the amount has been reduced proportionally based on the 2-hour length of stay in a tornado shelter.

This should not create a burden on the shelter owners. Tornado shelters with a small number of occupants could utilize jugs of water that is poured into the water closet, while a larger 1000-person shelter would require less than 100 gallons of storage within the storm shelter. The former may be accomplished with a tank installed in-line of the water supply, with a check valve to prevent reverse flow in the event of loss of pressure.

PUBLIC COMMENT 3- FIRST DRAFT:
Proponent: Glen Overcash, AECOM, representing FEMA

Desired Action: AFM

Modification:

Further modify the proposal:

SECTION 702
TORNADO SHELTERS

702.1 General….

702.2 Protection of tornado shelter critical support systems. *Tornado shelter critical support systems* shall remain functional for the design storm event and a minimum period of two hours. *Tornado shelter critical support systems* located outside of the tornado shelter areas shall be protected by a means that meets the wind load and impact requirements of Chapter 3, and, as applicable, the flood-resistance requirements of Chapter 4.

Exception: The ~~water supply system and the wastewater system~~ sanitation support systems for water closets and lavatories are not required to comply with this section.

Reason: The updated definition of ‘critical support systems, storm shelter’ in Chapter 2 has deleted ‘water supply system and wastewater system’ so they are no longer required to be protected in Chapter 7. They were replaced by ‘sanitation support systems’ which should be called out here in the exception unless the committee decides to add back requirements for tornado sanitation support systems, in which case updated requirements in 702.4 would replace the exception.

PUBLIC COMMENT- FIRST DRAFT:
Proponent: Robert Frank

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

REPORT OF HEARING – FIRST DRAFT

Modification (if any):

Committee Reason:

PUBLIC COMMENT- SECOND DRAFT:

Proponent:

Desired Action:

Modification:

Reason:

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

FINAL ACTION:

Modification (if any):

Committee Reason:

IS-STM 07-12-23

703.7.3

Proponent: ICC Work Group 7

Revise as follows:

SECTION 703
HURRICANE SHELTERS

703.7.3 Independence. ~~The~~ Where the standby power supply ~~shall be~~ is located on-site, ~~and~~ the standby power supply shall be independent of off-site sources of fuel or water.

Reason: Some states that have community hurricane shelters have generators in one central location and move them to the shelter that are being opened in anticipation of the hurricane hitting that location.

IS-STM 07-12-23 replacement

703.7.3, 703.7.5

Proponent: ICC Work Group 7

Revise as follows:

703.7.3 Independence. The standby power supply shall be ~~–~~located on-site, and the standby power supply shall be independent of ~~off-site~~ municipal sources of fuel or water.

Exception: A standby power supply is not required on-site where the standby power supply is to be brought in as part of an approved emergency operations plan.

703.7.4 Protection of components. Standby power supply, transformers, distribution panels, cabling, fuel supply storage tanks, fuel lines and power supply to *storm shelter critical support system* components shall be protected in accordance with Section 701.2.

~~**703.7.5 Location.** Standby power supply shall be accessible by a protected access route. The access route shall be located within the *hurricane shelter* or shall meet the provisions for exterior wall and roof *impact-protective systems* in accordance with this standard.~~

Reason: Some states that have community hurricane shelters have generators in one central location and move them to the shelter that are being opened in anticipation of the hurricane hitting that location.

RE: Hurricane Shelter Protected Generator Paths:
Just had a conversation with three electrical engineers with ICC500 (tornado) design experience. (I'm currently at the Texas Society of Professional Engineers Conference.)
Their recommendation was to not require the wind-protected path, but possibly to require a generator annunciator panel within the shelter area, which would provide feedback on generator status, low fuel levels, or other issues - like if transfer switch has been placed in maintenance mode (the most likely 'unplugged' condition) from within the shelter.
Without tools and parts on site, there are limited repair options during the event for a general occupant.

Committee Action: As Modified (Vote10-0-1)

Modification (if any):

Replace with the following:

~~**703.7.5 Location.** Standby power supply shall be accessible by a protected access route. The access route shall be located within the *hurricane shelter* or shall meet the provisions for exterior wall and roof *impact-protective systems* in accordance with this standard.~~

Committee Reason: Without tools and parts on site, or trained personnel, there are limited repair options during the event for a general occupant. There is also a concern with the fumes from the generator coming from the generator through this connection.

Notes 5-18-2023: Send back to work group 7. On-site can be temporary and permanent. Look at title.

IS-STM 07-12-23 Ballot Comment 1

106.1

Proponent: Corey Schultz

Further revise as follows: No modification proposed.

Reason: I question the removal of this requirement. If it was not important, why has it been in the three previous versions? Since my knowledge of the actual operations of a hurricane shelter is void, I cannot determine if the elimination of 703.7.5 is valid therefore I elect to abstain.

Committee Action for BC1: (Vote:)

Modification (if any):
Committee Reason:

Report for *07-12– 23*		
Committee decision: AM	***Committee Vote at Meeting: 10-0-1***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any): **Replace with the following:**		

Report for *07-12– 23*		
~~**703.7.5 Location.** Standby power supply shall be accessible by a protected access route. The access route shall be located within the *hurricane shelter* or shall meet the provisions for exterior wall and roof *impact-protective systems* in accordance with this standard.~~		
Committee Reason: Without tools and parts on site, or trained personnel, there are limited repair options during the event for a general occupant. There is also a concern with the fumes from the generator coming from the generator through this connection.		
BALLOT COMMENT 1- FIRST DRAFT: Proponent: Corey Schultz		
Desired Action: **Abstain with comment**		
Modification:		
Reason: I question the removal of this requirement. If it was not important, why has it been in the three previous versions? Since my knowledge of the actual operations of a hurricane shelter is void, I cannot determine if the elimination of 703.7.5 is valid therefore I elect to abstain.		
PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

Chapter 8
TEST METHODS FOR IMPACT AND PRESSURE TESTING

IS-STM 08-03-23
803.9.1

Proponent: Andrew Holstein, Ph.D., P.E., representing Intertek

Revise as follows:

SECTION 803
IMPACT TESTING

803.9.1 Panel or framed wall assemblies and roof assemblies. Sections of panel or framed wall assemblies and roof assemblies shall be impacted in the center of the section, and at one interface corner as detailed in Figures 803.9.1(1) and 803.9.1(2). Where an interior stud or support is present at the center of the wall section, the center wall impact shall be adjusted to strike centered between studs or supports.

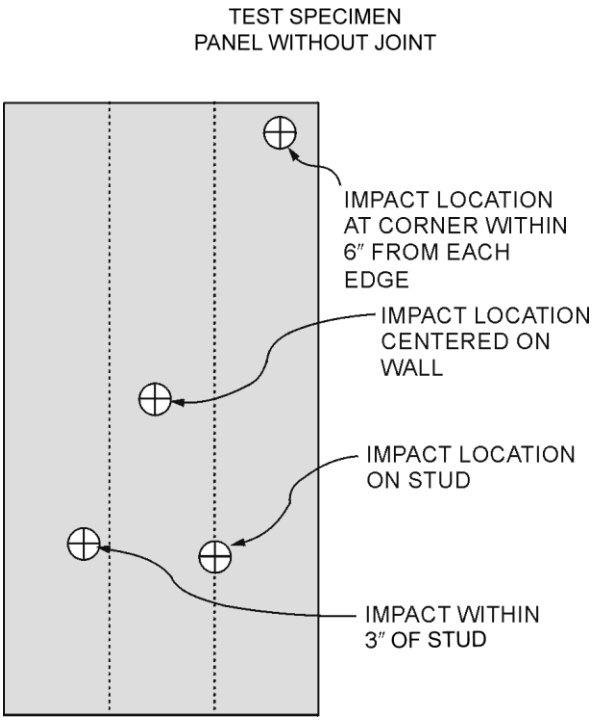
Where an interior stud or support is present, additional impacts shall be performed within 3 inches (76 mm) of the stud or support, and directly on a stud support, as detailed in Figures 803.9.1(1) and 803.9.1(2).

Interface joints used for attachment or joining at corners, at panel-to-panel sections, or at panel-to-roof shall be impacted directly on the interface joints as detailed in Figure 803.9.1(2) for each type of joint.

Where a section contains lapped materials, the centered impact shall be adjusted to strike the center of any lap, and an additional impact shall be performed within 3 inches (76 mm) of the lap on the panel that laps behind the seam as detailed in Figure 803.9.1(2).

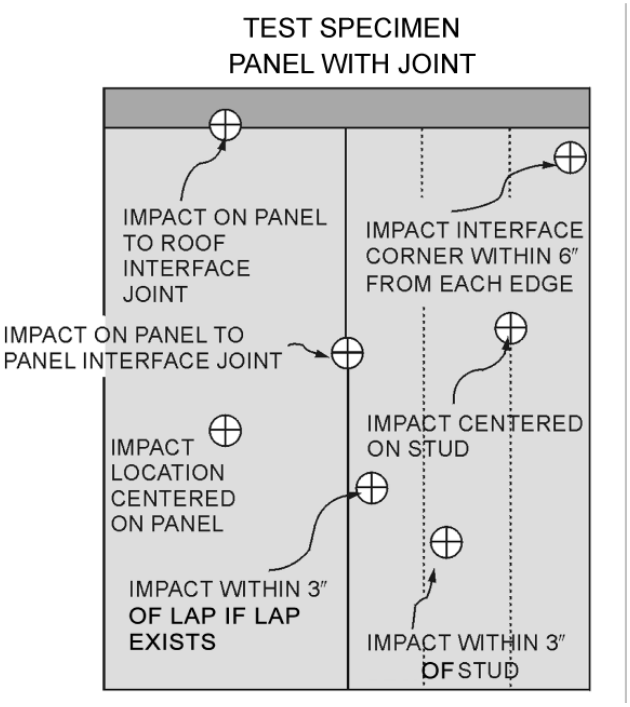
No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

> **Exception:** More than three impacts shall be permitted to be made on the same test *specimen* by mutual con- sent of the test sponsor and *test laboratory*.



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.1(1)
PANEL OR FRAMED WALL ASSEMBLIES AND ROOF ASSEMBLIES



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.1(2)

PANEL OR FRAMED WALL ASSEMBLIES AND ROOF ASSEMBLIES

Staff Note: Direction is needed for any changes to the graphics.

Reason: Framed wall and roof assemblies may have an interior stud or support present at the center of the wall section (e.g. a 4-foot-wide wall with 24 inch on-center stud spacing). In this case, it is necessary to move the wall's center impact to a section of the wall without interior studs or supports so that this thinnest section of the assembly may be evaluated. The impact on the stud is covered by the following paragraph, which is not being revised.

Committee Action: Approval as submitted (Vote:11-0-0)

Modification (if any):

Committee Reason: Framed wall and roof assemblies may have an interior stud or support present at the center of the wall section (e.g. a 4-foot-wide wall with 24 inch on-center stud spacing). In this case, it is necessary to move the wall's center impact to a section of the wall without interior studs or supports so that this thinnest section of the assembly may be evaluated. The impact on the stud is covered by the following paragraph, which is not being revised.
No change to graphics.

IS-STM 08-03-23 Public Comment 1

803.9, 803.9.7.3

Further revise as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts…..

803.9.1 Panel or framed wall assemblies and roof assemblies. Sections of panel or framed wall assemblies and roof assemblies shall be impacted in the center of the section, and at one interface corner as detailed in Figures 803.9.1(1) and 803.9.1(2).

Where an interior stud or support is present, additional impacts shall be performed within 3 inches (76 mm) of the stud or support, and directly on a stud support, as detailed in Figures 803.9.1(1) and 803.9.1(2). Where an interior stud or support is present at the center of the wall section, the center wall impact shall be adjusted to ~~strike~~ impact centered between studs or supports.

Interface joints used for attachment or joining at corners, at panel-to-panel sections, or at panel-to-roof shall be impacted directly on the interface joints as detailed in Figure 803.9.1(2) for each type of joint.

Where a section contains lapped materials, the centered impact shall be adjusted to ~~strike~~ impact the center of any lap, and an additional impact shall be performed within 3 inches (76 mm) of the lap on the panel that laps behind the seam as detailed in Figure 803.9.1(2).

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.7 Alcove or baffled storm shelter entry systems……

803.9.7.3 Door assemblies subject to first impact. Where a first-~~ strike~~ impact angle missile will impact on the door assembly (see Figure 803.9.7.3 for an example) the door assembly shall meet the tornado or wind load requirements of Section 306.3, the fire-resistance requirements of Section 603, and meet one of the following debris impact criteria:

1. The door assembly withstands the impact of a missile ~~striking~~ impacting the door assembly at an angle closest to perpendicular to the plane of the door.
2. The door assembly withstands missile impacts by the design missile ~~striking~~ impacting perpendicular to the surface with speed equal to or greater than the *storm shelter* design missile's velocity component perpendicular to the door assembly for the most critical angle that can occur in the application.

The minimum debris impact criterion for the door assembly shall be an impact perpendicular to the door assembly of a 9-pound sawn lumber 2 by 4 traveling at 50 feet per second [34 mph (15.2 m/s)].

Reason: Update this section and rest of document for consistency. Strike is used 5 times (searched using "strik" w/o "e") where impact is used 244 times.

Committee Action for PC1: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 08-03-23 Public Comment 2

803.9

Proponent: Mike Steele, representing Greenheck Fan Corporation

Further revise as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts. For purposes of testing, impact locations and quantities shall be as indicated in Sections 803.9.1 through 803.9.7.3, as applicable. The tolerance for impact locations shall be that the center of the missile profile shall impact within a $2^1/_2$ inch (64 mm) radius circle, with the center of the circle located as indicated in Sections 803.9.1 through 803.9.7.3, as applicable.

Reason: The draft standard for review now has one new missile impact requirement in Section 803.9.1 (IS-STM 08-03-23), and the above proposed language will help to clarify the tolerance of the new (and all other) impact locations. Current language is not explicit whether all or only a part of the missile profile shall hit within the noted tolerance. ICC-500 does reference ASTM E 1886, but 1886 does not mention tolerance circles, nor what part of the missile profile must hit within the tolerance circle. Looking at ASTM E 1996 for guidance (which is not reference by ICC-500), where references a 2.5" radius circle, it also states, "Impact …with the center of the missile within a 2.5" radius circle located at…". It is believed that the proposed is current common practice when using ICC-500.

Committee Action for PC2: (Vote:)

Modification (if any):

Committee Reason:

Report for *08-03– 23*		
Committee decision: AS	***Committee Vote at Meeting: 11-0-0***	***Committee Vote on Ballot:***

REPORT OF HEARING:

Modification (if any):

Committee Reason: Framed wall and roof assemblies may have an interior stud or support present at the center of the wall section (e.g. a 4-foot-wide wall with 24 inch on-center stud spacing). In this case, it is necessary to move the wall's center impact to a section of the wall without interior studs or supports so that this thinnest section of the assembly may be evaluated. The impact on the stud is covered by the following paragraph, which is not being revised.

No change to graphics.

PUBLIC COMMENT 1- FIRST DRAFT:

Proponent: Mike Steele, representing Greenheck Fan Corporation

Desired Action: AFM

Modification:

Further modify as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts…..

803.9.1 Panel or framed wall assemblies and roof assemblies. Sections of panel or framed wall assemblies and roof assemblies shall be impacted in the center of the section, and at one interface corner as detailed in Figures 803.9.1(1) and 803.9.1(2).

Where an interior stud or support is present, additional impacts shall be performed within 3 inches (76 mm) of the stud or support, and directly on a stud support, as detailed in Figures 803.9.1(1) and 803.9.1(2). Where an interior stud or support is present at the center of the wall section, the center wall impact shall be adjusted to ~~strike~~ impact centered between studs or supports.

Interface joints used for attachment or joining at corners, at panel-to-panel sections, or at panel-to-roof shall be impacted directly on the interface joints as detailed in Figure 803.9.1(2) for each type of joint.

Where a section contains lapped materials, the centered impact shall be adjusted to ~~strike~~ impact the center of any lap, and an additional impact shall be performed within 3 inches (76 mm) of the lap on the panel that laps behind the seam as detailed in Figure 803.9.1(2).

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.7 Alcove or baffled storm shelter entry systems……

803.9.7.3 Door assemblies subject to first impact. Where a first- ~~strike~~ impact angle missile will impact on the door assembly (see Figure 803.9.7.3 for an example) the door assembly shall meet the tornado or wind load requirements of Section 306.3, the fire-resistance requirements of Section 603, and meet one of the following debris impact criteria:

1. The door assembly withstands the impact of a missile ~~striking~~ impacting the door assembly at an angle closest to perpendicular to the plane of the door.
2. The door assembly withstands missile impacts by the design missile ~~striking~~ impacting perpendicular to the surface with speed equal to or greater than the *storm shelter* design missile's velocity component perpendicular to the door assembly for the most critical angle that can occur in the application.

The minimum debris impact criterion for the door assembly shall be an impact perpendicular to the door assembly of a 9-pound sawn lumber 2 by 4 traveling at 50 feet per second [34 mph (15.2 m/s)].

Reason: Update this section and rest of document for consistency. Strike is used 5 times (searched using "strik" w/o "e") where impact is used 244 times.

Report for *08-03– 23*

PUBLIC COMMENT 2- FIRST DRAFT:

Proponent: Mike Steele, representing Greenheck Fan Corporation

Desired Action: AFM

Modification:

Further modify as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts. For purposes of testing, impact locations and quantities shall be as indicated in Sections 803.9.1 through 803.9.7.3, as applicable. The tolerance for impact locations shall be that the center of the missile profile shall impact within a $2^1/_2$ inch (64 mm) radius circle, with the center of the circle located as indicated in Sections 803.9.1 through 803.9.7.3, as applicable.

Reason: The draft standard for review now has one new missile impact requirement in Section 803.9.1 (IS-STM 08-03-23), and the above proposed language will help to clarify the tolerance of the new (and all other) impact locations. Current language is not explicit whether all or only a part of the missile profile shall hit within the noted tolerance. ICC-500 does reference ASTM E 1886, but 1886 does not mention tolerance circles, nor what part of the missile profile must hit within the tolerance circle. Looking at ASTM E 1996 for guidance (which is not reference by ICC-500), where references a 2.5" radius circle, it also states, "Impact …with the center of the missile within a 2.5" radius circle located at…". It is believed that the proposed is current common practice when using ICC-500.

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

REPORT OF HEARING – FIRST DRAFT

Modification (if any):

Committee Reason:

PUBLIC COMMENT- SECOND DRAFT:

Proponent:

Desired Action:

Modification:

Reason:

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

FINAL ACTION:

Modification (if any):

Committee Reason:

IS-STM 08-05-23

803.9.4.3, Figure 803.9.4.3

Proponent: ICC 500 Work Group 8

Revise as follows:

SECTION 803
IMPACT TESTING

803.9.4.3 Sectional door assemblies. For sectional door assemblies, the door shall be impacted centered on a section joint at a hinge location nearest the midpoint of the test specimen, equidistant between the lower two section joints and centered between two vertical stiles, centered at a point 6 inches horizontally and vertically away from a ~~at one~~ bottom corner, and within 6 inches (152 mm) of the primary latch or lock mechanism ~~as shown~~.See example in Figure 803.9.4.3.

EXISTING FIGURE

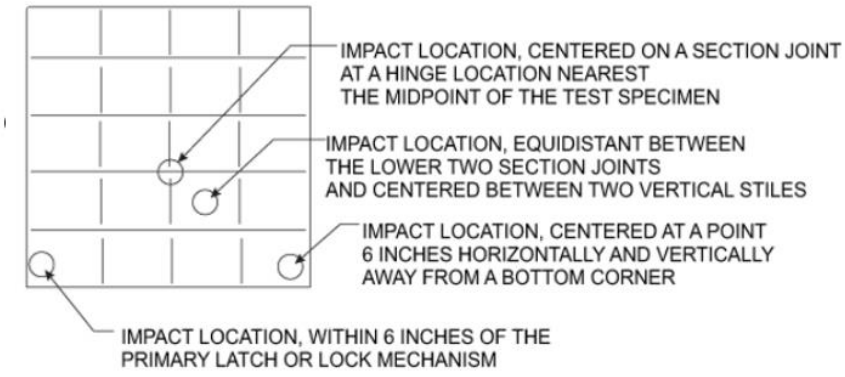


FIGURE 803.9.4.3SECTIONAL DOOR ASSEMBLIES

PROPOSED NEW FIGURE

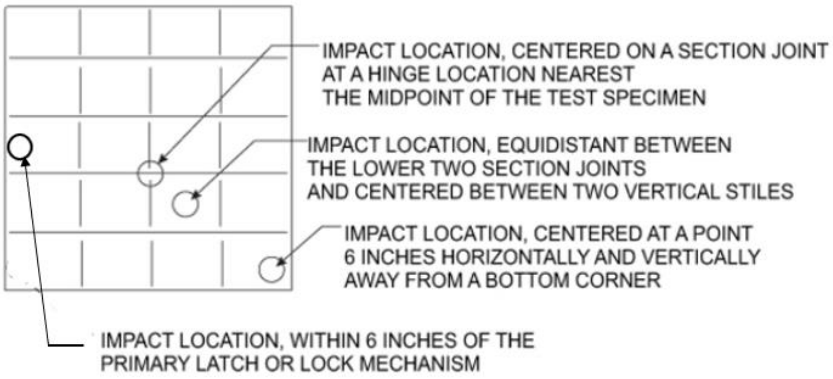


FIGURE 803.9.4.3SECTIONAL DOOR ASSEMBLIES

Reason: Cleanup and clarity of text to align with Figure. There should not be variation in the text between the section language and the figure.
Modifications allow for clarity between figures and text.
Current figure shows lock in bottom corner – where it never is for sectional doors. Move to mid-sectional as shown

---

Committee Action: Approval as Submitted (Vote:11-0-0)

Modification (if any):

Committee Reason: Agree with reason and new figure.

IS-STM 08-05-23 Ballot Comment 1

Section 803

Proponent: Andrew Holstein

Further revise as follows:

SECTION 803
IMPACT TESTING

803.9.1 Panel or framed wall assemblies and roof assemblies. Sections of panel or framed wall assemblies and roof assemblies shall be impacted in the center of the section, and at one interface corner. See examples ~~as detailed~~ in Figures 803.9.1(1) and 803.9.1(2).

Where an interior stud or support is present, additional impacts shall be performed within 3 inches (76 mm) of the stud or support, and directly on a stud support~~, as detailed~~. See examples in Figures 803.9.1(1) and 803.9.1(2). Where an interior stud or support is present at the center of the wall section, the center wall impact shall be adjusted to strike centered between studs or supports.

Interface joints used for attachment or joining at corners, at panel-to-panel sections, or at panel-to-roof shall be impacted directly on ~~the interface joints~~ an example of each type of joint. See examples ~~as detailed~~ in Figure 803.9.1(2) ~~for each type of joint~~.

Where a section contains lapped materials, the centered impact shall be adjusted to strike the center of any lap, and an additional impact shall be performed within 3 inches (76 mm) of the lap on the panel that laps behind the seam ~~as detailed~~. See example in Figure 803.9.1(2).

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.2 Solid wall assemblies and roof assemblies of concrete or other materials. Sections of wall assemblies and roof assemblies of solid concrete or other solid material shall be impacted in the center of the section, and at one interface corner. See examples ~~as detailed~~ in Figures 803.9.2(1) and 803.9.2(2). Where interface joints are used for joining at corners or panel-to-panel joints, an additional section shall be impacted directly on the interface joints. See examples ~~as detailed~~ in Figure 803.9.2(2).

Where an interior stud or support is present, additional impacts shall be performed within 3 inches (76 mm) of the stud and support, and directly on the stud support. See examples ~~as detailed~~ in Figures 803.9.2(1) and 803.9.2(2).

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.
Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.3 Masonry unit wall assemblies and roof assemblies. Sections of wall assemblies and roof assemblies constructed of masonry units shall be impacted in the center of the section, and at one interface corner or joint. See example ~~as detailed~~ in Figure 803.9.3(1). Mortared joints shall be impacted directly on the interface joints. See example ~~as detailed~~ in Figure 803.9.3(2).

No more than three impacts shall be made on one *specimen* or specimen panel. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

[803.9.4 Unchanged]

803.9.4.1 Side-swinging door assemblies. Side-swinging door assemblies shall be impacted within 6 inches (152 mm) of an interface hinge joint, within 6 inches (152 mm) of an upper latch point and within 6 inches (152 mm) of center primary latches or operators. See example ~~as shown~~ in Figure 803.9.4.1(1).

For double door assemblies with each door leaf containing identical hardware, one door leaf shall receive the same three impacts as a single door leaf plus an additional impact on a center meeting point or mullion. See example ~~as shown~~ in Figure 803.9.4.1(2).

For double door assemblies where one or more hardware components differ between door leaves, each door leaf shall receive the same three impacts as a single door and an additional impact on a center meeting point or mullion. See example ~~as shown~~ in Figure 803.9.4.1(2). No more than four impacts shall be made on one *specimen*. Where more than four impacts are required, multiple identical test *specimens* shall be utilized. Impacts shown on the same leaf in Figure 803.9.4.1(2), shall occur on the same test *specimen*.

Exception: More than four impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.4.2 Rolling door assemblies. For *rolling door assemblies*, the door shall be impacted at the center of the door, centered at a point 6 inches (152 mm) horizontally and vertically away from a bottom corner and within 6 inches (152 mm) of the primary latch or lock mechanism, plus an additional impact centered on a barrel assembly. See example ~~as shown~~ in Figure 803.9.4.2.

Exception: The barrel assembly is not subject to the additional impact where the entire barrel assembly is protected by the shelter envelope.

[803.9.4.3 and 803.9.4.4 Unchanged]

Staff Note: Section 803.9.5 was revised by 08-06-23. Revised text shown for clarity.

803.9.5 Window assemblies and other glazed openings. All window assemblies and other glazed openings shall be impacted in the center of the smallest glazed section, and at the lock side corner, or one interface corner, within 6 inches from each edge as applicable. See Example ~~as detailed~~ in Figure 803.9.5(1). Where interior mullions or other glazed section joints are present, the assembly shall be impacted centered on the mullion and at base of mullion. See Example ~~as shown~~ in Figure 803.9.5(2). Interface hinge joints and primary latches, where present, shall be impacted. See Example ~~as shown~~ in Figure 803.9.4.1(2) on an additional specimen.

No more than two impacts shall be made on one specimen. Where more than two impacts
are required, multiple identical test specimens shall be provided.

Exception: More than two impacts shall be permitted to be made on the same test specimen
by mutual consent of the test sponsor and test laboratory.

Reason: Replace “as detailed in Figure…” or “as shown in Figure…” with “See example in Figure…” to coordinate with balloted changes in 08-05-23 and 08-10-23. As the figures are exemplary only, the text should refer to them as such rather than stating that the requirement is shown or detailed exactly in the figure.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 08-05-23 Public Comment 2

803.9.4.2, 803.9.4.2

Proponent: Mike Steele, representing Greenheck Fan Corporation

Further revise as follows:

SECTION 803
IMPACT TESTING

803.9.4.2 Rolling door assemblies. For *rolling door assemblies*, the door shall be impacted at the center of the door, ~~centered at a point~~ within 6 inches (152 mm) horizontally and vertically away from a bottom corner and within 6 inches (152 mm) of the primary latch or lock mechanism, plus an additional impact centered on a barrel assembly as shown in Figure 803.9.4.2.

803.9.4.3 Sectional door assemblies. For sectional door assemblies, the door shall be impacted centered on a section joint at a hinge location nearest the midpoint of the test specimen, equidistant between the lower two section joints and centered between two vertical stiles, ~~centered at a point~~ within 6 inches (152 mm) horizontally and vertically away from a bottom corner, and within 6 inches (152 mm) of the primary latch or lock mechanism. See example in Figure 803.9.4.3.

Reason: In all other section instances of “corner” impacts, the impacts are “within” 6 inches, not “at” 6 inches. They also do not use the word “centered” for corner impacts. Also added SI units to 803.9.4.3.

Committee Action for PC2: (Vote:)

Modification (if any):

Committee Reason:

Report for *08-05– 23*		
Committee decision: AS	***Committee Vote at Meeting: 11-0-0***	***Committee Vote on Ballot:***

Report for *08-05– 23*

REPORT OF HEARING:
Modification (if any):

Committee Reason: Cleanup and clarity of text to align with Figure. There should not be variation in the text between the section language and the figure.
Modifications allow for clarity between figures and text.
Current figure shows lock in bottom corner – where it never is for sectional doors. Move to mid-sectional as shown

BALLOT COMMENT 1- FIRST DRAFT:
Proponent: Andrew Holstein

Desired Action: Affirmative with comment

Modification:

SECTION 803
IMPACT TESTING

803.9.1 Panel or framed wall assemblies and roof assemblies. Sections of panel or framed wall assemblies and roof assemblies shall be impacted in the center of the section, and at one interface corner. See examples ~~as detailed~~ in Figures 803.9.1(1) and 803.9.1(2).

Where an interior stud or support is present, additional impacts shall be performed within 3 inches (76 mm) of the stud or support, and directly on a stud support~~, as detailed~~. See examples in Figures 803.9.1(1) and 803.9.1(2). Where an interior stud or support is present at the center of the wall section, the center wall impact shall be adjusted to strike centered between studs or supports.

Interface joints used for attachment or joining at corners, at panel-to-panel sections, or at panel-to-roof shall be impacted directly on ~~the interface joints~~ an example of each type of joint. See examples ~~as detailed~~ in Figure 803.9.1(2) ~~for each type of joint~~.

Where a section contains lapped materials, the centered impact shall be adjusted to strike the center of any lap, and an additional impact shall be performed within 3 inches (76 mm) of the lap on the panel that laps behind the seam ~~as detailed~~. See example in Figure 803.9.1(2).

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.2 Solid wall assemblies and roof assemblies of concrete or other materials. Sections of wall assemblies and roof assemblies of solid concrete or other solid material shall be impacted in the center of the section, and at one interface corner. See examples ~~as detailed~~ in Figures 803.9.2(1) and 803.9.2(2). Where interface joints are used for joining at corners or panel-to-panel joints, an additional section shall be impacted directly on the interface joints. See examples ~~as detailed~~ in Figure 803.9.2(2).

Where an interior stud or support is present, additional impacts shall be performed within 3 inches (76 mm) of the stud and support, and directly on the stud support. See examples ~~as detailed~~ in Figures 803.9.2(1) and 803.9.2(2).

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.
Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.3 Masonry unit wall assemblies and roof assemblies. Sections of wall assemblies and roof assemblies constructed of masonry units shall be impacted in the center of the section, and at one interface corner or joint. See example ~~as detailed~~ in Figure 803.9.3(1). Mortared joints shall be impacted directly on the interface joints. See example ~~as detailed~~ in Figure 803.9.3(2).

No more than three impacts shall be made on one *specimen* or specimen panel. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

[803.9.4 Unchanged]

803.9.4.1 Side-swinging door assemblies. Side-swinging door assemblies shall be impacted within 6 inches (152 mm) of an interface hinge joint, within 6 inches (152 mm) of an upper latch point and within 6 inches (152 mm) of center primary latches or operators. See example ~~as shown~~ in Figure 803.9.4.1(1).

Report for *08-05– 23*

For double door assemblies with each door leaf containing identical hardware, one door leaf shall receive the same three impacts as a single door leaf plus an additional impact on a center meeting point or mullion. See example ~~as shown~~ in Figure 803.9.4.1(2).

For double door assemblies where one or more hardware components differ between door leaves, each door leaf shall receive the same three impacts as a single door and an additional impact on a center meeting point or mullion. See example ~~as shown~~ in Figure 803.9.4.1(2). No more than four impacts shall be made on one *specimen*. Where more than four impacts are required, multiple identical test *specimens* shall be utilized. Impacts shown on the same leaf in Figure 803.9.4.1(2), shall occur on the same test *specimen*.

Exception: More than four impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.4.2 Rolling door assemblies. For *rolling door assemblies*, the door shall be impacted at the center of the door, centered at a point 6 inches (152 mm) horizontally and vertically away from a bottom corner and within 6 inches (152 mm) of the primary latch or lock mechanism, plus an additional impact centered on a barrel assembly. See example ~~as shown~~ in Figure 803.9.4.2.

Exception: The barrel assembly is not subject to the additional impact where the entire barrel assembly is protected by the shelter envelope.

[803.9.4.3 and 803.9.4.4 Unchanged]

Staff Note: Section 803.9.5 was revised by 08-06-23. Revised text shown for clarity.

803.9.5 Window assemblies and other glazed openings. All window assemblies and other glazed openings shall be impacted in the center of the smallest glazed section, and at the lock side corner, or one interface corner, within 6 inches from each edge as applicable. See Example ~~as detailed~~ in Figure 803.9.5(1). Where interior mullions or other glazed section joints are present, the assembly shall be impacted centered on the mullion and at base of mullion. See Example ~~as shown~~ in Figure 803.9.5(2). Interface hinge joints and primary latches, where present, shall be impacted. See Example ~~as shown~~ in Figure 803.9.4.1(2) on an additional specimen.

No more than two impacts shall be made on one specimen. Where more than two impacts are required, multiple identical test specimens shall be provided.

Exception: More than two impacts shall be permitted to be made on the same test specimen by mutual consent of the test sponsor and test laboratory.

Reason:
Replace “as detailed in Figure…” or “as shown in Figure…” with “See example in Figure…” to coordinate with balloted changes in 08-05-23 and 08-10-23. As the figures are exemplary only, the text should refer to them as such rather than stating that the requirement is shown or detailed exactly in the figure.

PUBLIC COMMENT 2- FIRST DRAFT:

Proponent: Mike Steele, representing Greenheck Fan Corporation

Desired Action: AFM

Modification:

Further modify as follows:

SECTION 803
IMPACT TESTING

803.9.4.2 Rolling door assemblies. For *rolling door assemblies*, the door shall be impacted at the center of the door, ~~centered at a point~~ within 6 inches (152 mm) horizontally and vertically away from a bottom corner and within 6 inches (152 mm) of the primary latch or lock mechanism, plus an additional impact centered on a barrel assembly as shown in Figure 803.9.4.2.

803.9.4.3 Sectional door assemblies. For sectional door assemblies, the door shall be impacted centered on a section joint at a hinge location nearest the midpoint of the test specimen, equidistant between the lower two section joints and centered between two vertical stiles, ~~centered at a point~~ within 6 inches (152 mm) horizontally and vertically away from a bottom corner, and within 6 inches (152 mm) of the primary latch or lock mechanism. See example in Figure 803.9.4.3.

Reason: In all other section instances of “corner” impacts, the impacts are “within” 6 inches, not “at” 6 inches. They also do not use the word “centered” for corner impacts. Also added SI units to 803.9.4.3.

Report for *08-05– 23*		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 08-06-23

202, 803.9.5

Proponent: ICC 500 Work Group 8

Revise as follows:

SECTION 202
DEFINITIONS

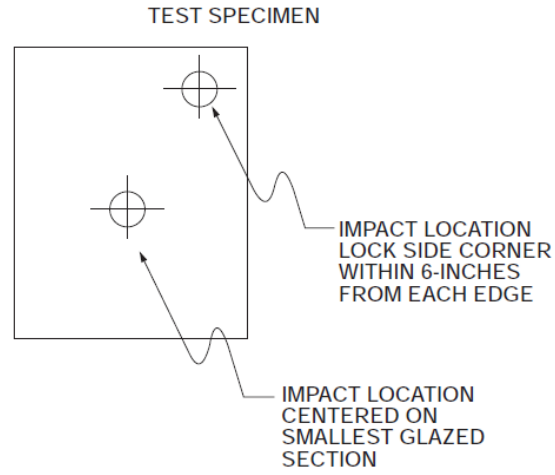
MULLION. A structural member used to connect or divide impact protective systems or individual elements within an impact protective systems.

SECTION 803
IMPACT TESTING

803.9.5 Window assemblies and other glazed openings. All window assemblies and other glazed openings shall be impacted in the center of the smallest glazed section, and at the lock side corner, or one interface corner, within 6 inches from each edge as applicable ~~one interface corner~~ as detailed in Figure 803.9.5(1). Where interior mullions or other glazed section joints ~~and/or latches~~ are present, the assembly shall be impacted centered on the mullion and at base of mullion ~~additional impacts shall be applied on these features~~ as shown in Figure 803.9.5(2). Interface hinge joints and primary latches, where present, shall be impacted as shown in Figure 803.9.4.1(2) on an additional specimen.

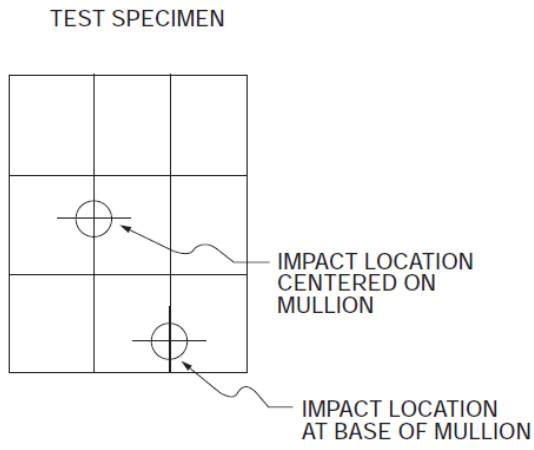
No more than two impacts shall be made on one *specimen*. Where more than two impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than two impacts shall be permitted to be made on the same test specimen by mutual consent of the test sponsor and *test laboratory*.



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.5(1)
WINDOW ASSEMBLIES AND OTHER GLAZED OPENINGS



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.5(2)
WINDOW ASSEMBLIES AND OTHER GLAZED OPENINGS

Reason: Cleanup and clarity of text to align with Figure. There should not be variation in the text between the section language and the figure.
There is no illustration for latches, only lock - add same text from 803.9.6.
Addition of "Mullion" definition to support Section 803.9.5 revisions.
Modified language allows for clarifying language of 'lock/latch corner' impact location
Addition of Section 803.9.5.2 to evaluate performance of different mullion designs and connections.
New Section 803.9.5.3 to qualify performance for operable windows separate from fixed windows.

Committee Action: Approval as Modified (Vote: 12-0-0)

Modification (if any):

Further modify as follows:

SECTION 202
DEFINITIONS

~~**MULLION.** A structural member used to connect or divide impact protective systems or individual elements within an impact protective systems.~~

Modify figure 803.9.5(1) to include 'one interface corner' in note

Committee Reason: The definition is deleted as this will be dealt with in a different change. Change graphic to match change for fixed windows – add 'interface corner to note on right side of 803.9.5(1). This proposal is a cleanup and clarity of text to align with Figure. There should not be variation in the text between the section language and the figure.

IS-STM 08-06-23 Public Comment 1

803.9.5

Proponent: Work Group 8

Further revise as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts. ….

803.9.5 Window assemblies and other glazed openings. All window assemblies and other glazed openings shall be impacted in the center of the smallest glazed section, and at ~~the lock side corner, or one interface corner,~~ a corner within 6 inches from each edge. Where a lock/latch is provided on the test specimen, the corner impact shall occur nearest the lock/latch. ~~as applicable as detailed~~ See example in Figure 803.9.5(1). Where interior mullions or other glazed section joints are present, the assembly shall be impacted centered on the mullion and at base of mullion as shown in Figure 803.9.5(2). Interface hinge joints and primary latches, where present, shall be impacted as shown in Figure 803.9.4.1(2) on an additional specimen.

No more than two impacts shall be made on one specimen. Where more than two impacts are required, multiple identical test specimens shall be provided.

Exception: More than two impacts shall be permitted to be made on the same test specimen by mutual consent of the test sponsor and test laboratory.

Reason: The current balloted language could be misinterpreted to indicate that a test sponsor or lab could choose an arbitrary corner to impact, even in the presence of a lock. The proposed language aligns with the approved language in Section 803.9.6 from IS-STM 08-10-23.

Committee Action for PC1: (Vote:)

Modification (if any):
Committee Reason:

IS-STM 08-06-23 Public Comment 2

803.9.6

Proponent: Mike Steele, representing Greenheck Fan Corporation

Further revise as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts….

803.9.6 Other impact-protective systems. All other impact-protective systems shall be impacted in the overall center of the test specimen, and at a perimeter corner within 6 inches (152 mm) from each edge. Where a lock/latch is provided on the test specimen, the corner impact shall occur nearest the lock/latch. See example in Figure 803.9.6(1).

~~Panels and interface joints~~ Where a panel to panel seam or lap is provided, the seam or lap shall be additionally impacted on the same test specimen ~~centered at~~ along a seam or lap ~~and at the center of a panel element~~, and the distance from mid-span of the seam or lap to the impact shall not be more than one fourth of the overall span. See example in Figure 803.9.6(2). Where more than one seam or lap construction method is present on a test *specimen* each method shall be impacted.

A panel element on the same test *specimen* shall be additionally impacted at mid-span between the longest edges of the panel element, and the impact shall not be required to be at the overall center of a panel element. See example in Figure 803.9.6(2).

Where an interior stud or support is present, additional impacts onto the same test *specimen* shall be performed within 3 inches (76 mm) of the stud or support, and directly on the stud or support. See examples in Figures 803.9.2(1) or 803.9.2(2).

All impact-protective systems that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4.

Reason: First paragraph: Added text to clarify that the locations are based on the entire test specimen, not a section of a test specimen.

New second paragraph: For clarity, separated Panel impacts and seam impacts into two paragraphs. For consistency, replaced “interface joints” with “seam or lap” as the latter is used later in the same sentence and both instances are referring to the same thing. “Seam or lap” is also used in the referenced figure 803.9.6(2).

New second paragraph: The draft updated the seam impact to now be on the “center” of the seam. Historically it has not been centered per the impact’s depiction on figure 803.9.6(2). The draft also updated the impact on the panel element to not be “centered” of the panel. Historically it has been only centered in one direction, not both as the new language would imply. Having these two impacts now “centered” as well as the overall test specimen “center” impact may have unintentional consequences and overstress the center spans of the product. In the past these impacts were allowed to be non-aligned per figure 803.9.6(2). It is proposed to allow the seam and panel impact to be non-centered.

New second paragraph: If the committee desires to better control the location of the seam impact, an addition to the sentence is proposed.

New second paragraph: The last sentence clarifies that all differing types of seams need to be impacted.

New third paragraph: Uses the term “panel element” to match figure 803.9.6(2). The description of the impact location was modified to better describe it. The impact is now not required to be at the “center” of the panel element with similar reasoning as described for the above seam impact.

Committee Action for PC2: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 08-06-23 Public Comment 3

803.9.6

Proponent: Mike Steele, representing Greenheck Fan Corporation

Further revise as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts….

803.9.6 Other impact-protective systems. All other impact-protective systems shall be impacted in the center of the test *specimen*, and at a corner within 6 inches (152 mm) from each edge. Where a lock/latch is provided on the test *specimen*, the corner impact shall occur nearest the lock/latch. See example in Figure 803.9.6(1).

Panels and interface joints shall be additionally impacted on the same test *specimen* centered at a seam or lap and at the center of a panel element. See example in Figure 803.9.6(2).

Where an interior stud or support is present, additional impacts onto the same test *specimen* shall be performed within 3 inches (76 mm) of the stud or support, and directly on the stud or support. See examples in Figures 803.9.2(1) or 803.9.2(2).

All *impact-protective systems* that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4 on an addition test *specimen*

Exception: The test *specimen* used for Section 803.9.6 shall be permitted to be the same test *specimen* used for the applicable requirements of Section 803.9.4 by mutual consent of the test sponsor and *test laboratory*.

Glazed openings in *impact-protective systems* shall be treated the same as glazed openings in doors and shall comply with Section 803.9.4.4. Impacts on glazing shall be permitted to be done on a separate test *specimen*. No more than two impacts on glazing shall be made on one specimen. Where more than two impacts are required, multiple identical test specimens shall be provided.

Exception: More than two impacts on glazing shall be permitted to be made on the same test specimen by mutual consent of the test sponsor and test laboratory.

Reason: The draft's new location of the impact requirements for hinged IPS leaves it unclear if a separate test specimen is allowed. ICC 500-2020 specifically allowed a separate test specimen for hinged IPS, but in the draft the "on an additional test specimen" language was not included in the new location. The confusion is that one does not know if they are to follow the IPS section that states all impacts are required on one test specimen, or do they follow section 803.9.4 which allows multiple test specimens to be impacted? The proposed language clarifies the requirement and put in the typical exception language.

The draft's re-written section of IPS that deals with hinged or pivoted portions of an IPS should also have language for the similar instance of glazed openings in IPS. Proposed language first sentence was copied and modified 803.9.4. Second sentence clarifies that an additional test specimen is allowed. Proposed third sentence and exception are taken from windows section 803.9.5 (which is reference by 803.9.4.4) and clarifies the number of test specimens and exceptions.

Committee Action for PC3: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 08-06-23 Public Comment 4

202, 803.9.1, 803.9.2, 803.9.6

Proponent: Mike Steele, representing Greenheck Fan Corporation

Further revise as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts….

803.9.1 Panel or framed wall assemblies and roof assemblies. Sections of panel or framed wall assemblies and roof assemblies shall be impacted in the center of the section, and at one interface corner as detailed in Figures 803.9.1(1) and 803.9.1(2).

Where an ~~interior stud or support~~ *interior support* is present, additional impacts shall be performed within 3 inches (76 mm) of the ~~stud or~~ support, and directly on ~~a stud~~ the same or different support. ~~, as detailed~~ The impacts shall be permitted to be at any location along the length of the support. See examples in Figures 803.9.1(1) and 803.9.1(2). Where an ~~interior stud or support~~ *interior support* is present at the center of the ~~wall~~ section, the center ~~wall~~ impact shall be adjusted to strike centered between ~~studs or supports.~~ the longest below span:

1. The longest span between adjacent *interior supports.*
2. The longest span between a section's edge and its adjacent *interior support.*

Interface joints used for attachment or joining at corners, at panel-to-panel sections, or at panel-to-roof shall be impacted directly on the interface joints as detailed in Figure 803.9.1(2) for each type of joint.

Where a section contains lapped materials, the centered impact shall be adjusted to strike the center of any lap, and an additional impact shall be performed within 3 inches (76 mm) of the lap on the panel that laps behind the seam as detailed in Figure 803.9.1(2).

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.2 Solid wall assemblies and roof assemblies of concrete or other materials. Sections of wall assemblies and roof assemblies of solid concrete or other solid material shall be impacted in the center of the section, and at one interface corner as detailed in Figures 803.9.2(1) and 803.9.2(2). Where interface joints are used for joining at corners or panel-to-panel joints, an additional section shall be impacted directly on the interface joints as detailed in Figure 803.9.2(2).

Where an ~~interior stud or support~~ *interior support*] is present, additional impacts shall be performed within 3 inches (76 mm) of the ~~stud and~~ support, and directly on the ~~stud~~ same or different support.~~, as detailed~~ The impacts shall be permitted to be at any location along the length of the support. See examples in Figures 803.9.2(1) and 803.9.2(2). Where an *interior support* is present at the center of the section, the center impact shall be adjusted to strike centered between the longest below span:

1. The longest span between adjacent *interior supports.*
2. The longest span between a section's edge and its adjacent *interior support.*

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.6 Other impact-protective systems. All other *impact-protective systems* shall be impacted in the center of the test *specimen*, and at a corner within 6 inches (152 mm) from each edge. Where a lock/latch is provided on the test *specimen*, the corner impact shall occur nearest the lock/latch. See example in Figure 803.9.6(1).

Panels and interface joints shall be additionally impacted on the same test *specimen* centered at a seam or lap and at the center of a panel element. See example in Figure 803.9.6(2).

Where an ~~interior stud or support~~ *interior support* is present, additional impacts onto the same test specimen shall be performed within 3 inches (76 mm) of the ~~stud or~~ support, and directly on the ~~stud~~ same or different support. The impacts shall be permitted to be at any location along the length of the support. See examples in Figures 803.9.2(1) or 803.9.2(2). Where an *interior support* is present at the panel element mid-span impact location, the panel element mid-span impact shall be adjusted to strike mid-span between the longest below span:

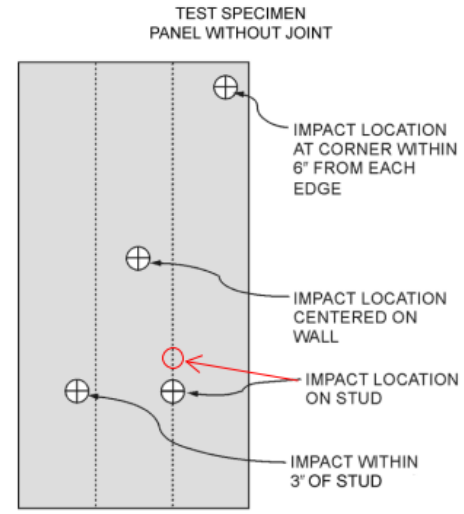
1. The longest span between adjacent *interior supports.*

2. The longest span between a section's edge and its adjacent *interior support.*

All *impact-protective systems* that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4

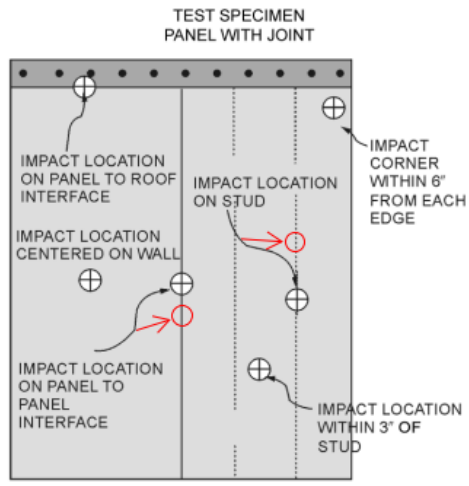
SECTION 202
DEFINITIONS

INTERIOR SUPPORT. A support member that is located within, behind or in front of a panel or section of a test *specimen*. It is not a support that is related to or along an individual panel or section's perimeter or along the entire test *specimen's* perimeter.



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.2(1)
SOLID WALL ASSEMBLIES AND ROOF ASSEMBLIES OF CONCRETE OR OTHER MATERIALS



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.2(2)
SOLID WALL ASSEMBLIES AND ROOF ASSEMBLIES OF CONCRETE OR OTHER MATERIALS

Reason: In 803.9.1, the word "wall" was removed from the draft's new sentence as the section is also for roof assemblies, and other language in the same sub-section leave it as generic (not wall or roof specific). The proposed follows what is currently done in solid wall and masonry wall sections where "wall" is not used by itself w/o also referencing "roofs".

Condensed the phrase "stud or support" into only "support" as a stud is a type of support, and there are other types of support than just a stud. The term support is more generic covering all types of supports. The proposed also removes inconsistency between sections where "stud OR support" is used and "stud AND support" is used (see blue highlight in proposed). The proposed adds clarity because if at specimen has both a "stud" and a "support", then which one is impacted, or do both get impacted? Additionally, the draft uses the phrase "a/the stud support" (see blue highlight in proposed), which leads to confusion because is one impacting a stud or impacting a support?

Added a sentence to clarify in text and to match figures 803.9.2(1) and 803.9.2(2) that the support impacts can be off-center.

Added a new definition of “interior support”, to clarify where the support is on the test specimen that will be impacted. The second sentence of the definition is to clarify that the support is not a mullion or at the mullion location, all while not using the term “mullion”.

With the draft’s addition of a new sentence in 803.9.1 (adjusting the center impact if a support is present), does not address what to do if only ONE support is present. The sentence instructs to impact BETWEEN supports, but we do not have clear guidance for when only one support is present as there are not two supports to be “between”. The additional sentence gives clarification for that situation. The added sentence is copied into sections 803.9.2 and 803.9.6 for consistency.

In 803.9.2 and 803.9.6, solid walls and other IPS can also have a centered support. Therefore, it is proposed to copy the draft’s new and proposed center impact sentences from the 803.9.1 into 803.9.2 and 803.9.6 as well. Note that IPS section 803.9.6 uses slightly different language for describing the “center” impact in order to match other language of the IPS section (see blue highlight in proposed).

Figures 803.9.2(1) and 803.9.2(2) are updated to better show that impacts do not need to be horizontally in line with each other.

Committee Action for PC4: (Vote:)

Modification (if any):

Committee Reason:

Report for *08-06– 23*		
Committee decision: AM	***Committee Vote at Meeting: 12-0-0***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any): **SECTION 202** **DEFINITIONS** ~~**MULLION.** A structural member used to connect or divide impact protective systems or individual elements within an impact protective systems.~~ Modify figure 803.9.5(1) to include ‘one interface corner’ in note		
Committee Reason: The definition is deleted as this will be dealt with in a different change. Change graphic to match change for fixed windows – add ‘interface corner to note on right side of 803.9.5(1). This proposal is a cleanup and clarity of text to align with Figure. There should not be variation in the text between the section language and the figure.		
PUBLIC COMMENT 1- FIRST DRAFT: Proponent: Work Group 8		
Desired Action: AFM		
Modification: Further modify as follows: **SECTION 803** **IMPACT TESTING** **803.9 Impact locations and the number of impacts. ….** **803.9.5 Window assemblies and other glazed openings.** All window assemblies and other glazed openings shall be impacted in the center of the smallest glazed section, and at ~~the lock side corner, or one interface corner,~~ a corner within 6 inches from each edge. Where a lock/latch is provided on the test specimen, the corner impact shall occur nearest the lock/latch. ~~as applicable as detailed~~ See example in Figure 803.9.5(1). Where interior mullions or other glazed section joints are present, the assembly shall be impacted centered on the mullion and at base of mullion as shown in Figure 803.9.5(2). Interface hinge joints and primary latches, where present, shall be impacted as shown in Figure 803.9.4.1(2) on an additional specimen. No more than two impacts shall be made on one specimen. Where more than two impacts are required, multiple identical test specimens shall be provided. **Exception:** More than two impacts shall be permitted to be made on the same test specimen by mutual consent of the test sponsor and test laboratory.		

Report for *08-06– 23*

Reason: The current balloted language could be misinterpreted to indicate that a test sponsor or lab could choose an arbitrary corner to impact, even in the presence of a lock. The proposed language aligns with the approved language in Section 803.9.6 from IS-STM 08-10-23.

PUBLIC COMMENT 2- FIRST DRAFT:

Proponent: Mike Steele, representing Greenheck Fan Corporation

Desired Action: AFM

Modification:

Further modify as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts….

803.9.6 Other impact-protective systems. All other impact-protective systems shall be impacted in the overall center of the test specimen, and at a perimeter corner within 6 inches (152 mm) from each edge. Where a lock/latch is provided on the test specimen, the corner impact shall occur nearest the lock/latch. See example in Figure 803.9.6(1).

~~Panels and interface joints~~ Where a panel to panel seam or lap is provided, the seam or lap shall be additionally impacted on the same test specimen ~~centered at~~ along a seam or lap ~~and at the center of a panel element~~, and the distance from mid-span of the seam or lap to the impact shall not be more than one fourth of the overall span. See example in Figure 803.9.6(2). Where more than one seam or lap construction method is present on a test *specimen* each method shall be impacted.

A panel element on the same test *specimen* shall be additionally impacted at mid-span between the longest edges of the panel element, and the impact shall not be required to be at the overall center of a panel element. See example in Figure 803.9.6(2).

Where an interior stud or support is present, additional impacts onto the same test *specimen* shall be performed within 3 inches (76 mm) of the stud or support, and directly on the stud or support. See examples in Figures 803.9.2(1) or 803.9.2(2).

All impact-protective systems that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4.

Reason: First paragraph: Added text to clarify that the locations are based on the entire test specimen, not a section of a test specimen.

New second paragraph: For clarity, separated Panel impacts and seam impacts into two paragraphs. For consistency, replaced “interface joints” with “seam or lap” as the latter is used later in the same sentence and both instances are referring to the same thing. “Seam or lap” is also used in the referenced figure 803.9.6(2).

New second paragraph: The draft updated the seam impact to now be on the “center” of the seam. Historically it has not been centered per the impact’s depiction on figure 803.9.6(2). The draft also updated the impact on the panel element to not be “centered” of the panel. Historically it has been only centered in one direction, not both as the new language would imply. Having these two impacts now “centered” as well as the overall test specimen “center” impact may have unintentional consequences and overstress the center spans of the product. In the past these impacts were allowed to be non-aligned per figure 803.9.6(2). It is proposed to allow the seam and panel impact to be non-centered.

New second paragraph: If the committee desires to better control the location of the seam impact, an addition to the sentence is proposed.

New second paragraph: The last sentence clarifies that all differing types of seams need to be impacted.

New third paragraph: Uses the term “panel element” to match figure 803.9.6(2). The description of the impact location was modified to better describe it. The impact is now not required to be at the “center” of the panel element with similar reasoning as described for the above seam impact.

PUBLIC COMMENT 3- FIRST DRAFT:

Proponent: Mike Steele, representing Greenheck Fan Corporation

Desired Action: AFM

Modification:

Further modify as follows:

Report for *08-06– 23*

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts….

803.9.6 Other impact-protective systems. All other impact-protective systems shall be impacted in the center of the test *specimen*, and at a corner within 6 inches (152 mm) from each edge. Where a lock/latch is provided on the test *specimen*, the corner impact shall occur nearest the lock/latch. See example in Figure 803.9.6(1).

Panels and interface joints shall be additionally impacted on the same test *specimen* centered at a seam or lap and at the center of a panel element. See example in Figure 803.9.6(2).

Where an interior stud or support is present, additional impacts onto the same test *specimen* shall be performed within 3 inches (76 mm) of the stud or support, and directly on the stud or support. See examples in Figures 803.9.2(1) or 803.9.2(2).

All *impact-protective systems* that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4 on an addition test *specimen*

Exception: The test *specimen* used for Section 803.9.6 shall be permitted to be the same test *specimen* used for the applicable requirements of Section 803.9.4 by mutual consent of the test sponsor and *test laboratory*.

Glazed openings in *impact-protective systems* shall be treated the same as glazed openings in doors and shall comply with Section 803.9.4.4. Impacts on glazing shall be permitted to be done on a separate test *specimen*. No more than two impacts on glazing shall be made on one specimen. Where more than two impacts are required, multiple identical test specimens shall be provided.

Exception: More than two impacts on glazing shall be permitted to be made on the same test specimen by mutual consent of the test sponsor and test laboratory.

Reason: The draft's new location of the impact requirements for hinged IPS leaves it unclear if a separate test specimen is allowed. ICC 500-2020 specifically allowed a separate test specimen for hinged IPS, but in the draft the "on an additional test specimen" language was not included in the new location. The confusion is that one does not know if they are to follow the IPS section that states all impacts are required on one test specimen, or do they follow section 803.9.4 which allows multiple test specimens to be impacted? The proposed language clarifies the requirement and put in the typical exception language.

The draft's re-written section of IPS that deals with hinged or pivoted portions of an IPS should also have language for the similar instance of glazed openings in IPS. Proposed language first sentence was copied and modified 803.9.4. Second sentence clarifies that an additional test specimen is allowed. Proposed third sentence and exception are taken from windows section 803.9.5 (which is reference by 803.9.4.4) and clarifies the number of test specimens and exceptions.

PUBLIC COMMENT 4- FIRST DRAFT:

Proponent: Mike Steele, representing Greenheck Fan Corporation

Desired Action: AFM

Modification:

Further modify as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts….

803.9.1 Panel or framed wall assemblies and roof assemblies. Sections of panel or framed wall assemblies and roof assemblies shall be impacted in the center of the section, and at one interface corner as detailed in Figures 803.9.1(1) and 803.9.1(2).

Where an ~~interior stud or support~~ *interior support* is present, additional impacts shall be performed within 3 inches (76 mm) of the ~~stud or~~ support, and directly on ~~a stud~~ the same or different support. ~~, as detailed~~ The impacts shall be permitted to be at any location along the length of the support. See examples in Figures 803.9.1(1) and 803.9.1(2). Where an ~~interior stud or support~~ *interior support* is present at the center of the ~~wall~~ section, the center ~~wall~~ impact shall be adjusted to strike centered between ~~studs or supports.~~ the longest below span:

3. The longest span between adjacent *interior supports*.

Report for *08-06– 23*

4. The longest span between a section's edge and its adjacent *interior support.*

Interface joints used for attachment or joining at corners, at panel-to-panel sections, or at panel-to-roof shall be impacted directly on the interface joints as detailed in Figure 803.9.1(2) for each type of joint.

Where a section contains lapped materials, the centered impact shall be adjusted to strike the center of any lap, and an additional impact shall be performed within 3 inches (76 mm) of the lap on the panel that laps behind the seam as detailed in Figure 803.9.1(2).

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.2 Solid wall assemblies and roof assemblies of concrete or other materials. Sections of wall assemblies and roof assemblies of solid concrete or other solid material shall be impacted in the center of the section, and at one interface corner as detailed in Figures 803.9.2(1) and 803.9.2(2). Where interface joints are used for joining at corners or panel-to-panel joints, an additional section shall be impacted directly on the interface joints as detailed in Figure 803.9.2(2).

Where an ~~interior stud or support~~ *interior support* is present, additional impacts shall be performed within 3 inches (76 mm) of the ~~stud and~~ support, and directly on the ~~stud~~ same or different support~~, as detailed~~ The impacts shall be permitted to be at any location along the length of the support. See examples in Figures 803.9.2(1) and 803.9.2(2). Where an *interior support* is present at the center of the section, the center impact shall be adjusted to strike centered between the longest below span:

3. The longest span between adjacent *interior supports.*

4. The longest span between a section's edge and its adjacent *interior support.*

No more than three impacts shall be made on one *specimen*. Where more than three impacts are required, multiple identical test *specimens* shall be provided.

Exception: More than three impacts shall be permitted to be made on the same test *specimen* by mutual consent of the test sponsor and *test laboratory*.

803.9.6 Other impact-protective systems. All other *impact-protective systems* shall be impacted in the center of the test *specimen*, and at a corner within 6 inches (152 mm) from each edge. Where a lock/latch is provided on the test *specimen*, the corner impact shall occur nearest the lock/latch. See example in Figure 803.9.6(1).

Panels and interface joints shall be additionally impacted on the same test *specimen* centered at a seam or lap and at the center of a panel element. See example in Figure 803.9.6(2).

Where an ~~interior stud or support~~ *interior support* is present, additional impacts onto the same test specimen shall be performed within 3 inches (76 mm) of the ~~stud or~~ support, and directly on the ~~stud~~ same or different support. The impacts shall be permitted to be at any location along the length of the support. See examples in Figures 803.9.2(1) or 803.9.2(2). Where an *interior support* is present at the panel element mid-span impact location, the panel element mid-span impact shall be adjusted to strike mid-span between the longest below span:

3. The longest span between adjacent *interior supports.*

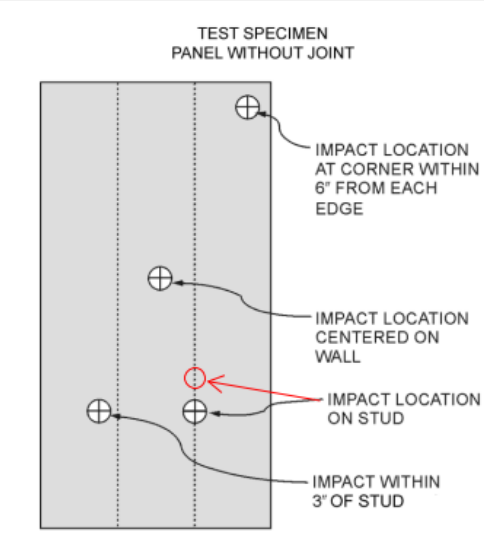
4. The longest span between a section's edge and its adjacent *interior support.*

All *impact-protective systems* that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4

SECTION 202
DEFINITIONS

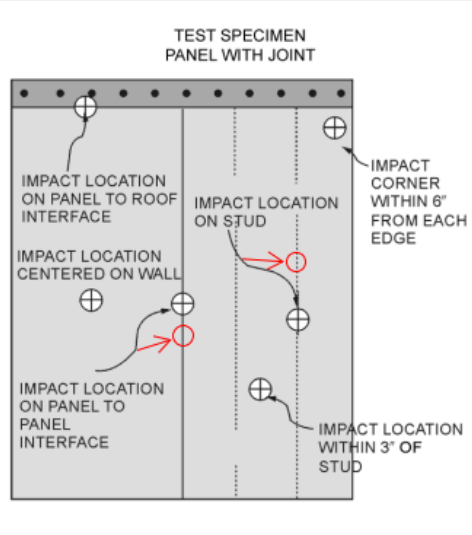
INTERIOR SUPPORT. A support member that is located within, behind or in front of a panel or section of a test *specimen*. It is not a support that is related to or along an individual panel or section's perimeter or along the entire test *specimen's* perimeter.

Report for *08-06– 23*



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.2(1)
SOLID WALL ASSEMBLIES AND ROOF ASSEMBLIES OF CONCRETE OR OTHER MATERIALS



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.2(2)
SOLID WALL ASSEMBLIES AND ROOF ASSEMBLIES OF CONCRETE OR OTHER MATERIALS

Reason: In 803.9.1, the word “wall” was removed from the draft’s new sentence as the section is also for roof assemblies, and other language in the same sub-section leave it as generic (not wall or roof specific). The proposed follows what is currently done in solid wall and masonry wall sections where “wall” is not used by itself w/o also referencing “roofs”.

Condensed the phrase “stud or support” into only “support” as a stud is a type of support, and there are other types of support than just a stud. The term support is more generic covering all types of supports. The proposed also removes inconsistency between sections where “stud OR support” is used and “stud AND support” is used (see blue highlight in proposed). The proposed adds clarity because if at specimen has both a “stud” and a “support”, then which one is impacted, or do both get impacted? Additionally, the draft uses the phrase “a/the stud support” (see blue highlight in proposed), which leads to confusion because is one impacting a stud or impacting a support?

Added a sentence to clarify in text and to match figures 803.9.2(1) and 803.9.2(2) that the support impacts can be off-center.

Added a new definition of “interior support”, to clarify where the support is on the test specimen that will be impacted. The second sentence of the definition is to clarify that the support is not a mullion or at the mullion location, all while not using the term “mullion”.

With the draft’s addition of a new sentence in 803.9.1 (adjusting the center impact if a support is present), does not address what to do if only ONE support is present. The sentence instructs to impact BETWEEN supports, but we do not have clear guidance for when only one support is present as there are not two supports to be “between”. The additional sentence gives clarification for that situation. The added sentence is copied into sections 803.9.2 and 803.9.6 for consistency.

In 803.9.2 and 803.9.6, solid walls and other IPS can also have a centered support. Therefore, it is proposed to copy the draft’s new and proposed center impact sentences from the 803.9.1 into 803.9.2 and 803.9.6 as well. Note that IPS section 803.9.6 uses slightly different language for describing the “center” impact in order to match other language of the IPS section (see blue highlight in proposed).

Figures 803.9.2(1) and 803.9.2(2) are updated to better show that impacts do not need to be horizontally in line with each other.

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT:		
Proponent:		

Report for *08-06– 23*		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 08-10-23

803.9.6

Proponent: ICC 500 Work Group 8

Revise as follows:

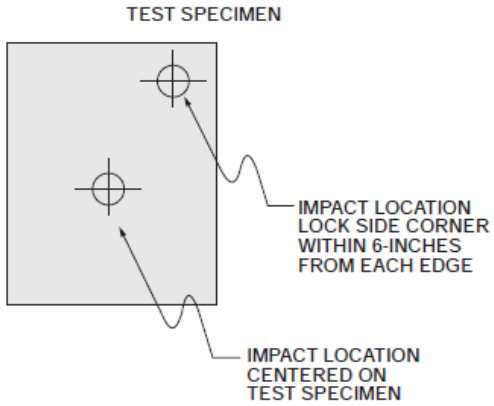
SECTION 803
IMPACT TESTING

803.9.6 Other impact-protective systems. All other impact-protective systems shall be impacted in the center of the test specimen, and one lock/latch side corner where a lock/latch is provided, or one interface corner where no lock/latch is provided, within 6 inches from each edge. ~~one interface corner~~ ~~as detailed~~ See example in Figure 803.9.6(1). Panels and interface joints shall be additionally impacted ~~onto~~ on the same ~~unit~~ test specimen centered at a seam or lap and at the center of a panel element. ~~as shown~~ See example in Figure 803.9.6(2). ~~Interface hinge joints and primary latches, where present, shall be impacted as shown in Figure 803.9.4.1(2) on an additional specimen. All impact-protective systems that include swinging door assemblies with latching hardware shall be tested in accordance with Section 803.9.4.~~

Where an interior stud or support is present, additional impacts onto the same ~~unit~~ test specimen shall be performed within 3 inches (76 mm) of the stud ~~and~~ or support, and directly on the stud or support.~~, as detailed~~ See examples in ~~Figure~~ Figures 803.9.2(1) or 803.9.2(2).

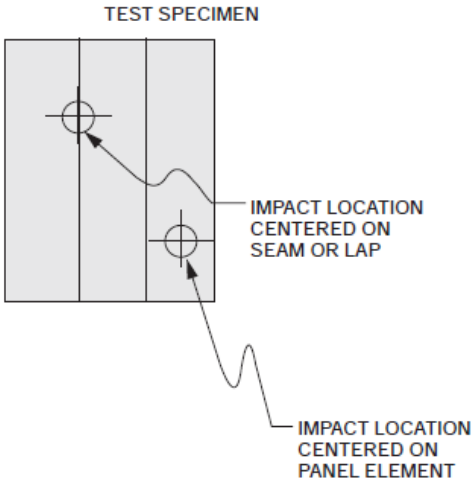
Where mullions are present, additional impacts shall be performed in accordance with Section 803.9.5.2.

All impact-protective systems that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4.



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.6(1)
OTHER IMPACT-PROTECTIVE SYSTEMS



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.6(2)
OTHER IMPACT-PROTECTIVE SYSTEMS

(Note: Change 'lock' to 'lock/latch' in the note)

Reason: This is a proposal for additional information for other impact systems. The work group also submitted a proposal for coordination with the figure only.

IS-STM 08-10-23 Replacement

803.9.6

Proponent: ICC 500 Work Group 8

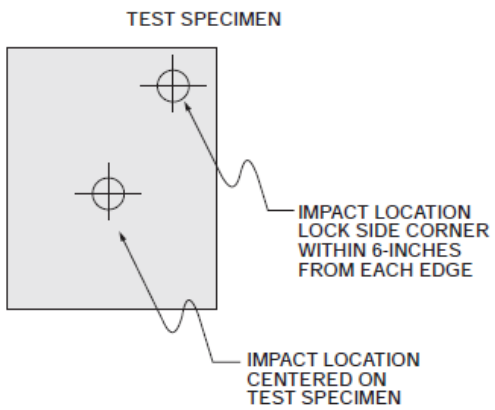
Replace with the following:

803.9.6 Other impact-protective systems.
All operable impact-protective systems shall be tested in accordance with the applicable requirements of Section 803.9.4 or 803.9.5.

All other impact-protective systems shall be impacted in the center of the test specimen, and at a corner within 6 inches from each edge. Where a lock/latch is provided on the test specimen, the corner impact shall occur nearest the lock/latch. ~~and at one interface corner as detailed~~ See example in Figure 803.9.6(1).

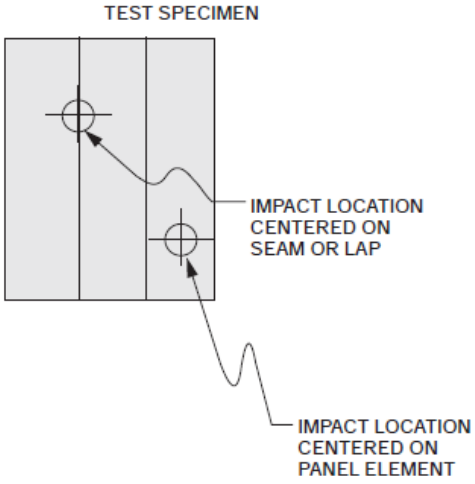
Panels and interface joints shall be additionally impacted ~~onto~~ on the same ~~unit~~ test specimen centered on a seam or lap and centered on a panel element. ~~as shown~~ See example in Figure 803.9.6(2). ~~Interface hinge joints and primary latches, where present, shall be impacted as shown in Figure 803.9.4.1(2) on an additional specimen. All impact-protective systems that include swinging door assemblies with latching hardware shall be tested in accordance with Section 803.9.4.~~

Where an interior stud or support is present, additional impacts on ~~onto~~ the same ~~unit~~ test specimen shall be performed within 3 inches (76 mm) of the stud ~~and~~ or support, and directly on the stud or support.~~, as detailed~~ See examples in ~~Figure~~ Figures 803.9.2(1) or 803.9.2(2).



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.6(1)
OTHER IMPACT-PROTECTIVE SYSTEMS



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.6(2)
OTHER IMPACT-PROTECTIVE SYSTEMS

(Note: Change note for corner to 'impact location within 6 inches from each edge – lock/latch side where lock/latch is provided')

Reason: In progress

Committee Action: Approval as Modified (Vote:10-0-0)

Modification (if any):

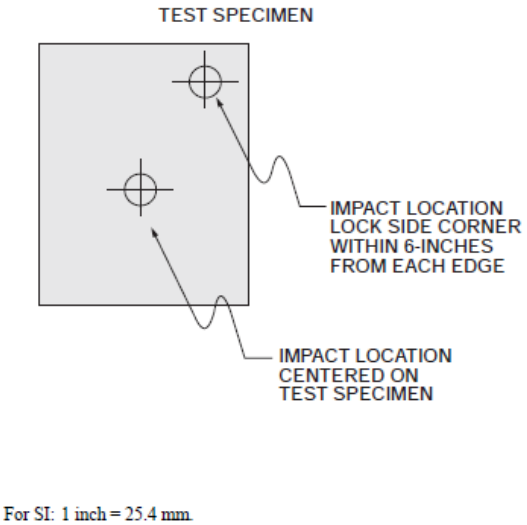
Replace with the following:

803.9.6 Other impact-protective systems. All other impact-protective systems shall be impacted in the center of the test specimen, and at a corner within 6 inches from each edge. Where a lock/latch is provided on the test specimen, the corner impact shall occur nearest the lock/latch. ~~and at one interface corner as detailed~~ See example in Figure 803.9.6(1).

Panels and interface joints shall be additionally impacted ~~onto~~ on the same ~~unit~~ test specimen centered at a seam or lap and at the center of a panel element. ~~as shown~~ See example in Figure 803.9.6(2). ~~Interface hinge joints and primary latches, where present, shall be impacted as shown in Figure 803.9.4.1(2) on an additional specimen. All impact-protective systems that include swinging door assemblies with latching hardware shall be tested in accordance with Section 803.9.4.~~

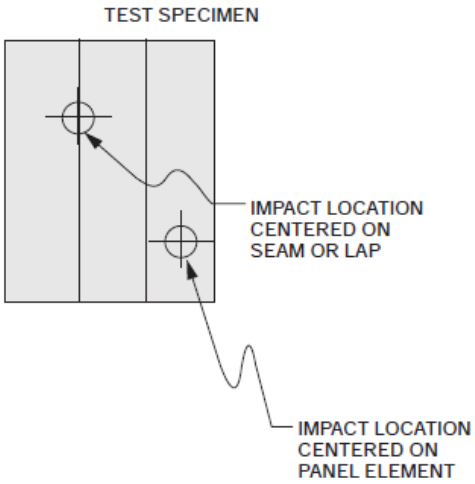
Where an interior stud or support is present, additional impacts onto the same ~~unit~~ test specimen shall be performed within 3 inches (76 mm) of the stud ~~and~~ or support, and directly on the stud or support.~~, as detailed~~ See examples in ~~Figure~~ Figures 803.9.2(1) or 803.9.2(2).

All impact-protective systems that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4.



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.6(1)
OTHER IMPACT-PROTECTIVE SYSTEMS



For SI: 1 inch = 25.4 mm.

FIGURE 803.9.6(2)
OTHER IMPACT-PROTECTIVE SYSTEMS

(Note: Change note for corner to 'impact location within 6 inches from each edge – lock/latch side where lock/latch is provided')

Committee Reason: Remove new text on mullions because Work Group 8 is still working on a complete package. This is a clean up of the current language.

IS-STM 08-10-23 Public Comment 1

803.9

Proponent: Mike Steele, representing Greenheck Fan Corporation

Further revise as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts. For purposes of testing, impact locations and quantities shall be as indicated in Sections 803.9.1 through 803.9.7.3, as applicable. The tolerance for impact locations shall be within a $2^1/_2$ inch (64 mm) radius circle, with the center of the circle located as indicated in Sections 803.9.1 through 803.9.7.3, as applicable. Where the location of an impact satisfies multiple defined impact locations, only one impact shall be required to satisfy the multiple applicable defined impacts.

Reason:

Committee Action for PC1: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 08-10-23 Public Comment 2

803.9

Proponent: Mike Steele, representing Greenheck Fan Corporation

Further revise as follows:

SECTION 802
TEST SPECIMENS

802.1 Test ~~assembly~~ specimen. All parts of the test *specimen* shall be full size…

…

802.2 Number of test specimens. *(No change)*

…

802.3 Test s~~S~~pecimen conditioning. Samples shall be conditioned at ambient temperature [59ºF to 95ºF (15ºC to 35ºC)] for a minimum of 2 hours prior to testing.

Reason: Draft section 803.9.6 inserted new language using the term “test specimen”, the two above section headers should also be updated to be consistent with the rest of the section.

Also, to remove confusion, the phase “test assembly” should be changed to “test specimen”. The phrase “test assembly” is only used once in the document. Updating Section 802.1 will remove confusion as to if there is a difference between a test assembly and a test specimen.

Also, section 802.3 is updated for consistency with section titles of 802.1 (as proposed) and 802.2.

Committee Action for PC2: (Vote:)

Modification (if any):

Committee Reason:

Report for *08-10– 23*		
Committee decision: AM	***Committee Vote at Meeting: 10-0-0***	***Committee Vote on Ballot:***

REPORT OF HEARING:

Modification (if any):

Replace with the following:

SECTION 803
IMPACT TESTING

803.9.6 Other impact-protective systems. All other impact-protective systems shall be impacted in the center of the test specimen, and at a corner within 6 inches from each edge. Where a lock/latch is provided on the test specimen, the corner impact shall occur nearest the lock/latch. ~~and at one interface corner as detailed~~ See example in Figure 803.9.6(1).

Report for *08-10– 23*

Panels and interface joints shall be additionally impacted ~~onto~~ on the same ~~unit~~ test specimen centered at a seam or lap and at the center of a panel element. ~~as shown~~ See example in Figure 803.9.6(2). ~~Interface hinge joints and primary latches, where present, shall be impacted as shown in Figure 803.9.4.1(2) on an additional specimen. All impact-protective systems that include swinging door assemblies with latching hardware shall be tested in accordance with Section 803.9.4.~~

Where an interior stud or support is present, additional impacts onto the same ~~unit~~ test specimen shall be performed within 3 inches (76 mm) of the stud ~~and~~ or support, and directly on the stud or support~~., as detailed~~ See examples in ~~Figure~~ Figures 803.9.2(1) or 803.9.2(2).

All impact-protective systems that include hinged or pivoted assemblies shall be tested in accordance with the applicable requirements of Section 803.9.4.

Committee Reason: Remove new text on mullions because Work Group 8 is still working on a complete package. This is a clean up of the current language.

PUBLIC COMMENT 1- FIRST DRAFT:

Proponent: Mike Steele, representing Greenheck Fan Corporation

Desired Action: AFM

Modification:

Further modify as follows:

SECTION 803
IMPACT TESTING

803.9 Impact locations and the number of impacts. For purposes of testing, impact locations and quantities shall be as indicated in Sections 803.9.1 through 803.9.7.3, as applicable. The tolerance for impact locations shall be within a $2^1/_2$ inch (64 mm) radius circle, with the center of the circle located as indicated in Sections 803.9.1 through 803.9.7.3, as applicable. Where the location of an impact satisfies multiple defined impact locations, only one impact shall be required to satisfy the multiple applicable defined impacts.

Reason: Due to the addition of new draft language in IPS section 803.9.6, it is possible for several scenarios to have required impact locations from different parts of the standard to be located at the same location on the test specimen. Clarity is needed to know if a single impact will satisfy the requirements of all defined impacts.

PUBLIC COMMENT 2- FIRST DRAFT:

Proponent: Mike Steele, representing Greenheck Fan Corporation

Desired Action: AFM

Modification:

Further modify as follows:

SECTION 802
TEST SPECIMENS

802.1 Test ~~assembly~~ specimen. All parts of the test *specimen* shall be full size…

…

802.2 Number of test specimens. *(No change)*

…

802.3 Test s~~S~~pecimen conditioning. Samples shall be conditioned at ambient temperature [59ºF to 95ºF (15ºC to 35ºC)] for a minimum of 2 hours prior to testing.

Reason: Draft section 803.9.6 inserted new language using the term “test specimen”, the two above section headers should also be updated to be consistent with the rest of the section.

Also, to remove confusion, the phase “test assembly” should be changed to “test specimen”. The phrase “test assembly” is only used once in the document. Updating Section 802.1 will remove confusion as to if there is a difference between a test assembly and a test specimen.

Also, section 802.3 is updated for consistency with section titles of 802.1 (as proposed) and 802.2.

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

REPORT OF HEARING – FIRST DRAFT

Modification (if any):

Committee Reason:

PUBLIC COMMENT- SECOND DRAFT:

Proponent:

Desired Action:

Modification:

Reason:

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

Report for *08-10– 23*
FINAL ACTION: Modification (if any):
Committee Reason:

IS-STM 08-13-23

803.10.1, 803.10.4

Proponent: Andrew Holstein, Ph.D., P.E., representing Intertek

Revise as follows:

SECTION 803
IMPACT TESTING

803.10.1 Perforation. Any perforation of the interior surface of <u>any component of</u> the tested <u>assembly</u> ~~component of the storm shelter envelope~~ by the design missile shall constitute a failure. ~~For impact-protective systems, perforation or deflection that would result in impact of the protected component constitutes a failure.~~ <u>For pre-existing joint openings, the creation of a through opening in the tested assembly allowing the complete passage of a 3/8 inch (9.5 mm) rod at any angle shall constitute a failure.</u>

<u>**Exception:** Joints, gaps, or voids permitted by Section 306.5 to be greater than 3/8 inches (9.5 mm) shall not exceed their permitted size after testing.</u>

803.10.4 Permanent deformation. Permanent deformation of an interior surface of the test specimen shall be determined by measuring the distance from a straight edge held between two undeformed points on the specimen. The maximum permanent deformation shall be measured to the nearest 1/8 inch (3.2 mm) and shall not exceed 3 inches (76 mm). <u>For impact-protective systems, deflection that would result in impact of the protected component constitutes a failure.</u>

Reason: 1) Additional guidance is required on what constitutes perforation by the missile. If an existing joint/gap is expanded due to the impact, is this considered to be perforation? The current language is subjective, which has led to varying applications at different labs. This revision establishes an objective metric to evaluate perforation to ensure consistency across labs. The exception recognizes that some joints and gaps are permitted by Section 306.5 to be larger than 3/8" (i.e. door undercut) and in those cases the permitted dimension is not intended to be reduced by this requirement.

2) The pass/fail criteria of deflection for impact-protective systems does not belong in the perforation section and should be relocated to the more closely related Permanent Deformation section.

Committee Action: Disapproval (Vote: 7-1-0)

Modification (if any):

Committee Reason: Further work is needed on this issue for a complete package.

IS-STM 08-13-23 Ballot Comment 1

803.10.1, 803.10.5(New)

Proponent: Andrew Holstein

Further revise as follows:

SECTION 803
IMPACT TESTING

803.10.1 Perforation. Any perforation of the interior surface of the tested component of the storm shelter envelope by the design missile shall constitute a failure. ~~For impact-protective systems, perforation or deflection that would result in impact of the protected component constitutes a failure.~~

803.10.5 Maximum Deflection. The maximum deflection under impact testing shall not result in perforation of the witness screen detailed in Sections 803.10.2 and 803.10.3. For *impact-protective systems* that are intended for installation to the exterior of a protected component, impact deflection that would result in contact with the protected component constitutes a failure.

Reason: A requirement for deflection does not belong under the heading of "Perforation", so it should be separated into a specific section. Additionally, the first sentence of the new 803.10.5 section clarifies a common understanding of the existing intent that perforation of the kraft paper witness screen for any reason constitutes a failure. After removing "or deflection" from the last sentence of 803.10.1, the remainder of the sentence is repetitive with the first sentence, but limited to impact-protective systems.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

IS-STM 08-13-23 Public Comment 2

803.10.1, 803.10.5(New)

Proponent: Work Group 8

Further revise as follows:

SECTION 803
IMPACT TESTING

803.10.1 Perforation. Any perforation of the interior surface of the tested component of the storm shelter envelope by the design missile shall constitute a failure. For impact-protective systems, perforation ~~or deflection~~ that would result in impact of the protected component constitutes a failure.

803.10.5 Maximum Deflection. The maximum deflection under impact testing shall not result in perforation of the witness screen detailed in Sections 803.10.2 and 803.10.3. For *impact protective systems* that are intended for installation to the exterior of a protected component, impact deflection that would result in contact with the protected component constitutes a failure.

Reason: A requirement for deflection does not belong under the heading of “Perforation”, so it should be separated into a specific section. Additionally, the first sentence of the new 803.10.5 section clarifies a common understanding of the existing intent that perforation of the kraft paper witness screen for any reason constitutes a failure.

Committee Action for PC2: (Vote:)

Modification (if any):

Committee Reason:

Report for *08-13– 23*		
Committee decision: D	***Committee Vote at Meeting: 7-1-0***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any):		
Committee Reason: Further work is needed on this issue for a complete package		
BALLOT COMMENT 1- FIRST DRAFT: Proponent: Andrew Holstein		
Desired Action: Negative with comment		
Modification: **Further Modify as shown:** **SECTION 803** **IMPACT TESTING** **803.10.1 Perforation.** Any perforation of the interior surface of the tested component of the storm shelter envelope by the design missile shall constitute a failure. ~~For impact-protective systems, perforation or deflection that would result in impact of the protected component constitutes a failure.~~ **803.10.5 Maximum Deflection.** The maximum deflection under impact testing shall not result in perforation of the witness screen detailed in Sections 803.10.2 and 803.10.3. For *impact-protective systems* that are intended for installation to the exterior of a protected component, impact deflection that would result in contact with the protected component constitutes a failure.		
Reason: A requirement for deflection does not belong under the heading of “Perforation”, so it should be separated into a specific section. Additionally, the first sentence of the new 803.10.5 section clarifies a common understanding of the existing intent that perforation of the kraft paper witness screen for any reason constitutes a failure. After removing “or deflection” from the last sentence of 803.10.1, the remainder of the sentence is repetitive with the first sentence, but limited to impact-protective systems.		
PUBLIC COMMENT 2- FIRST DRAFT: Proponent: Work Group 8		
Desired Action: AFM		
Modification: Further revise as follows: *Staff note: Section number is what is shown in draft for clarity of revision location.* **SECTION 803** **IMPACT TESTING** **803.10.1 Perforation.** Any perforation of the interior surface of the tested component of the storm shelter envelope by the design missile shall constitute a failure. For impact-protective systems, perforation ~~or deflection~~ that would result in impact of the protected component constitutes a failure. **803.10.5 Maximum Deflection.** The maximum deflection under impact testing shall not result in perforation of the witness screen detailed in Sections 803.10.2 and 803.10.3. For *impact protective systems* that are intended for installation to the exterior of a protected component, impact deflection that would result in contact with the protected component constitutes a failure.		
Reason: A requirement for deflection does not belong under the heading of “Perforation”, so it should be separated into a specific section. Additionally, the first sentence of the new 803.10.5 section clarifies a common understanding of the existing intent that perforation of the kraft paper witness screen for any reason constitutes a failure.		

Report for *08-13– 23*		
PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 08-15-23

805.3.2

Proponent: Andrew Holstein, Ph.D., P.E., representing Intertek

Revise as follows:

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.3.2 Hurricane Shelters. Impact-protective systems for use in hurricane shelters shall be static pressure tested to a pressure of 1.2 times the design wind pressure or greater in accordance with ASTM E330 and subjected to cyclic pressure testing in accordance with ASTM E1886. Cyclic pressure testing shall follow the impact testing required in Section 803.

Exception: Cyclic pressure testing is not required for side-swinging door assemblies without glazing where such assemblies are static pressure tested to a pressure of 1.5 times the design wind pressure or greater in accordance with ASTM E330.

Reason: With the 2020 addition of rolling and sectional doors, the "door assemblies" referenced in the exception should be clarified. The exception was originally added at a time when "door assemblies" in the standard meant side-hinged door assemblies. Rolling or sectional door assemblies could be susceptible to fatigue-related failure and should be subjected to the standard cyclic pressure testing when use in hurricane shelters is desired.

Committee Action: Approval as submitted (Vote:12-0-0)

Modification (if any):

Committee Reason: The exception is only applicable to side swinging doors, not rolling or sectional doors.

IS-STM 08-15-23 Ballot Comment 1

804.3

Proponent: Dave Monsour, DASMA

Further revise as follows:

SECTION 804
STATIC AND CYCLIC PRESSURE TESTING

804.3 Cyclic pressure testing after impact. Test *specimens* requiring cyclic pressure testing shall be cyclic tested in accordance with ASTM E1886 using the loading sequence detailed in Table 1 of ASTM E1886 to the *design wind pressure.* The test *specimens* used shall be the same test specimens that received impact testing in accordance with Section

803. Cyclic pressure testing procedures shall be performed in accordance with the Air Pressure Cycling criteria as detailed in ASTM E1886.

Exception: The maximum allowable cycle time for specimens over 75 square feet (7 m^2) in area shall be permitted to be calculated using the following equation:
For *impact-protective systems* other than garage doors and rolling doors, ~~Maximum~~ maximum allowable cycle time in seconds = (area of specimen in sq. ft. – 75) × 0.06 + 3 or 10 seconds, whichever is less.
~~In no case shall the maximum cycle time exceed 10 seconds.~~
For garage doors and rolling doors, cycle time shall not exceed 20 seconds.

Reason: The proposed 20 second time limit for garage doors and rolling doors is from ANSI/DASMA 115. With this change, 804.3 will be in line with the requirements of ASCE 7-22, the 2023 Florida Building Code, and the 2021 IBC, all of which permit testing to ANSI/DASMA 115. NOTE: The change to 805.3.2 to stipulate “side-swinging” in the exception (IS-STM 08-15-23 AS) necessitated this proposal to revise the time allowance.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *08-15– 23*		
Committee decision: AS	***Committee Vote at Meeting: 12-0-0***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any):		
Committee Reason: The exception is only applicable to side swinging doors, not rolling or sectional doors.		
PUBLIC COMMENT 1- FIRST DRAFT: Proponent: Dave Monsour, DASMA		
Desired Action:		
Modification: Further modify as follows: **SECTION 804** **STATIC AND CYCLIC PRESSURE TESTING** **804.3 Cyclic pressure testing after impact**. Test *specimens* requiring cyclic pressure testing shall be cyclic tested in accordance with ASTM E1886 using the loading sequence detailed in Table 1 of ASTM E1886 to the *design wind pressure.* The test *specimens* used shall be the same test specimens that received impact testing in accordance with Section 803. Cyclic pressure testing procedures shall be performed in accordance with the Air Pressure Cycling criteria as detailed in ASTM E1886. **Exception**: The maximum allowable cycle time for specimens over 75 square feet (7 m^2) in area shall be permitted to be calculated using the following equation: For *impact-protective systems* other than garage doors and rolling doors, ~~Maximum~~ maximum allowable cycle time in seconds = (area of specimen in sq. ft. – 75) × 0.06 + 3 or 10 seconds, whichever is less. ~~In no case shall the maximum cycle time exceed 10 seconds.~~ For garage doors and rolling doors, cycle time shall not exceed 20 seconds.		
Reason: The proposed 20 second time limit for garage doors and rolling doors is from ANSI/DASMA 115. With this change, 804.3 will be in line with the requirements of ASCE 7-22, the 2023 Florida Building Code, and the 2021 IBC, all of which permit testing to ANSI/DASMA 115. NOTE: The change to 805.3.2 to stipulate “side-swinging” in the exception (IS-STM 08-15-23 AS) necessitated this proposal to revise the time allowance.		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		

Report for *08-15– 23*		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

IS-STM 08-16-23

805.4(New), 805.4.1(New), 805.4.2(New), 805.4.3(New)

Proponent: Andrew Holstein, Ph.D., P.E., representing Intertek

Revise as follows:

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.4 Pass or Fail. The pass or fail criteria for static or cyclic pressure testing shall be in accordance with Sections 805.4.1 through 805.4.3.

805.4.1 Loss of Pressure Resistance. Inability of the tested component to withstand the applied static or cyclic pressure for the required duration shall constitute a failure.

805.4.2 Permanent Deformation. Permanent deformation of an interior surface of the test specimen shall be determined by measuring the distance from a straight edge held between two undeformed points on the specimen. The maximum permanent deformation after static or cyclic loading shall be measured to the nearest 1/8 inch (3.2 mm) and shall not exceed 3 inches (76 mm).

805.4.3 Maximum Deflection. The maximum deflection under static pressure shall not exceed 5 inches.

Exception: Deflections in excess of 5 inches are permissible when the minimum setback distance determined through testing is clearly indicated in the certification listing and accommodated in the shelter design. Accommodation in the shelter design shall include either of the following:

1. Signage on the interior surface of the component indicating the safe setback distance as well as indication of the safe setback distance on the shelter floor and walls.
2. Other methods of indicating safe setback distance suitable to the shelter designer, shelter owner, and authority having jurisdiction.

Reason:

805.4 - No pass or fail criteria currently exist for static and cyclic pressure testing. Clear pass or fail criteria should be added to ensure uniform application of the standard across test laboratories.

805.4.1 - A loss of structural resistance to the applied loading signifies that the tested component can no longer protect shelter occupants. This should be considered a failure.

805.4.2 - The permanent deformation requirement for impact testing has been repeated here. If the standard deems 3 inches of permanent set to be unacceptable after impact testing, it stands to reason that this level of permanent set would be unacceptable after pressure testing as well.

805.4.3 - The maximum deflection under the applied pressure should not exceed the assumed safe set-back distance established by the placement of the kraft paper witness screen 5 inches from the interior

component surface during impact testing. An exception is provided for assemblies that do not meet this criteria, but the shelter designer must then consider this greater deflection and address it in their shelter design via signage and setback marking or another method acceptable to the building owner and AHJ. Deflection measurement is not addressed in ASTM E1886, so this requirement does not apply to cyclic pressure loading.

IS-STM 08-16-23 Modification

805.4(New), 805.4.1(New), 805.4.2(New), 805.4.3(New)

Proponent: Work Group 8

Further revise as follows:

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.4 Pass or Fail. The pass or fail criteria for static or cyclic pressure testing shall be in accordance with Sections 805.4.1 through 805.4.3.

805.4.1 ~~Loss of~~ Pressure Resistance. ~~Inability of the tested component to withstand the applied static or cyclic pressure for the required duration shall constitute a failure.~~ The test specimen shall sustain the applied static or cyclic pressure for the required duration.

805.4.2 Permanent Deformation. Permanent deformation of an interior surface of the test specimen shall be determined by measuring the distance from a straight edge held between two undeformed points on the specimen. The maximum permanent deformation after static or cyclic loading shall be measured to the nearest 1/8 inch (3.2 mm) and shall not exceed 3 inches (76 mm).

805.4.3 Maximum Deflection. The maximum deflection under static or cyclic design pressure shall not exceed 5 inches. For *impact protective systems* that are intended for installation to the exterior of a protected component, deflection that would result in contact with the protected component constitutes a failure.

~~Exceptions~~ Exception: Deflections in excess of 5 inches are permitted where the maximum deflection under design pressure is indicated in the certification listing. ~~Deflections in excess of 5 inches are permissible when the minimum setback distance determined through testing is clearly indicated in the certification listing and accommodated in the shelter design. Accommodation in the shelter design shall include either of the following:~~

1. ~~Signage on the interior surface of the component indicating the safe setback distance as well as indication of the safe setback distance on the shelter floor and walls.~~
2. ~~Other methods of indicating safe setback distance suitable to the shelter designer, shelter owner, and authority having jurisdiction.~~

Reason: 805.4.1 was changed to a positive statement.
805.4.3 – some overhead doors cannot meet the 5 inch deflection. A setback for safety would be indicated in the listing, and the items in the proposed exception could be utilized. However, this cannot be part of the testing of the sample. If desired, this a requirement for this could possibly be located in Chapter 7.

Committee Action: Approval as Modified (Vote:11-0-0) w/ electronic vote

Modification (if any):

Further revise as follows:

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.4 Pass or Fail. The pass or fail criteria for static or cyclic pressure testing shall be in accordance with Sections 805.4.1 through 805.4.3.

805.4.1 ~~Loss of~~ Pressure Resistance. ~~Inability of the tested component to withstand the applied static or cyclic pressure for the required duration shall constitute a failure.~~ The test specimen shall sustain the applied static or cyclic pressure for the required duration.

805.4.2 Permanent Deformation. Permanent deformation of an interior surface of the test specimen shall be determined by measuring the distance from a straight edge held between two undeformed points on the specimen. The maximum permanent deformation after static or cyclic loading shall be measured to the nearest 1/8 inch (3.2 mm) and shall not exceed 3 inches (76 mm).

805.4.3 Maximum Deflection. The maximum deflection under static or cyclic design pressure shall not exceed 5 inches. For *impact protective systems* that are intended for installation to the exterior of a protected component, deflection that would result in contact with the protected component constitutes a failure.

~~Exceptions~~ Exception: Deflections in excess of 5 inches are permitted where the maximum deflection under design pressure is indicated in the certification listing. ~~Deflections in excess of 5 inches are permissible when the minimum setback distance determined through testing is clearly indicated in the certification listing and accommodated in the shelter design. Accommodation in the shelter design shall include either of the following:~~

~~3. Signage on the interior surface of the component indicating the safe setback distance as well as indication of the safe setback distance on the shelter floor and walls.~~

~~Other methods of indicating safe setback distance suitable to the shelter designer, shelter owner, and authority having jurisdiction.~~

Committee Reason:
805.4.1 was changed to a positive statement.
805.4.3 – clarification of protection components and deflection criteria
Overall – the current text does not include pass fail criteria for static and cyclic structural testing. This would address that gap and work with 08-17-23.

IS-STM 08-16-23 Ballot Comment 1

804.3.1(New)

Proponent: Work Group 8

Further revise as follows:

SECTION 804
STATIC AND CYCLIC PRESSURE TESTING

804.3 Cyclic pressure testing after impact. …

804.3.1 Maximum Deflection Measurement. The maximum deflection of the test specimen shall be measured and recorded for each loading sequence during cyclic pressure testing. The deflection-measuring system shall comply with the requirements of Sections 6 and 9 of ASTM E330.

Reason: IS-STM 08-16-23 created a deflection-based pass/fail criteria for cyclic pressure testing (805.4.3) and IS-STM 08-17-23 created a maximum deflection reporting requirement for cyclic testing (805.5 #10). There is no requirement for making deflection measurements in ASTM E1886; therefore, reference to the standard methods of ASTM E1886 in Section 804 is insufficient and ICC 500 must contain both the requirement to take deflection measurements as well as the guidance on the tolerance and calibration of the measurement system.

Committee Action for BC1: (Vote:)

Modification (if any):
Committee Reason:

Report for *08-16– 23*		
Committee decision: AM	***Committee Vote at Meeting: 11-0-0***	***Committee Vote on Ballot:***

REPORT OF HEARING:
Modification (if any):
Further revise as follows:

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.4 Pass or Fail. The pass or fail criteria for static or cyclic pressure testing shall be in accordance with Sections 805.4.1 through 805.4.3.

805.4.1 ~~Loss of~~ Pressure Resistance. ~~Inability of the tested component to withstand the applied static or cyclic pressure for the required duration shall constitute a failure.~~ The test specimen shall sustain the applied static or cyclic pressure for the required duration.

Report for *08-16– 23*

805.4.2 Permanent Deformation. Permanent deformation of an interior surface of the test specimen shall be determined by measuring the distance from a straight edge held between two undeformed points on the specimen. The maximum permanent deformation after static or cyclic loading shall be measured to the nearest 1/8 inch (3.2 mm) and shall not exceed 3 inches (76 mm).

805.4.3 Maximum Deflection. The maximum deflection under static or cyclic design pressure shall not exceed 5 inches. For *impact protective systems* that are intended for installation to the exterior of a protected component, deflection that would result in contact with the protected component constitutes a failure.

~~**Exceptions**~~ **Exception:** Deflections in excess of 5 inches are permitted where the maximum deflection under design pressure is indicated in the certification listing.

~~Deflections in excess of 5 inches are permissible when the minimum setback distance determined through testing is clearly indicated in the certification listing and accommodated in the shelter design. Accommodation in the shelter design shall include either of the following:~~

~~4. Signage on the interior surface of the component indicating the safe setback distance as well as indication of the safe setback distance on the shelter floor and walls.~~

~~5. Other methods of indicating safe setback distance suitable to the shelter designer, shelter owner, and authority having jurisdiction.~~

Committee Reason: 805.4.1 was changed to a positive statement.
805.4.3 – clarification of protection components and deflection criteria
Overall – the current text does not include pass fail criteria for static and cyclic structural testing. This would address that gap and work with 08-17-23.

PUBLIC COMMENT 1- FIRST DRAFT:

Proponent: Work Group 8

Desired Action: AFM

Modification:
Further revise as follows:

SECTION 804
STATIC AND CYCLIC PRESSURE TESTING

804.3 Cyclic pressure testing after impact. …

804.3.1 Maximum Deflection Measurement. The maximum deflection of the test specimen shall be measured and recorded for each loading sequence during cyclic pressure testing. The deflection-measuring system shall comply with the requirements of Sections 6 and 9 of ASTM E330.

Reason: IS-STM 08-16-23 created a deflection-based pass/fail criteria for cyclic pressure testing (805.4.3) and IS-STM 08-17-23 created a maximum deflection reporting requirement for cyclic testing (805.5 #10). There is no requirement for making deflection measurements in ASTM E1886; therefore, reference to the standard methods of ASTM E1886 in Section 804 is insufficient and ICC 500 must contain both the requirement to take deflection measurements as well as the guidance on the tolerance and calibration of the measurement system.

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

REPORT OF HEARING – FIRST DRAFT

Modification (if any):

Committee Reason:

PUBLIC COMMENT- SECOND DRAFT:

Proponent:

Desired Action:

Modification:

Reason:

Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

FINAL ACTION:

Modification (if any):

Committee Reason:

IS-STM 08-17-23

805.5(New)

Proponent: Andrew Holstein, Ph.D., P.E., representing Intertek

Revise as follows:

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.5 Minimum Reporting Requirements. At a minimum, the test report shall include the following items:

1. The dates of testing and report issuance.
2. The names and addresses of the test sponsor and test laboratory.
3. The product name and model number.
4. A description of the tested specimens, including all parts and components, and the number of specimens tested.
5. Dimensioned drawings, verified by the test laboratory as representative of the tested assembly, including: section profiles; framing layout; type and spacing of anchorage; hardware make, model, and location; and any other pertinent construction details.
6. A description of the test chamber mounting, when used.
7. The ambient temperature at the time of testing.
8. When static pressure testing is conducted, a tabulation of applied pressure differences, their duration, and resulting deflection.
9. When cyclic pressure testing is conducted, a tabulation of the applied pressure differences, their average cycle times, and the number of cycles.
10. A statement of observations after testing including permanent deformation and details of any damage or other pertinent information.
11. A statement that testing was conducted in accordance with ICC 500, including the edition.
12. A statement of compliance or non-compliance with each of the requirements in Section 805.4.
13. Photos of the interior and exterior of the tested assembly, before and after testing.

Reason: Minimum reporting requirements are required in the standard to ensure consistency across test laboratories and to ensure that pertinent information is being reported to allow determination of compliance with standard requirements. Requirements in this section have been taken from ASTM E330, ASTM E1886, and other sections of ICC 500. Some additional requirements have been added to aid in the interpretation of assembly performance.

IS-STM 08-17-23 Modification

805.5(New)

Proponent: Work group 8

Further revise as follows:

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.5 Minimum Reporting Requirements. At a minimum, ~~the~~ ~~test report~~ reporting for static and cyclic pressure testing shall include the following items as applicable:

1. The dates of testing and report issuance.
2. The names and addresses of the test sponsor and test laboratory.
3. The product name and model number.
4. A description of the tested specimens, including all parts and components, and the number of specimens tested.
5. Dimensioned drawings, verified by the test laboratory as representative of the tested assembly, including: section profiles; framing layout; type and spacing of anchorage; hardware make, model, and location; and any other pertinent construction details.
6. A description of the test chamber mounting, ~~when~~ where used.
7. The ambient temperature at the time of testing.
8. When static pressure testing is conducted, a tabulation of applied pressure differences, their duration, and the maximum resulting deflection.
9. When cyclic pressure testing is conducted, a tabulation of the applied pressure differences, their average cycle times, ~~and~~ the number of cycles and the maximum resulting deflection.
10. A statement of observations after testing including permanent deformation and details of any damage or other pertinent information.
11. A statement that testing was conducted in accordance with ICC 500, including the edition.
12. A statement of compliance or non-compliance with each of the requirements in Section 805.4.
13. Photos of the interior and exterior of the tested assembly, before and after testing.

Reason: Adding ‘static and cyclic’ adds specificity. Not all items apply to all tested specimens, so ‘as applicable’ was added. ‘Where’ is better code language than ‘when’. ‘When’ is a function of time. The deflection discussed in the IS-STM 08-16-23 are addressed in Item 9.

Staff note: Item 12 is based on the approval of IS-STME 08-16-23.

Committee Action: Approval as Modified (Vote:1-0-0)w/ electronic vote

Modification (if any):

Further revise as follows:

SECTION 805
STATIC AND CYCLIC PRESSURE TESTING PROCEDURES

805.5 Minimum Reporting Requirements. At a minimum, ~~the~~ ~~test report~~ reporting for static and cyclic pressure testing shall include the following items as applicable:

1. The dates of testing and report issuance.
2. The names and addresses of the test sponsor and test laboratory.
3. The product name and model number.
4. A description of the tested specimens, including all parts and components, and the number of specimens tested.
5. Dimensioned drawings, verified by the test laboratory as representative of the tested assembly, including: section profiles; framing layout; type and spacing of anchorage; hardware make, model, and location; and any other pertinent construction details.
6. A description of the test chamber mounting, ~~when~~ where used.
7. The ambient temperature at the time of testing.
8. When static pressure testing is conducted, a tabulation of applied pressure differences, their duration, and the maximum resulting deflection.
9. When cyclic pressure testing is conducted, a tabulation of the applied pressure differences, their average cycle times, ~~and~~ the number of cycles and the maximum resulting deflection.
10. A statement of observations after testing including permanent deformation and details of any damage or other pertinent information.
11. A statement that testing was conducted in accordance with ICC 500, including the edition.
12. A statement of compliance or non-compliance with each of the requirements in Section 805.4.
13. Photos of the interior and exterior of the tested assembly, before and after testing.

Committee Reason: This coordinates with the new pass fail criteria in 08-16-23. Overall, the reporting requirements allow for data collection without an actual test report being required. The list will improve consistency between test labs.

IS-STM 08-17-23 Ballot Comment 1

106.1

Proponent: Work Group 8

Further revise as follows: See Public Comment to 08-16-23

Reason: IS-STM 08-16-23 created a deflection-based pass/fail criteria for cyclic pressure testing (805.4.3) and IS-STM 08-17-23 created a maximum deflection reporting requirement for cyclic testing

(805.5 #10). There is no requirement for making deflection measurements in ASTM E1886; therefore, reference to the standard methods of ASTM E1886 in Section 804 is insufficient and ICC 500 must contain both the requirement to take deflection measurements as well as the guidance on the tolerance and calibration of the measurement system.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *08-17– 23*		
Committee decision: AM	***Committee Vote at Meeting: 11-0-0***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any): **Further revise as follows:** **SECTION 805** **STATIC AND CYCLIC PRESSURE TESTING PROCEDURES** **805.5 Minimum Reporting Requirements.** At a minimum, ~~the~~ ~~test report~~ reporting for static and cyclic pressure testing shall include the following items as applicable: 1. The dates of testing and report issuance. 2. The names and addresses of the test sponsor and test laboratory. 3. The product name and model number. 4. A description of the tested specimens, including all parts and components, and the number of specimens tested. 5. Dimensioned drawings, verified by the test laboratory as representative of the tested assembly, including: section profiles; framing layout; type and spacing of anchorage; hardware make, model, and location; and any other pertinent construction details. 6. A description of the test chamber mounting, ~~when~~ where used. 7. The ambient temperature at the time of testing. 8. When static pressure testing is conducted, a tabulation of applied pressure differences, their duration, and the maximum resulting deflection. 9. When cyclic pressure testing is conducted, a tabulation of the applied pressure differences, their average cycle times, ~~and~~ the number of cycles and the maximum resulting deflection. 10. A statement of observations after testing including permanent deformation and details of any damage or other pertinent information. 11. A statement that testing was conducted in accordance with ICC 500, including the edition. 12. A statement of compliance or non-compliance with each of the requirements in Section 805.4. 13. Photos of the interior and exterior of the tested assembly, before and after testing.		
Committee Reason: This coordinates with the new pass fail criteria in 08-16-23. Overall, the reporting requirements allow for data collection without an actual test report being required. The list will improve consistency between test labs.		
PUBLIC COMMENT 1- FIRST DRAFT: Proponent: Work Group 8		
Desired Action: AFM		
Modification: See Public Comment to 08-16-23		
Reason: IS-STM 08-16-23 created a deflection-based pass/fail criteria for cyclic pressure testing (805.4.3) and IS-STM 08-17-23 created a maximum deflection reporting requirement for cyclic testing (805.5 #10). There is no requirement for making deflection measurements in ASTM E1886; therefore, reference to the standard methods of ASTM E1886 in Section 804 is insufficient and ICC 500 must contain both the requirement to take deflection measurements as well as the guidance on the tolerance and calibration of the measurement system.		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		

Report for *08-17– 23*
Committee Reason:

Chapter 9
REFERENCED STANDARDS

IS-STM 09-01-23
Chapter 9

Proponent: ICC 500 committee

Revise as follows:

ACI 318-19 Building Code Requirements for Structural Concrete
ACI 332-19 Residential Code Requirements for Structural Concrete

ASCE 7-~~16~~ 22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures ~~with Supplement No. 1~~
ASCE 24-14 Flood Resistant Design and Construction

ASTM C920—18 Standard Specification for Elastomeric Joint Sealants
ASTM E330/E330M—14 (2021) Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E1592—05 (Reapproved 2017) Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E1886—19 Standard Test Method for the Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials

DOC PS 20—20 American Softwood Lumber Standard

FM 4474—~~2011~~ 2020 American National Standard for Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures

ICC IBC—~~21~~ 24 International Building Code
ICC A117.1—~~17~~ 23 Accessible and Usable Buildings and Facilities
ICC IPC—~~21~~ 24 International Plumbing Code
ICC IRC—~~21~~ 24 International Residential Code

ISEA ANSI/ISEA Z308.1—2015 Minimum Requirements for Workplace First Aid Kits and Supplies

NFPA-10—~~18~~ 22 Portable Fire Extinguishers
NFPA-70—17 National Electrical Code

TMS 602—~~2016~~ 2022 Specification for Masonry Structures

UL1897—15 Standard for Safety for Uplift Tests for Roof Covering Systems -with revisions through September 2020

Reason: Update to coordinate with 2024 I-codes per ADM52-22

Committee Action: Approval as Submitted (Vote: 8-0-0)

Modification (if any):

Committee Reason: Coordination with the 2024 IBC.

IS-STM 09-01-23 Ballot Comment 1

106.1

Proponent: Gary Ehrlich

Further revise as follows:

NFPA-70—~~17~~23 National Electrical Code

Reason: The latest edition of NFPA 70 is 2023.

Committee Action for BC1: (Vote:)

Modification (if any):

Committee Reason:

Report for *09-01– 23*		
Committee decision: AS	***Committee Vote at Meeting: 8-0-0***	***Committee Vote on Ballot:***
REPORT OF HEARING: Modification (if any): Committee Reason: Coordination with the 2024 IBC.		
BALLOT COMMENT 1- FIRST DRAFT: Proponent: Gary Ehrlich		
Desired Action: **Negative with comment**		
Modification: **Further revise as follows:** NFPA-70—~~17~~23 National Electrical Code		
Reason: The latest edition of NFPA 70 is 2023.		
PUBLIC COMMENT- FIRST DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***

Report for *09-01– 23*		
REPORT OF HEARING – FIRST DRAFT		
Modification (if any):		
Committee Reason:		
PUBLIC COMMENT- SECOND DRAFT: Proponent:		
Desired Action:		
Modification:		
Reason:		
Committee decision: AS/AM/D	***Committee Vote at Meeting:***	***Committee Vote on Ballot:***
FINAL ACTION: Modification (if any):		
Committee Reason:		

Appendix
STORM SHELTER PREPAREDNESS AND EMERGENCY OPERATIONS PLAN (SSPEOP)