

BCAC Public Comment Proposals

June 9, 2021 Meeting

Proposals in this report for BCAC review –

- G201-21
- E55-21
- G196-21
- G198-21

G201-21

IBC: APPENDIX Q (New)

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2021 International Building Code

Add new text as follows:

APPENDIX Q TEMPORARY STRUCTURES AND USES TO SERVE EMERGENCIES

Q101 GENERAL

Q101.1 Scope. The provisions of this appendix shall apply to the use, construction, installation, alteration, relocation and location of emergency need based temporary structures and any service utilities or systems that serve such temporary structures.

Q101.1.1 Objectives. The objective of this Appendix is intended to provide flexibility to permit the use of innovative approaches and techniques to establish temporary structures and uses in a timely fashion while encountering unusual circumstances and maintain the level of safety intended by the code.

Q101.1.2 Temporary use. Temporary use during emergencies may exceed 180 days. Judgement shall be used by the code official to allow for temporary uses and conditions to continue for the duration of the emergency based on the needs of the emergency. The building official is authorized to grant extensions for demonstrated cause.

Q102 DEFINITIONS

Q102.1 Definitions. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

EMERGENCY. Any event declared by local, state, or federal entities that temporarily overwhelms response capabilities, and may require the suspension or modification of regulations, codes, or standards to facilitate response to such an event.

TEMPORARY STRUCTURES. That which is built, constructed or erected for a period of less than 180 days.

TEMPORARY USE. An activity or practice that is established at designated location for a period of less than 180 days. Uses include, but are not limited to, those functional designations listed within the occupancy group descriptions in Section 302.1 of this code.

Q103 SUBMITTAL DOCUMENTS

Q103.1 General. Submittal documents shall be of sufficient clarity to indicate the location, nature and extent of the work or use proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the code official.

Q104 CONFORMANCE

Q104.1 Conformance. Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this section as necessary to provide a reasonable level of safety, health and general welfare.

Q104.2 Changes over time. As an emergency evolves, and more resources become available, plans should be made to bring structures and temporary uses in line with the main body of the code.

Q105 PERMITS

Q105.1 Required permits. Temporary structures other than tents and other membrane structures that occupy an area greater than 120 square feet (11.16 m²), shall not be erected, operated or maintained for any purpose without obtaining a permit from the code official. Tents and membrane structures should be permitted in accordance with the International Fire Code.

Q106 GENERAL STANDARDS FOR EMERGENCY STRUCTURES

Q106.1 Scope. The provisions of Sections Q106.2 through Q106.7 shall apply to all structures constructed, erected or relocated during emergencies.

Q106.2 Intent. The intent of this section is to provide a base level of safety in a structure built or repurposed for emergency use.

Q106.3 Change of occupancy. Existing buildings used in a way that was not originally intended by occupancy class or use shall be allowed without formally changing the occupancy class. The previous occupancy class shall be restored upon the conclusion of the emergency.

Q106.4 Fire Safety Provisions. Determine fire safety requirements in accordance with Section Q106.4.1 through Q106.4.5 in order to make determinations of safe conditions rather than strict adherence to the provisions of International Fire Code.

Q106.4.1 Fire safety and evacuation plans. Fire Safety and evacuation plans shall be provided in accordance with Section 403 and 404 of the International Fire Code. Plans should be updated where there are any physical changes to the layout of the structure.

Q106.4.2 Training and practice drills. Training of staff and practice drills shall comply with Section 405 and 406 of the International Fire Code. Structures in place for longer than 30 days shall conduct evacuation drill in accordance with Section 405.3 of the International Fire Code based on the temporary use.

Q106.4.3 Fire Protection. An evaluation shall be performed to decide on fire protection needed utilizing NFPA 550.

Q106.4.4 Emergency Access. Emergency vehicle access roads shall be approved by the fire code official.

Q106.4.5 Fire Watch. A fire watch in accordance with Section 403.11.1 of the International Fire Code shall be permitted to be provided in lieu of other fire protection system.

Q106.5 Means of Egress. Means of Egress shall comply with Sections 1004, 1005, 1006, 1007, 1008 and 1010 of the International Building Code in addition to Sections Q106.5.1 through Q106.5.3.

Q106.5.1 Exit Discharge. Exits shall provide access to a public way, or to a safe dispersal area in accordance with 1028.5.

Q106.5.2 Means of Egress Lighting. The means of egress shall be illuminated when the space is occupied.

Exception: Sleeping areas.

Q106.5.3 Exit Signs. Exit signs shall be provided where the means of egress is not readily identifiable. Exit signs shall be permitted to be illuminated by the lighting provided in the structure.

Q106.6 Accessibility. A facility that is constructed to be accessible shall be maintained accessible during occupancy.

Q106.7 Temporary connection. The code official shall have the authority to authorize the temporary connection of the building or system to the utility, the source of energy, fuel, or power, or the water system or sewer system in accordance with Section 112. Water closets and lavatories shall be either permanent plumbing fixtures installed within the structure, or temporary water closets or lavatories, such as chemical toilets or other means approved by the code official.

Q106.7.1 Portable heating and cooling equipment. Portable heating and cooling equipment shall be used in accordance with their listing, and manufacturer's instructions.

Q107 Use Specific Standards

Q107.1 Increased occupant load. Temporary waivers for allowing for additional occupants in existing building shall comply with Section Q107.1.1 through Q107.1.3.

Q107.1.1 Authorization. The code official is authorized to allow for an increase in the number of occupants or a change of use in a building or portion of a building during an emergency.

Q107.1.2 Maintenance of the means of egress. The existing means of egress shall be maintained.

Q107.1.3 Sleeping areas. Where a space is used for sleeping purposes, the space shall be equipped with smoke alarms in accordance with Section 907.2.11 or be provided with a fire watch in accordance with Section 403.11.1 of the International Fire Code. Carbon monoxide detectors shall be installed in accordance with Section 915 where the structure uses any fossil fuel or wood burning appliances.

Q107.2 Temporary healthcare facilities. Temporary health care facilities shall comply with Section Q107.2.1 and Q107.2.2.

Q107.2.1 General. Temporary health care facilities shall be erected, maintained and operated to minimize the possibility of a fire emergency requiring the evacuation of occupants.

Q107.2.2 Membrane structures under projections. Membrane structures of less than 100 square feet (9.3 m²) may be placed under projections of a permanent building provided the permanent building is protected with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

Q107.3 Use of tiny houses or manufactured housing. Tiny houses or manufactured housing used for temporary housing shall comply with Section Q107.3.1 through Q107.3.5.

Q107.3.1 Fire separation distances. Tiny houses or manufactured housing shall be separated by not less than 5 feet (1524 mm) between structures.

Q107.3.2 Fire breaks. Tiny houses and manufactured housing shall not be located in groups of more than 20 units. Fire breaks of at least 20 feet (6096 mm) shall be provided between each group.

Q107.3.3 Smoke alarms. Tiny houses and manufactured housing used for sleeping purposes shall be equipped with a smoke alarm complying with Section 907.2.11. Smoke detectors are not required to be hard wired.

Q107.3.4 Carbon monoxide detectors. Carbon monoxide detectors shall be installed in accordance with Section 915, where the tiny house or manufactured housing uses any fossil fuel or wood burning appliances.

Q107.3.5 Structures located in a wildland urban interface zone. Tiny houses and manufactured housing that are located in a wildland urban interface area shall be provided with defensible space in accordance with the Section 603 of the International Wildland Urban Interface Code.

Q107.4 Tents and membrane structures used as sleeping accommodations. Tents or membrane structures used as sleeping accommodations shall comply with the same requirements as tiny homes in Section Q107.3.1 through Q107.3.5 and Chapter 31 of the International Fire Code.

Q107.5 Temporary emergency shelters during/after a natural disaster – wildfire, tornado, flood. Where emergency shelters are planned, the process of organizing, planning, implementing, and evaluating a program for mass evacuation, sheltering, and re-entry shall comply with NFPA 1660.

SECTION Q108 REFERENCED STANDARDS

Q108.1 General. See Table Q108.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix referenced in the standard.

TABLE Q108.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
<u>NFPA 550-2017</u>	<u>Guide to the Fire Safety Concepts Tree</u>	<u>Q106.5.3</u>
<u>NFPA 1660 - 2022</u>	<u>Standard on Community Risk Assessment, Pre-Incident Planning, Mass Evacuation, Sheltering, and Re-entry Programs.</u>	<u>Q107.5</u>

Reason: The purpose of the proposed Appendix is to provide regulatory options to users based on trends that don't fit squarely in the IBC. Code users are facing diverse challenges never encountered before. Examples include setting up medical facilities in gymnasiums, or in tents in a park or parking lot. With the wildfires in the Western United States, emergency temporary housing is needed for displaced residents, as well as First Responders from other areas who are providing assistance. The Appendix format allows for Jurisdictional adoption with or without amendments, creating solutions for these types of uses, providing the AHJ with wide flexibility while ensuring public health, safety and general welfare for the end users

There will be related proposals submitted in group B.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned

International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. These options mirror established ICC codes sections and standards.

Staff Analysis: A review of the standard proposed for inclusion in the code, NFPA 550-2017 and NFPA 1660-2022, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

G201-21

Committee Action: Disapproved

Committee Reason: The proposal was disapproved as the proposal has a lack of enforceable language. The proposal does not provide full guidance in an emergency. With extensive work, the topic has potential. (Vote: 9-5)

Hearing video: <https://www.cdpassess.com/videos/4103/>

G201-21 Public Comment

Red- from work group

Blue – notes for consideration

User notes:

- About this appendix: The primary purpose for Appendix Q is to provide guidance for designers, engineers, architects, fire and building code officials, plans reviewers and inspectors to establish temporary emergency uses of existing building or temporary structures with respect to contemporary code minimums. The intent of this appendix is to not become code language. Rather, it should serve as that template or checklist for use during a time of urgency. A template to assure a path forward that references the relevant code concerns.

APPENDIX Q

TEMPORARY EMERGENCY STRUCTURES AND EMERGENCY USES **TO SERVE EMERGENCIES**

SECTION Q101 GENERAL

Q101.1 Scope. The provisions of this appendix shall apply to the use, construction, installation, alteration, relocation and location of *emergency need based temporary structures* and any service utilities or systems that serve such *temporary structures*.

Q101.1.1 Objectives. The objective of this Appendix is intended to provide flexibility to permit the use of innovative approaches and techniques to establish *temporary structures* and *uses* in a timely fashion while encountering unusual circumstances and maintain the level of safety intended by the code.

Q101.1.2 Temporary use. Where *temporary uses* during emergencies **may** exceed 180 days, Judgement shall be used by the code official to allow for *temporary uses* and conditions to continue for the duration of the *emergency* based on the needs of the *emergency*. The building official is authorized to grant extensions for demonstrated cause.

*(ASCE and AIA recommended consideration of seasonal changes in roof live loads as part of consideration for an extension. This is addressed in Q104.1 for tents and membrane structures. Not applicable to existing buildings.
Jon Sui said 2nd sentence is commentary and should be removed.)*

SECTION Q102 DEFINITIONS

Q102.1 Definitions. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

EMERGENCY. Any event declared by local, state, or federal entities that temporarily overwhelms response capabilities, and ~~shall that~~ require the suspension or modification of regulations, codes, or standards to facilitate response to such an event.

*(David Bonowitz – emergency rules should extend from the declaration; get rid of commentary)
Against – the purpose of this proposal is when this exceeds what is planned.*

TEMPORARY STRUCTURES. That which is built, constructed or erected for a period of less than 180 days.

TEMPORARY USE. An activity or practice that is established at designated location for a period of less than 180 days. Uses include, but are not limited to, those functional designations listed within the occupancy group descriptions in Section 302.1 of this code.

SECTION 103 SUBMITTAL DOCUMENTS

Q103.1 General. Submittal documents shall be of sufficient clarity to indicate the location, nature and extent of the work or use proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the code official.

SECTION 104 CONFORMANCE

Q104.1 Conformance. *Temporary use* ~~of existing buildings and temporary structures and uses~~ shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this ~~section code~~ as necessary to provide a reasonable level of safety, health and general welfare. Tents and other membrane structures shall comply with Section 3102 and 3103.

Q104.2 Changes over time. As an emergency evolves, ~~and more resources become available,~~ plans shall be made to bring ~~structures and temporary uses~~ in line compliance with the main body requirements of the code.

(recommended removal blue language – commentary and not always applicable)

SECTION P105 PERMITS.

Q105.1 Required permits. *Temporary structures* other than tents and other membrane structures that occupy an area greater than 120 square feet (11.16 m²), shall not be erected, operated or maintained for any purpose without obtaining a permit from the code official. Tents and membrane structures shall be permitted in accordance with the *International Fire Code*.

SECTION 106 GENERAL STANDARDS FOR EMERGENCY STRUCTURES

Q106.1 Scope. The provisions of Sections 106.2 through 106.7 shall apply to all ~~existing structure being repurposed or temporary~~ structures constructed, erected or relocated ~~during to support needs for a response to emergencies.~~

Q106.2 Intent. The intent of this section is to provide a base level of safety in a structure built or repurposed for *emergency* use.

Q106.3 Change of occupancy. Existing buildings used in a way that was not originally intended by occupancy class or use shall be allowed without formally changing the occupancy class. The previous occupancy class shall be restored upon the conclusion of the *emergency*. Where the temporary live load of the floor is more than that required by Section 1607 for the original use, the area designated for the temporary live load shall be posted with placards for the approved live load.

Q106.4 Fire Safety Provisions. Determine fire safety requirements in accordance with Section Q106.4.1 through Q106.4.5 in order to make determinations of safe conditions rather than strict adherence to the provisions of *International Fire Code*.

Q106.4.1 Fire safety and evacuation plans. Fire safety and evacuation plans shall be provided in accordance with Section 403 and 404 of the *International Fire Code*. Plans shall be updated where there are any physical changes to the layout of the structure.

Q106.4.2 Training and practice drills. Training of staff and practice drills shall comply with Section 405 and 406 of the IFC. Structures in place for longer than 30 days shall conduct evacuation drill in accordance with Section 405.3 of the *International Fire Code* based on the temporary use.

Q106.4.3 Fire Protection. An evaluation shall be performed to decide on fire protection needed utilizing NFPA 550.
(Jeff Hugo – NFPA 550 is a guide)

Q106.4.4 Emergency Access. Emergency vehicle access roads shall be approved by the fire code official.

Q106.4.5 Fire Watch. A fire watch in accordance with IFC Section 403.11.1 shall be permitted to be provided in lieu of other fire protection system.

Q106.5 Means of Egress. Means of egress shall comply with Sections 1004, 1005, 1006, 1007, 1008 and 1010 in addition to Sections Q106.5.1 through Q106.5.3.

Q106.5.1 Exit Discharge. Exits shall provide access to a public way, or to a safe dispersal area in accordance with 1028.5.

Q106.5.2 Means of Egress Lighting. The means of egress shall be illuminated when the space is occupied.

Exception: Sleeping areas.

Q106.5.3 Exit Signs. Exit signs shall be provided where the means of egress is not readily identifiable. Exit signs shall be permitted to be illuminated by the lighting provided in the structure.

Q106.6 Accessibility. A facility that is constructed to be accessible shall be maintained accessible during occupancy.

Q106.7 Temporary connection. The *code official* shall have the authority to authorize the temporary connection of the building or system to the utility, the source of energy, fuel, or power, or the water system or sewer system in accordance with Section 112. Water closets and lavatories shall be either permanent plumbing fixtures installed within the structure, or temporary water closets or lavatories, such as chemical toilets or other means, approved by the code official.

Q106.7.1 Portable heating and cooling equipment. Portable heating and cooling equipment shall be used in accordance with their listing, and manufacturer's instructions.

SECTION Q107 Use Specific Standards

Q107.1 Increased occupant load. ~~Temporary waivers for~~ allowing for additional occupants in existing building shall comply with Section Q107.1.1 through Q107.1.3.

Q107.1.1 Authorization. The code official is authorized to allow for an increase in the number of occupants or a change of use in a building or portion of a building during an *emergency*.

Q107.1.2 Maintenance of the means of egress. The existing a means of egress shall be maintained.

Q107.1.3 Sleeping areas. Where a space is used for sleeping purposes, the space shall be equipped with smoke alarms in accordance with Section 907.2.11 or be provided with a fire watch in accordance with Section 403.11.1 of the IFC. Carbon monoxide detectors shall be installed in accordance with Section 915 where the structure uses any fossil fuel or wood burning appliances.

Q107.2 Temporary healthcare facilities. Temporary health care facilities shall comply with Section Q107.2.1 and Q107.2.2.

Q107.2.1 General. Temporary health care facilities shall be erected, maintained and operated to minimize the possibility of a fire *emergency* requiring the evacuation of occupants.

Q107.2.2 Membrane structures under projections. Membrane structures of less than 100 square feet (9.3 m²) shall be placed under projections of a permanent building provided the permanent building is protected with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

Q107.3 Use of tiny houses or manufactured housing homes. Tiny houses or manufactured housing homes used for temporary housing for facilities such as alternate care facilities, *emergency* responders or homeless shelters shall comply with Section Q107.3.1 through Q107.3.5.
(FEMA requirements would apply to the structure itself – reference structural compliance?)

Q107.3.1 Fire separation distances. Tiny houses or manufactured housing homes shall be separated by not less than 5 feet between structures.

Q107.3.2 Fire breaks. Tiny houses and manufactured housing homes shall not be located in groups of more than 20 units. Fire breaks of at least 20 feet shall be provided between each group.

Q107.3.3 Smoke alarms. Tiny houses and manufactured housing homes used for sleeping purposes shall be equipped with a smoke alarm complying with Section 907.2.10. Smoke detectors are not required to be hard wired.

Q107.3.4 Carbon monoxide detectors. Carbon monoxide detectors shall be installed in accordance with Section 915, where the tiny house or manufactured housing homes uses any fossil fuel or wood burning appliances.

Q107.3.5 Structures located in a wildland urban interface zone. Tiny houses and manufactured housing homes that are located in a wildland urban interface area shall be provided with defensible space in accordance with the Section 603 of the *International Wildland Urban Interface Code*.

Q107.4 Tents and membrane structures used as sleeping accommodations. Tents or membrane structures used as sleeping accommodations shall comply with the same requirements as tiny ~~homes~~ houses in Section Q107.3.1 through Q107.3.5 and Chapter 31 of the *International Fire Code*.

~~**Q107.5 Temporary emergency shelters during/after a natural disaster – wildfire, tornado, flood.** Where emergency shelters are planned, the process of organizing, planning, implementing, and evaluating a program for mass evacuation, sheltering, and re-entry shall comply with NFPA 1660. (David Bonowitz – this is done before hand and should not be part of this appendix)~~

**SECTION Q108
REFERENCED STANDARDS**

Q108.1 General. See Table Q108.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix referenced in the standard.

**TABLE Q108.1
REFERENCED STANDARDS**

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
NFPA 550-2017	Guide to the Fire Safety Concepts Tree	Q106.5.3
NFPA 1660 – 2022	Standard on Community Risk Assessment, Pre-Incident Planning, Mass Evacuation, Sheltering, and Re-entry Programs.	Q107.5

Reason: This Appendix is a guidance document for emergencies that exceed pre-planned emergency responses.

The following revisions were incorporated based on the input received during the hearing:

- Q104.1 was modified to mirror Section 3103.1. This is already permitted by the code.
- Q104.1 was modified to clarify that tents and other membrane structures are required to comply with Section 3102 and 3103. These sections also incorporate Chapter 16.
- Additional load requirement were added to Q106.3 from the IEBC in addition to the changes to Q104.1
- A floor modification proposed, but it is addressed better in modifications.
- The structural questions were related to flood, hurricanes and earthquake design for structures, the use of which would change in the aftermath of an emergency (i.e., hospital care in hotels, tents and convention centers during emergencies etc) for a short period of time. (already addressed in existing buildings, that is the disaster that just happened) The priority is to provide a reasonable level of safety in these non-typical buildings.
- These are not pre-planned emergency response structures. This appendix is for the emergencies unique situations similar to those encountered in 2020 The structural concerns are addressed by the permit requirements in Q105 and the extended time as the immediate emergencies wind down/there is time to look at other options.
- With regard to non-mandatory code language – this is a guidance appendix for emergencies that are past any anticipated situations.
- Q107.5 and NFPA 1660 have been removed as they apply to previously anticipated emergencies.
- Section Q106.1 was clarified and with sections Q101.1 and Q106.2 indicate that these provisions apply to uses established and construction to support needs for a response to emergencies.

Notes for reason:

Support – this is guidance for emergencies that exceed pre-planned emergency responses.

3103.1.1 has the same language for safety for temporary structures as found in Q104.1 – this is already permitted by the code.

Several concerns from structural folks (almost all of opposition)–

- Live load changes over 180 days/seasonal changes – only applicable to tents and membrane structures – addressed in Q104.1
- No load information provided – revised in Q104.1 and Q106.3
- There was a floor modification proposed, but it is addressed better in modifications.
- The structural questions were related to flood, hurricanes, earthquake design for structures (already addressed in existing buildings, that is the disaster that just happened)– but proponents were in opposition to allow for reasonable timeframe/urgency/immediate need; Chapter 16 changes are not yet known; priority is to provide a reasonable level of safety in non-typical buildings (i.e., hospital care in hotels, tents and convention centers during emergencies) for a short period of time.
- They kept talking about pre-planned emergency response structures (Adhoc committee planning structural proposals for Group B changes). This appendix is for past those emergencies. The structural concerns are addressed by the permit requirements in Q105 and the extended time as the immediate emergencies wind down/there is time to look at other options.

Non-mandatory code language – this is a guidance appendix for emergencies that are past any anticipated. Emergency plans for county emergency responses will have already reviewed these criteria. (remove Q107.4 and NFPA 1660)

Saying that these provisions apply to all construction during an emergency, not just the emergency response construction – already addressed in Q101.1 and Q106.2 and added in Q106.1.

E55-21

IBC: SECTION 202 (New), 1010.2.15 (New) [IFC:[BE] SECTION 202 (New), 1010.2.15 (New)]

Proponents: Mike Nugent, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2021 International Building Code

Add new definition as follows:

CONTROL VESTIBULE. A space with doors in series such that when one door is open the other door is interlocked and cannot be opened.

Add new text as follows:

1010.2.15Control vestibule. Control vestibules shall be permitted for security, clinical needs or environmental control in Groups F, H-5, and S and in Groups B, I-1, I-2, and M where the occupant load of the room or space served by the control vestibule is less than 50. Where doors in the means of egress are configured as a control vestibule, the control vestibule door locking system shall provide for egress. The control vestibule shall comply with all of the following:

1. On the egress side of each door of the control vestibule, an approved override shall be provided which deactivates the interlock of the door when that door is interlocked. Signage shall be provided with instructions on the use of the override.
2. Where an automatic sprinkler system or automatic fire detection system is provided, upon activation of such system the interlock function of the door locking system of the control vestibule shall deactivate.
3. Upon loss of power to the interlock function of the doors, the interlock function of the door locking system of the control vestibule shall deactivate.
4. The egress path from any point shall not pass through more than one control vestibule.
5. The control vestibule door interlocking system units shall be listed in accordance with UL 294.

Reason:

This proposal includes a definition for “control vestibule” and offers detailed requirements for control vestibules. This vestibule system controls egress temporarily. One door must be closed for the other to open.

Control vestibules – which have doors in series which are interlocked – are being incorporated in the means of egress in a variety of occupancies. The IBC is currently silent regarding requirements and guidance for control vestibules. This proposal offers requirements (guidance) for control vestibules in the means of egress.

The significant difference between typical doors in series in the means of egress (i.e. one after the other) and doors in the means of egress configured as a control vestibule is the doors of a control vestibule are interlocked such that when one door of a control vestibule is open, the other door in series in the control vestibule is temporarily locked; and conversely, in the means of egress when all doors of a control vestibule are closed, any door may be opened.

Control vestibules are most commonly configured as a space with two doors in series. But, some control vestibules are configured with more than one inner door and / or more than one outer door. For example, where a control vestibule is required to help keep clean rooms clean, there may be inner doors from three different clean rooms opening into the control vestibule, and one outer door for leaving the control vestibule in the direction of egress.

It should be noted that control vestibules on the access (ingress) side of doors controlling access into a building or into a space within a building are more common than control vestibules on the egress side of doors controlling egress from a space or from a building. Requirements for access-side control vestibules is outside the scope of the IBC. Thus access-side control vestibules are not regulated or prohibited by the IBC provided all requirements for egress are complied with. This proposal addresses control vestibules in the means of egress addressing egress-side requirements.

Also, it should be noted that control vestibules may be “stacked” or combined with any of the other “shall be permitted” electrical locking arrangements of the IBC (2021 IBC sections 1010.2.11 through 1010.2.14). For example, assume both doors in the (air lock) control vestibule from an electronics manufacturing clean room are equipped with sensor release of electrically locked egress doors (IBC Section 1010.2.12) to allow no-touch exiting from the clean room through the (air-lock) control vestibule. The electrical locks on the two doors of the (air lock) control vestibule would be interlocked such that only one door is able to be open at a time. In the event of fire in the clean room, Item 2 requires the interlock function of the control vestibule to be deactivated, facilitating egress through the control vestibule with both doors open at the same time.

The proposed requirements for control vestibules are for these reasons:

Control vestibules are recommended to be permitted in the listed occupancy groups: Group B for banks and laboratories. Group F for factories. Group H for operations where contamination or atmospheric control is vital. Groups I-1 and I-2 to facilitate patient care and patient security. Group M for sales rooms for jewelry, gems, drugs, and similar highly valuable items. Group S for storage of valuables.

This proposal has no limits on occupant loads for a factory – access to factories is limited to employees, or visitors escorted by employees. Similar situation for H-5. And for storage, especially large storage areas, the calculated occupant load may be significant although the actual quantity of occupants is typically limited (i.e. employees). The other Groups – the proposed less than 50 occupant load is to be consistent with requirements for panic hardware on doors in the means of egress (occupant loads of 50 or more require panic hardware).

Control vestibules must provide for egress – which is a requirement in the charging language.

The last sentence in the charging language provides needed flexibility. For example, where casinos count money, accepted industry practices may not incorporate all of the requirements of Items 1 through 5 but may incorporate significant other security and safety provisions.

Item 1: A requirement to address the potential situation where one of the doors on the control vestibule is held open (example: a person holds the outer doorway open and other occupants need to be able to egress through the control vestibule in an emergency situation). This item requires, on the egress side of each door of the control vestibule, installation of an approved override which deactivates the interlock on that door. It is common the activation of an override would set off an alarm, and / or the activation of an override without a valid reason results in disciplinary action (i.e. employee gets fired). This item also requires signage with instruction on how to use the override.

Items 2 and 3: Requires the interlock function to be disabled in the event of fire, actuation of the fire detection system, or power loss to the interlock system renders the control vestibule equivalent to two doors in the means of egress allowing unobstructed egress.

Item 4: Requires that egressing through the control vestibule involves no more than two doors. While not common, there are situations where more than one control vestibule may be needed in the means of egress.

Item 5: Requires the units of the control vestibule locking system to be listed in accordance with UL 294, the same standard required for units for other electrical locking system units.

Together, the definition and proposed requirements provide for egress and emergency egress where control vestibules are installed.

Note: a control vestibule is different than a sallyport, which is defined in the IBC and permitted in Group I-3 occupancies. Group I-3 includes correction centers, detention centers, jails, prisons, and similar uses. A sallyport is a security vestibule which prevents unobstructed passage. A control vestibule is intended to allow unobstructed passage, but prevents more than one door of doors in series to be open at the same time.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC.

Cost Impact:

The code change proposal will increase the cost of construction. Control vestibules are currently not addressed in the code. Where control vestibules are constructed, these requirements may include some locking requirements and interconnectedness currently not incorporated into some control vestibules.

E55-21

Committee Action: Disapproved

Committee Reason: This proposal was disapproved. The intent is good and is needed but there were still several questions. What is the maximum size of the vestibule? Is self closing needed on the doors for the exiting? What is the duration of the over ride? Would this be a hazard if used for areas with large occupant loads? (Vote: 13-1)

Hearing video: <https://www.cdpassess.com/videos/4348/>

E55-21 Public Comment

Further revise as follows:

CONTROL VESTIBULE. A space with doors in series such that when one door is open the other door is interlocked and cannot be opened.

Revise further as follows:

1010.2.15 Control vestibule. Control vestibules shall be permitted for security, clinical needs or environmental control in Groups F, H-5, and S₁ and in Groups ~~B, I-1, and I-2, and M~~ where the occupant load of the room or space served by the control vestibule is less than 50, and in Groups B and M where the occupant load of the room or space served by the control vestibule is 10 or less. Where doors in the means of egress are configured as a control vestibule, the control vestibule door locking system shall provide for egress. The control vestibule shall comply with all of the following:

1. On the egress side of each door of the control vestibule, an approved override shall be provided which deactivates the interlock of the door when that door is interlocked. Signage shall be provided with instructions on the use of the override.

Exception: Where approved by the building official, overrides are not required where the control vestibule is designed for security reasons to impede occupant egress.

2. Where an automatic sprinkler system or automatic ~~fire~~ smoke detection system is provided, upon activation of such system the interlock function of the ~~door doors locking system~~ of the control vestibule shall deactivate.

3. Upon loss of power to the interlock function of the doors, the interlock function of the door locking system of the control vestibule shall deactivate.

4. The egress path from any point shall not pass through more than one control vestibule.

5. The control vestibule door interlocking system units shall be listed in accordance with UL 294.

Reason:

Questions and discussion during CAH:

1. Vestibules – questions as to minimum size, maximum size, adequate space between doors for wheelchairs (maneuvering clearances).
2. Occupant loads in public occupancies: concerns that occupant load up to 50 is too high for public occupancies (B and M from the list).
3. Concerns with requiring an approved override (for the interlock function) on the egress side of each door of the control vestibule.
 - If the control vestibule is used where security is important and occupant egress may need to be impeded (expensive jewelry stores, drugs dispensing, or money counting, etc.) perhaps interlock overrides should not be provided.
4. Questions re: specifics of override switch, location, type, who has control over it.
5. Question as to what deactivate means (in deactivate the interlock).
6. Door operations questions: require door closers on doors, no specifics as to minimum or maximum duration the override switch deactivates the interlock function, door locks fail-safe or fail-secure.
7. Concern that buildings w/o fire sprinkler system or smoke detection system could be quite large, and control vestibules would be permitted in all the MOEs.

Note: split public comment so that exception is separate; John to write reasons – bring back for future meeting

G196-21

IBC: 3115.3, 3115.3.2 (New), FIGURE 3115.3.2 (New), 3115.8, 3115.8.1, 3115.8.1.1, 3115.8.2, 3115.8.3, 3115.8.3.4 (New), FIGURE 3115.8.3.4 (New), 3115.8.3.4.1 (New), 3115.8.3.4.2 (New), 3115.8.4.1, 3115.8.4.2, 3115.8.4.3, 3115.8.3.4.1 (New), 3115.8.3.4.2, 3115.8.5, 3115.8.5.1, 3115.8.5.2, 3115.8.5.3, TABLE 3115.8.5.3, ISO Chapter 35

Proponents: John-Jozef Proczka, representing self (john-jozef.proczka@phoenix.gov)

2021 International Building Code

Add new text as follows:

3115.3 Intermodal shipping container physical identification. *Intermodal shipping containers* shall have the physical markings and data plate required by Sections 3115.3.1 and 3115.3.2 and verified by an approved agency. A report of the verification process and findings shall be provided to the building owner and building official.

Where approved by the building official, the markings and existing data plate are permitted to be removed from the intermodal shipping containers before they are repurposed for use as buildings or structures or as a part of buildings or structures.

~~**3115.3 3115.3.1 Intermodal shipping container information data plate.** *Intermodal shipping containers* shall bear an existing plate labelled as "CSC SAFETY APPROVAL" in English or French containing the following information. as required by ISO 6346-CSC and verified by an approved agency. A report of the verification process and findings shall be provided to the building owner.~~

- ~~1. Manufacturer's name or identification number. Abbreviated country of approval, abbreviated approval agency, and approval agency reference number.~~
2. Date manufactured.
- ~~3. Safety approval number.~~
- ~~4.3. Manufacturer's Identification number.~~
- ~~5.4. Maximum operating gross mass or weight (kg) (lbs).~~
- ~~6.5. Allowable stacking load for 1.8G (kg) (lbs).~~
- ~~7.6. Transverse racking test force (Newtons).~~
- ~~8.7. Valid Required maintenance examination date.~~

~~Where approved by the building official, the markings and existing data plate are permitted to be removed from the intermodal shipping containers before they are repurposed for use as buildings or structures or as a part of buildings or structures.~~

3115.3.2 Intermodal shipping container markings. *Intermodal shipping containers* shall have markings, separate from the data plate, containing the following information. Refer to Figure 3115.3.2 for an example layout of the markings.

1. An owner code consisting of three letters.
2. An equipment category identifier that shall be the letter U. This equipment category identifier is grouped with and immediately follows the owner code.
3. A six digit serial number.
4. A check digit in a box.

5. A two digit size code.
6. A type code of two letters. The first letter shall be G, V, U, B, or S. This type code is grouped with and immediately follows the size code.
7. Maximum gross mass (kgs) (lbs).
8. Tare mass (kgs) (lbs).

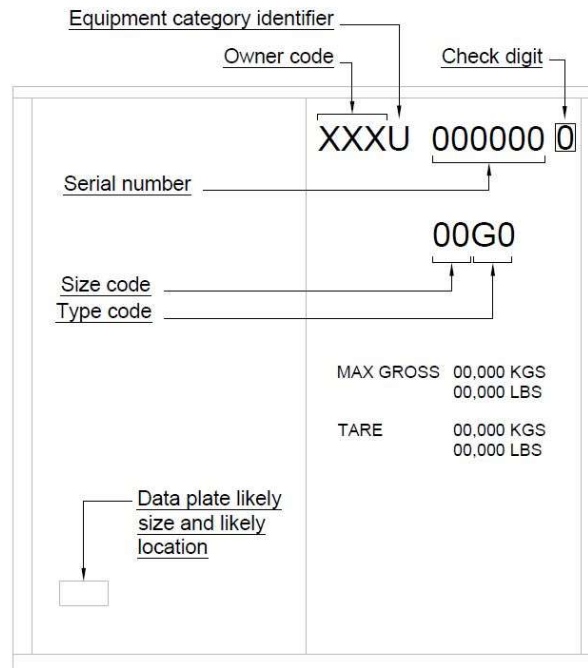


FIGURE 3115.3.2 MARKING IDENTIFICATION AND LIKELY LAYOUT

3115.4 Protection against decay and termites. Wood structural floors of *intermodal shipping containers* shall be protected from decay and termites in accordance with the applicable provisions of Section 2304.12.1.1.

3115.5 Under-floor ventilation. The space between the bottom of the floor joists and the earth under any *intermodal shipping container*, except spaces occupied by basements and cellars, shall be provided with ventilation in accordance with Section 1202.4.

3115.6 Roof assemblies. *Intermodal shipping container* roof assemblies shall comply with the applicable requirements of Chapter 15.

Exception: Single-unit, stand-alone intermodal shipping containers not attached to, or stacked vertically over, other intermodal shipping containers, buildings or structures.

3115.7 Joints and voids. Joints and voids that create concealed spaces between connected or stacked *intermodal shipping containers* at fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved *fire-resistant joint system* in accordance with Section 715.

3115.8 Structural. Intermodal shipping containers that conform to international standards that test certain structural properties of the containers ISO 1496-1, as identified by the required markings in Section 3115.3.2, and are repurposed for use as buildings or structures, or as a part of buildings or

structures, shall be designed in accordance with Chapter 16, ~~and the material specific chapters, and~~ except for the provisions specifically stated in Section 3115.8.1 through 3115.8.4.3 this section.

3115.8.1 Foundations and stacking. *Intermodal shipping containers* repurposed for use as a permanent building or structure shall be supported on foundations, ~~other intermodal shipping containers,~~ or other supporting structures designed and constructed in accordance with Chapters 16 through 23.

3115.8.1.1 Anchorage. *Intermodal shipping containers* shall be anchored to foundations or other supporting structures as necessary to provide a continuous load path for all applicable design and environmental *loads* in accordance with Chapter 16.

3115.8.2 Welds. ~~New welds and connections shall be equal to or greater than the original connections.~~

3115.8.3 3115.8.2 Structural design. The structural design for the *intermodal shipping containers* repurposed for use as a building or structure, or as part of a building or structure, shall comply with Section ~~3115.8.4 3115.8.3~~ or ~~3115.8.5 3115.8.4.~~

3115.8.4 3115.8.3 Detailed design procedure. A structural analysis meeting the requirements of Chapter 16, ~~the applicable material chapters, and Section 3115.8.3.1 through 3115.8.3.4.2 this~~ section shall be provided to the *building official* to demonstrate the structural adequacy of the intermodal shipping containers.

Exception: Intermodal shipping containers designed in accordance with Section ~~3115.8.4 3115.8.5.~~

3115.8.4.1 3115.8.3.1 Steel Material properties. Structural material properties for existing *intermodal shipping container* steel components shall be established by Section 2202, ~~material testing where the steel grade and composition cannot be identified by the manufacturer's designation as to manufacture and mill test.~~

3115.8.4.2 3115.8.3.2 Seismic design parameters. The seismic force-resisting system shall be designed and detailed in accordance with one of the following:

1. Where all or portions of the ~~corrugated~~ profiled steel panel container sides are considered to be the vertical seismic force-resisting system, design and detailing shall be in accordance with AISI S100 ~~the and~~ ASCE 7, Table 12.2-1 requirements for ~~light frame bearing wall systems with shear panels of all other materials.~~ steel systems not specifically detailed for for seismic resistance, excluding cantilever column systems.
2. Where portions of the ~~corrugated~~ profiled steel panel container sides are retained, but are not considered to be the vertical seismic force-resisting system, an independent seismic force-resisting system shall be selected, designed and detailed in accordance with ASCE 7, Table 12.2-1.
3. Where portions of the ~~corrugated~~ profiled steel panel container sides are retained and integrated into a vertical seismic force-resisting system other than as permitted by Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.11 and ASCE 7, Section 12.2.1.1 or 12.2.1.2.

3115.8.4.3 3115.8.3.3 Allowable shear value. The allowable shear values for the *intermodal shipping container* ~~corrugated~~ profiled steel sheet panel side walls and end walls shall be demonstrated by testing and analysis accordance with Section 104.11. Where penetrations are made in the side walls or end walls designated as part of the lateral force-resisting system, the penetrations shall be substantiated by rational analysis.

Exceptions: The allowable shear values shall be obtained from Section 3115.8.4.3 where the seismic design category is A, and the following two items are met:

1. The *intermodal shipping container* top and bottom rails, corner fittings, and columns or any portion thereof are not notched, cut, or removed in any manner.
2. The *intermodal shipping container* is erected in a level and horizontal position with the floor located at the bottom.

3115.8.3.4 Tested structural components. Where they are not altered, the structural components identified in Section 3115.8.3.4.1 and 3115.8.3.4.2 can be used with the load combinations of Section 1605.3 based on the testing performed during the *intermodal shipping container* certification process. This certification shall have been verified by the data plate and markings in Section 3115.3. The components names are labeled in Figure 3115.8.3.4.

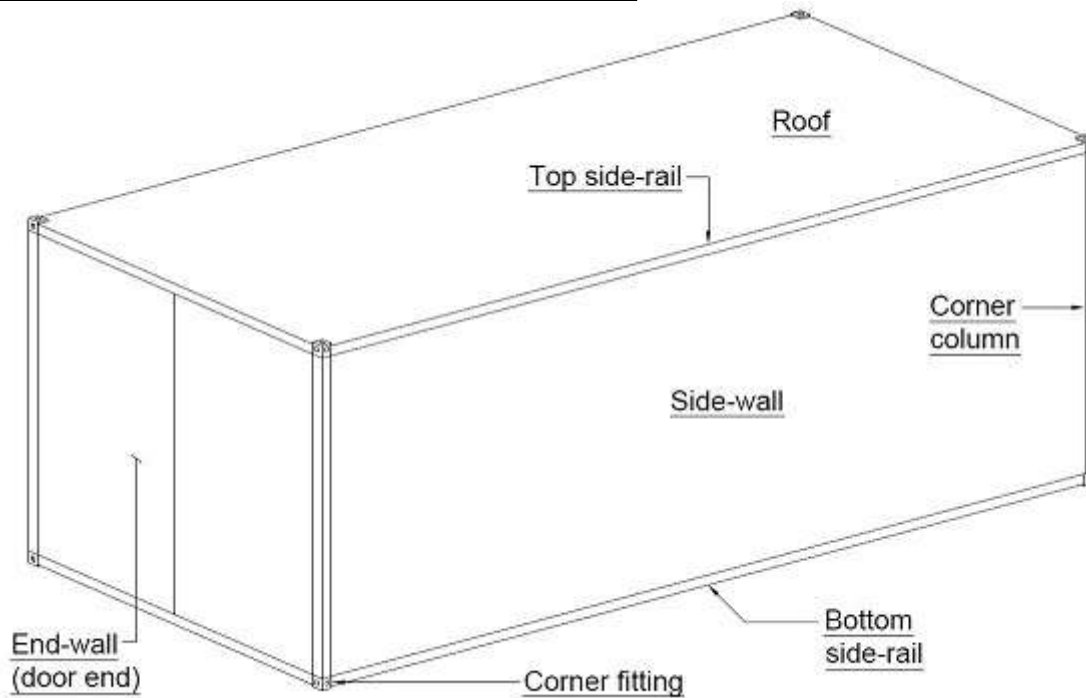


FIGURE 3115.8.3.4 CONTAINER ELEMENT IDENTIFICATION

3115.8.3.4.1 Floors. Where the floor is not structurally altered from its state as a shipping container, the allowable superimposed out-of-plane design load for the floor is permitted to be calculated in accordance with Equation 31-1. The design load of the bottom rails to span from corner to corner shall not be obtained using similar methods. The ability for the floors and bottom rails to sustain these out-of-plane loads in combination with other forces shall be determined by the structural analysis.

Exceptions:

1. The capacity of the shipping container bottom side rails, in their original vertical orientation, to span from corner to corner under gravity loads can be obtained from Equation 31-2, where the floor, walls directly above, top rail directly above, corner columns, and roof are not structurally altered from their state as a shipping container.
2. The capacity of the shipping container bottom end rails, in their original vertical orientation, to span from corner to corner under gravity loads can be obtained from Equation 31-3, where the floor, walls directly above, top rail directly above, corner columns, and roof are not structurally altered from their state as a shipping container.

$$q_s = 0.8(R-T)/(LW)$$

(Equation 31-1)

where:

q_s = Allowable superimposed design load using ASD load combinations, in lb/ft²(kg/m²)

R = Maximum gross mass, as marked on the container and its CSC Safety Approval Plate, in lbs (kgs)

T = Tare mass, as marked on the container and its CSC Safety Approval Plate, in lbs (kgs)

L = Interior floor length dimension of the shipping container, in feet (meters)

W = interior floor width dimension of the shipping container, in feet (meters)

$$w_s = 0.8(R-T)/W$$

(Equation 31-2)

where:

w_s = Allowable superimposed design load using ASD load combinations, in lb/ft (kg/m)

The other variables are defined as in Equation 31-1.

$$w_s = 0.8(R-T)/L$$

(Equation 31-3)

where:

The variables are defined as in Equation 31-1 and 31-2.

3115.8.3.4.2 Side-wall and end-wall. Where the side-wall is not structurally altered from its state as a shipping container, the allowable out-of-plane design load for the side-wall is permitted to be calculated in accordance with Equation 31-4. The ability for the side-wall to sustain these out-of-plane loads in combination with other forces shall be determined by the structural analysis.

Where the end-wall is not structurally altered from its state as a shipping container, the allowable out-of-plane design load for the end-wall is permitted to be calculated in accordance with Equation 31-5. The ability for the end-wall to sustain these out-of-plane loads in combination with other forces shall be determined by the structural analysis.

$$q_s = 0.24(R-T)/HL$$

(Equation 31-4)

where:

H = The interior height dimension of the wall, in feet (meters)

The other variables are defined as in equation 31-1.

$$q_s = 0.16(R-T)/HW$$

(Equation 31-5)

where:

The variables are defined as in Equation 31-1 and 31-4.

3115.8.4 3115.8.5 Simplified structural design of single-unit containers. Single-unit *intermodal shipping containers* conforming to the limitations of Section 3115.8.5.1 shall be permitted to be designed in accordance with the simplified structural design provisions of Section 3115.8.5.2.

3115.8.4.1 3115.8.5.1 Limitations. The use of Section 3115.8.5 is subject to the following limitations:

1. The *intermodal shipping container* shall be a single-unit, stand-alone unit supported on a foundation and shall not be in contact with or supporting any other shipping container or other structure.
2. The *intermodal shipping container* top and bottom rails, corner castings, and columns or any portion thereof shall not be notched, cut, or removed in any manner.
3. The *intermodal shipping container* shall be erected in a level and horizontal position with the floor located at the bottom.
4. The *intermodal shipping container* shall be located in Seismic Design Category A, B, C or D.

3115.8.5.2 3115.8.4.2 Simplified structural design. Where permitted by Section

~~3115.8.5.1~~ 3115.8.4.1, single-unit, stand-alone intermodal shipping containers shall be designed using the following assumptions for the ~~corrugated~~ profiled steel panel shear walls:

1. The appropriate detailing requirements contained in Chapters 16 through 23.
2. Response modification coefficient, $R = 2$.
3. Overstrength factor, $\Omega_0 = 2.5$.
4. Deflection amplification factor, $C_d = 2$.
5. Limits on structural height, $h_n = 9.5$ feet (2900 mm).

~~3115.8.5.3~~ 3115.8.4.3 Allowable shear. The allowable shear for the ~~corrugated~~ profiled steel panel side walls (longitudinal) and end walls (transverse) for wind design and seismic design using the coefficients of Section ~~3115.8.5.2~~ 3115.8.4.2 shall be in accordance with Table ~~3115.8.5.3~~ 3115.8.4.3, provided that all of the following conditions are met:

1. The total linear length of all openings in any individual side wall or end wall shall be limited to not more than 50 percent of the length of that side wall or end wall, as shown in Figure ~~3115.8.5.3(1)~~ 3115.8.4.3(1).
2. Any full-height wall length, or portion thereof, less than 4 feet (305 mm) shall not be considered as a portion of the lateral force-resisting system, as shown in Figure ~~3115.8.5.3(2)~~ 3115.8.4.3(2).
3. All side walls or end walls used as part of the lateral force-resisting system shall have an existing or new boundary element on all sides to form a continuous load path, or paths, with adequate strength and stiffness to transfer all forces from the point of application to the final point of resistance, as shown in Figure ~~3115.8.5.3(3)~~ 3115.8.4.3(3).
4. Where openings are made in container walls, floors or roofs, for doors, windows and other openings:
 - 4 The openings shall be framed with steel elements that are designed in accordance with Chapters 16 and 22.
 - 4 The cross section and material grade of any new steel element shall be equal to or greater than the steel element removed.
5. A maximum of one penetration not greater than 6 inches (152 mm) in diameter for conduits, pipes, tubes or vents, or not greater than 16 square inches (10 323 mm²) for electrical boxes, is permitted for each individual 8-foot (2438 mm) length of lateral force-resisting wall. Penetrations located in walls that are not part of the lateral force-resisting system shall not be limited in size or quantity. Existing *intermodal shipping container* vents shall not be considered a penetration, as shown in Figure ~~3115.8.5.3(4)~~ 3115.8.4.3(4).
6. End wall doors designated as part of the lateral force-resisting system shall be welded closed.

TABLE ~~3115.8.5.3~~ 3115.8.4.3 ALLOWABLE SHEAR VALUES FOR INTERMODAL SHIPPING CONTAINER ~~CORRUGATED~~ PROFILED STEEL PANEL WALLS FOR WIND OR SEISMIC LOADING

CONTAINER-DESIGNATION ^b	CONTAINER DIMENSION (nominal length)	CONTAINER DIMENSION (nominal height)	ALLOWABLE SHEAR VALUES (PLF) ^{a,c}	
			Side Wall	End Wall
4EEE	45 feet	9.5 feet	75	843
4EE		8.5 feet		

1AAA	40 feet	9.5 feet	84
1AA		8.5 feet	
1A		8.0 feet	
1AX		< 8.0 feet	
1BBB	30 feet	9.5 feet	112
1BB		8.5 feet	
1B		8.0 feet	
1BX		< 8.0 feet	
1CC	20 feet	8.5 feet	168
1C		8.0 feet	
1CX		< 8.0 feet	
1D	10 feet	8.0 feet	337
1DX		< 8.0 feet	

For SI: 1 foot = 304.8 mm.

- a. ~~The allowable strength shear for the side walls and end walls of the intermodal shipping containers are derived from ISO 1496-1 and reduced by a factor of safety of 5.~~
- b. ~~Container designation type is derived from ISO 668.~~
- e-a. Limitations of Section ~~3115.8.4.1~~ 3115.8.5.1 shall apply.

~~ISO 668—2013~~
~~ISO 1496-1—2013~~
~~ISO 6346—1995~~

~~Series 1 Freight Containers—Classifications, Dimensions and Ratings~~
~~Series 1 Freight Containers—Specification and Testing—Part 1: General Cargo~~
~~Freight Containers—Code, Identification and Marking with Amendment 3—2013~~

Reason:

Intermodal international shipping containers are primarily governed by two standards that would affect portions of how they behave structurally: The International Maritime Organization's (IMO) International Convention for Safe Containers (CSC) of 1972, amended in 1993, and ISO 1496-1. ISO 6346 contains the marking requirements for containers that meet various ISO standards, including 1496-1.

Re 3115.3: Both CSC and ISO 6346 require different physical identifiable information to be present on the container. The CSC requires the data plate, and ISO 6346 requires much larger markings, that are usually painted on. Both need to be present in order to verify both CSC and 1496-1 have been met.

Re 3115.3.1: This section is adjusted to remove the reference to ISO 6346 for the data plate, which was both incorrect and unnecessary, as the user of the code does not need to actually read CSC or ISO 6346 to verify the items written.

Re 3115.3.2: This section is added such that the requirements that ISO 6346 requires be marked on the containers are verified, and have the correct type code, such that conformance to ISO 1496-1 can be determined by these markings.

Re 3115.8: The reference to ISO 1496-1 is removed, as the user of the code does not need to read ISO 1496-1, as it does not contain information that is used for design in this code. The user is informed that the markings that were required in 3115.3.2 verify that international standards have been met. The inclusion of the material specific chapters, is that many of the components of shipping containers cannot be structurally verified purely by the tests that have been conducted as part of the international certification process, so they would need to be analyzed in accordance with the steel

and wood chapters. The final statement is in recognition that Section 3115 is modifying the provisions found elsewhere in the code that, unless specifically stated, would still apply.

Re 3115.8.1: Clarifying that containers can be stacked

Re 3115.8.2: The statement on welds could have multiple interpretations, and doesn't seem to add any value with any of them. It would require welds to be held to some vague and arbitrary standard of equality to existing welds. If this section was intended for weld replacements, or weld fixes, it should be modified as such, but its purpose would still seem dubious. It could also be interpreted that every weld taking place on a container would need to meet this vague equality requirement, which once again doesn't seem to have a purpose.

Re 3115.8.4: The inclusion of the material specific chapters, is that many of the components of shipping containers cannot be structurally verified purely by the tests that have been conducted as part of the international certification process, so they would need to be analyzed in accordance with the steel and wood chapters.

Re 3115.8.4.1: The requirements of Section 2202 already have provisions for identifying unknown steel, and so they should not be recreated or differently stated.

Re 3115.8.4.2: The sides of containers do not meet the definition for *light-frame construction* as used in the IBC or in the AISI standards, so they should not be using light-frame construction methods. They are cold-formed steel profiled panels, as such AISI S100, which invokes AISI S310 for profiled steel panels being used as diaphragms is therefore the correct reference. All of their components are steel, as required by the definition of intermodal shipping containers, so it clearly follows that they are steel systems which have not been detailed for seismic resistance. This would be in line with AISI S310 design methods as invoked by AISI S100.

Re 3115.8.4.3: A name change to be consistent with the AISI standards governing profiled steel deck diaphragm panels, AISI S100 and AISI S310. The exception proposed follows the logic used to justify the floor tested components, as the static racking strength in the longitudinal and transverse directions has been verified by tests in accordance with ISO 1496-1.

Re 3115.8.4.4: As the containers have already undergone certification that involves structural testing they can be trusted for their structural capacity in certain specific ways. The challenge comes with cutting parts out of them, or leaving their doors open, as is done when converting them into buildings. Therefore, the components that can be trusted must only be done so under certain circumstances, as laid out in this section. With some clever deductive reasoning the provisions of this section could potentially be expanded.

Re 3115.8.4.4.1: One of the easiest components of the certified containers to trust based on their testing are the floor members that typically span from side-wall to side-wall. These floors have had two primary tests conducted on them as required by both CSC and ISO 1496-1: Being loaded such that the total mass of the container and its contents reaches two times the maximum gross mass marked on the containers, and having a 16 kip 2 wheeled vehicle driven around inside of them all while only supported from their corner fittings, that project further down than their side rails. As such, equation 31-1 recognizes the tested capacity of the floors, with factors of safety. The value that the floor is required to hold during its tests is $2(R-T)$. As such the allowance for $0.8(R-T)$ is using a factor of safety of 2.5, as used for tested components in 1709.3.1. The international standard for serviceability that these containers meet is: no permanent deformation that would render them incapable of being used for their designed purpose, as such factor of safety of 2.5 should suffice for maintaining serviceability under live loading scenarios, even though the containers have never had proper serviceability limit states in accordance with the IBC. The allowance for the bottom side rails to span is similar to the floor members themselves, however the bottom side rails are braced against buckling by the adjacent floors and walls above, so the adjacent members become critical components. The bottom side rails are also aided to a very large extent in their spanning capabilities by acting as deep beams with the walls and top rail above. Therefore, their capacity can only be relied on in the cases where all of their bracing and composite action bestowing components have remained in place.

Re 3115.8.4.4.2: Similar to the floors, the walls of the containers have been tested under the international standards that the containers are certified to. The side walls are tested under a load

equal to 0.6 times the mass of the net contents multiplied by the acceleration due to gravity. This is further reduced here by a factor of safety of 2.5.

The end walls are tested under a load equal to 0.4 times the mass of the net contents multiplied by the acceleration due to gravity. This is further reduced here by a factor of safety of 2.5.

Re 3115.8.5.2 and 3115.8.5.3: Simply a name change to be consistent with the AISI standards governing profiled steel deck diaphragm panels, AISI S100 and AISI S310.

Re Table 3115.8.5.3: Containers that are 10 feet long, with designations of 1D or 1DX have not been tested to transverse or longitudinal racking force resistance, in accordance with ISO 1496-1, so they cannot be trusted to have this strength, and are removed from the table. The container designation and container height provide no useful information, and are also removed.

Re ISO Standard 668, 1496-1, and 6346: The code does not require the user to go to these reference standards in order to design a building or structure, as such their inclusion as referenced standards is inconsistent with how the other reference standards are used, where they provide design information to be used in conjunction with the IBC.

Bibliography:

CSC (1996), *International Convention for Safe Containers*, CSC, International Maritime Organization, 4 Albert Embankment, London SE1 7SR, United Kingdom of Great Britain and Northern Ireland.

ISO (2013), *Series 1 freight containers - Specification and testing - Part 1: General cargo containers for general purposes*, ISO 1496-1, International Organization for Standardization, Chemin de Blandonnet 8, CP 401-1214 Vernier, Geneva, Switzerland

ISO (1995), *Freight containers - Coding, identification and marking*, ISO 6346, International Organization for Standardization, Chemin de Blandonnet 8, CP 401-1214 Vernier, Geneva, Switzerland

AISI (2020), *North American Specification for the Design of Cold-Formed Steel Structural Members*, AISI S100-16 w/S2-20, American Iron and Steel Institute, 25 Massachusetts Avenue, NW, Suite 800, Washington, DC 20001

AISI (2020), *North American Specification for the Design of Profiled Steel Diaphragm Panels*, AISI S310-20, American Iron and Steel Institute, 25 Massachusetts Avenue, NW, Suite 800, Washington, DC 20001

Cost Impact:

The code change proposal will decrease the cost of construction

By recognizing some of the tests that containers have already been certified to under international standards, some of the structural components do not need to be verified by material testing or structural investigation.

G196-21

Committee Action: Disapproved

Committee Reason: The proposal was disapproved as the proposal has inconsistencies. The committee encouraged the proponent to review with and propose future updates. (Vote: 14-0)

Hearing video: <https://www.cdpassess.com/videos/4102/>

G196-21 Public Comment 1

Replace with the following:

TABLE 3115.8.5.3 ALLOWABLE SHEAR VALUES FOR PROFILED STEEL PANEL SIDE WALLS AND END WALLS FOR WIND OR SEISMIC LOADING

CONTAINER DESIGNATION ^b	CONTAINER DIMENSION (nominal length)	CONTAINER DIMENSION (nominal height)	ALLOWABLE SHEAR VALUES (PLF) ^{a,c}	
			Side Wall	End Wall
1EEE	45 feet	9.5 feet	75	843
1EEE		8.5 feet		
1AAA	40 feet	9.5 feet	84	
1AAA		8.5 feet		
1AAA		8.0 feet		
1AX		< 8.0 feet		
1BBB	30 feet	9.5 feet	112	
1BBB		8.5 feet		
1BBB		8.0 feet		
1BX		< 8.0 feet		
1CC	20 feet	8.5 feet	168	
1CC		8.0 feet		
1CX		< 8.0 feet		
1D ^d	10 feet	8.0 feet	337	
1DX ^d		< 8.0 feet		

a. The allowable strength shear values for the side walls and end walls of the intermodal shipping containers are derived from ISO 1496-1 and reduced by a factor of safety of 5.

b. Container designation type is derived from ISO 668.

c. Limitations of Sections 3115.8.5.1 and 3115.8.5.3 shall apply.

[d. The shear values for 1D and 1DX containers have been extrapolated from the test data available on other container designations.](#)

Reason:

ISO 1496-1 requires two types of load tests to be carried out to prove the ability of a container, other than a 1D or a 1DX container (aka, a 10 ft. length container), to withstand specified racking forces. Except for a 1D and a 1DX container, the allowable shear values in Table 3115.8.5.3 are based on these load tests. The allowable shear values for a 1D and a 1DX container was allowed to be extrapolated based on the tests on the other container designations. The inclusion of footnote d serves as an important reminder that the use of the allowable shear values for the 1D and 1DX container were deemed reasonable and safe only when designed in accordance with the limitations of the simplified structural design provision.

Notes: BCAC will vote to either co-sponsor or support with rest of public comments.

G196-21 Public Comment 2

Replace with the following:

3115.8.1 Foundations and supports. *Intermodal shipping containers* repurposed for use as a permanent building or structure shall be supported on foundations or other supporting structures designed and constructed in accordance with Chapters 16 through 23.

3115.8.1.1 Anchorage. *Intermodal shipping containers* shall be anchored to foundations or other supporting structures as necessary to provide a continuous load path for all applicable design and environmental *loads* in accordance with Chapter 16.

3115.8.1.2 Stacking. *Intermodal shipping containers* used to support stacked units shall comply with Section 3115.8.4.

Reason:

The original intent was not to prohibit stacking. Stacking of intermodal shipping containers was never clearly addressed in the 2021 IBC. This proposal clarifies that stacking is allowed and which section is required for the design of stacked containers.

Notes: BCAC will vote to either co-sponsor or support with rest of public comments.

G198-21

G198-21

Proposed Change as Submitted

Proponents: Julie Furr, Rimkus Consulting Group, Inc., representing Federal Emergency Management Agency/Applied Technology Council - Seismic Code Support Committee (jfurr@rimkus.com); Kelly Cobeen, Wiss Janney Elstner Associates, Inc., representing Federal Emergency Management Agency/Applied Technology Council - Seismic Code Support Committee (kcobeen@wje.com); Michael Mahoney, Federal Emergency Management Agency, representing Federal Emergency Management Agency (mike.mahoney@fema.dhs.gov); Ronald LaPlante, representing Federal Emergency Management Agency/Applied Technology Council - Seismic Code Support Committee (ron.laplante@dgs.ca.gov)

2021 International Building Code

Revise as follows:

3115.8.2 Welds. The strength of new ~~New~~ welds and connections shall be ~~no less equal to or greater~~ than the strength provided by the original connections. All new welds and connections shall be designed and constructed in accordance with Chapters 16, 17, and 22.

3115.8.4 Detailed design procedure. A structural analysis meeting the requirements of this section shall be provided to the *building official* to demonstrate the structural adequacy of the intermodal shipping containers.

Exception: Structures using an intermodal ~~intermodal shipping container~~ containers designed in accordance with Section 3115.8.5.

3115.8.4.2 Seismic design parameters. The seismic force-resisting system shall be designed and detailed in accordance with ASCE 7 and one of the following:

1. Where all or portions of the corrugated steel container sides are considered to be the seismic force-resisting system, design and detailing shall be in accordance with the ASCE 7, Table 12.2-1 requirements for light-frame bearing-wall systems with shear panels of all other materials. ASCE 7 seismic provision exceptions, related to light-frame construction, shall not apply to the design of structures using intermodal shipping containers. The allowable shear values shall be determined in accordance with Section 3115.8.4.3.
2. Where all or portions of the corrugated steel container sides are ~~retained, but are~~ not considered to

be part of the seismic force-resisting system, an independent seismic force-resisting system shall be selected, ~~designed~~ and detailed in accordance with ASCE 7, Table 12.2-1.

3. Where all or portions of the corrugated steel container sides are retained and integrated into a seismic force-resisting system other than as permitted by Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.11 and ASCE 7, Section 12.2.1.1 or 12.2.1.2.

3115.8.5.3 Allowable shear. The allowable shear for the corrugated steel side walls (longitudinal) and end walls (transverse) for wind design and seismic design using the coefficients of Section 3115.8.5.2 shall be in accordance with Table 3115.8.5.3, provided that all of the following conditions are met:

- 1 The total linear length of all openings in any individual side wall or end wall shall be limited to not more than 50 percent of the length of that side wall or end wall, as shown in Figure 3115.8.5.3(1).
- 2 Any full-height wall length, or portion thereof, less than 4 feet (305 mm) shall not be considered as a portion of the lateral force-resisting system, as shown in Figure 3115.8.5.3(2).
- 3 All side walls or end walls used as part of the lateral force-resisting system shall have an existing or new boundary element on all sides to form a continuous load path, or paths, with adequate strength and stiffness to transfer all forces from the point of application to the final point of resistance, as shown in Figure 3115.8.5.3(3). The existing door interlocking mechanism shall not be considered as a component of the required load path.
- 4 Where openings are made in container walls, floors or roofs, for doors, windows and other openings:
 - 4.1 The openings shall be framed with steel elements that are designed in accordance with Chapters 16 and 22.
 - 4.2 The cross section and material grade of any new steel element shall be equal to or greater than the steel element replaced.
- 5 A maximum of one penetration not greater than 6 inches (152 mm) in diameter for conduits, pipes, tubes or vents, or not greater than 16 square inches (10 323 mm²) for electrical boxes, is permitted for each individual 8-foot (2438 mm) length of lateral force-resisting wall. Penetrations located in walls that are not part of the lateral force-resisting system shall not be limited in size or quantity. Existing *intermodal shipping container* vents shall not be considered a penetration, as shown in Figure 3115.8.5.3(4).
- 6 End wall doors designated as part of the lateral force-resisting system shall be welded closed around the full perimeter of the door panels.

Reason: Section 3115.8.2 is not clear as to what welds and connections this applies to, nor does it clarify what is meant by “equal to or greater than” (strength, size, or other). This change clarifies that it is the “strength” of the welds and connections that should be assessed for equivalency. The proposed language clarifies that new welds shall comply with minimum design standards as already specified elsewhere in the IBC.

Section 3115.8.4.2 is modified to include direct reference to ASCE 7 to capture the seismic design provisions, such as combination of seismic force-resisting systems, regardless of which of the 3 design items are selected. The first proposed change to Item 1 is to not permit simplified and relaxed requirements in ASCE 7, intended specifically for light-frame construction, to be applied to steel shipping containers since these containers may not exhibit similar seismic response characteristics as light-frame construction. The second proposed change to Item 1 is to tie the system seismic parameters to the system capacity by direct reference to Section 3115.8.4.3. This is also intended to further clarify that the allowable shear values contained in the simplified procedure shown in Table 3115.8.5.3 are not intended to be permitted with the detailed design procedure. The proposed changes in Items 2 and 3 are editorial to be consistent with Item 1.

Section 3115.8.5.3 is modified to ensure that the allowable shear in Table 3115.8.5.3 for the end wall with doors is based on an adequate load path between the door panels and boundary elements, as determined by established design theory. The perimeter welds of the end door panels are to be designed per Section 3115.8.2 and may be continuous or intermittent as required by design. These changes

further clarify that the original mechanical locking mechanisms shall not be relied upon to function as a lateral force-resisting system component of the repurposed shipping container.

Cost Impact:

The code change proposal will not increase or decrease the cost of construction
These changes are editorial in nature and intended to clarify the design requirements.

G198-21

Committee Action: As Modified

Committee Modification:

3115.8.5.3 Allowable shear. The allowable shear for the corrugated steel side walls (longitudinal) and end walls (transverse) for wind design and seismic design using the coefficients of Section 3115.8.5.2 shall be in accordance with Table 3115.8.5.3, provided that all of the following conditions are met:

1. The total linear length of all openings in any individual side wall or end wall shall be limited to not more than 50 percent of the length of that side wall or end wall, as shown in Figure 3115.8.5.3(1).
2. Any full-height wall length, or portion thereof, less than 4 feet (305 mm) shall not be considered as a portion of the lateral force-resisting system, as shown in Figure 3115.8.5.3(2).
3. All side walls or end walls used as part of the lateral force-resisting system shall have an existing or new boundary element on all sides to form a continuous load path, or paths, with adequate strength and stiffness to transfer all forces from the point of application to the final point of resistance, as shown in Figure 3115.8.5.3(3). The existing door interlocking mechanism shall not be considered as a component of the required load path.
4. Where openings are made in container walls, floors or roofs, for doors, windows and other openings:
 - 4.1 The openings shall be framed with steel elements that are designed in accordance with Chapters 16 and 22.
 - 4.2 The cross section and material grade of any new steel element shall be equal to or greater than the steel element removed.
5. A maximum of one penetration not greater than 6 inches (152 mm) in diameter for conduits, pipes, tubes or vents, or not greater than 16 square inches (10 323 mm) for electrical boxes, is permitted for each individual 8-foot (2438 mm) length of lateral force-resisting wall. Penetrations located in walls that are not part of the lateral force-resisting system shall not be limited in size or quantity. Existing intermodal shipping container vents shall not be considered a penetration, as shown in Figure 3115.8.5.3(4).
6. End wall doors designated as part of the lateral force-resisting system shall be intermittently welded closed around the full perimeter of the door panels.

Committee Reason: The proposal was approved as modified by Furr-2 based on the committee actions on G197. The proposal, and modification, coordinate and clarify the welding, shear and seismic provisions. The proposal adds a pointer to ASCE 7 seismic provisions. The modification Furr2 clarifies intermediate welding for Section 3115.8.5.3 item #6. (Vote: 14-0)

Hearing video: <https://www.cdpassess.com/videos/4100/>

G197-21 Public Comment - Furr

IBC: 3115.8.4.2, 3115.8.4.1, 3115.8.4.3

Proponents: Julie Furr, representing Federal Emergency Management Agency/Applied Technology Council - Seismic Code Support Committee (jfurr@rimkus.com) requests As Modified by Public Comment

Further modify as follows:

2021 International Building Code

3115.8.4.1 Material properties. Structural material properties for existing intermodal shipping container steel components shall be established by ~~Section 2202 material testing where the steel grade and composition cannot be identified by the manufacturer's designation as to manufacture and mill test.~~

3115.8.4.2 Seismic design parameters. The seismic force-resisting system shall be designed and detailed in accordance with ASCE 7 and one of the following:

1. Where all or portions of the corrugated steel container sides are considered to be the seismic force-resisting system, design and detailing shall be in accordance with AISI S100 and the ASCE 7, Table 12.2-1 requirements for steel systems not specifically detailed for seismic resistance, excluding cantilever column systems. light-frame bearing wall systems with shear panels of all other materials. ~~ASCE 7 seismic provision exceptions, related to light frame construction, shall not apply to the design of structures using intermodal shipping containers. The allowable shear values shall be determined in accordance with Section 3115.8.4.3.~~
2. Where all or portions of the corrugated steel container sides are not considered to be part of the seismic force-resisting system, an independent seismic force-resisting system shall be selected and detailed in accordance with ASCE 7, Table 12.2-1.
3. Where all or portions of the corrugated steel container sides are retained and integrated into a seismic force-resisting system other than as permitted by Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.11 and ASCE 7, Section 12.2.1.1 or 12.2.1.2.

3115.8.4.3 Allowable shear value. The allowable shear values for the intermodal shipping container corrugated steel sheet panel side walls and end walls shall be determined in accordance with the design approach selected in Section 3115.8.4.2 demonstrated by testing and analysis ~~accordance with Section 104.11.~~ Where penetrations are made in the side walls or end walls designated as part of the lateral force-resisting system, the penetrations shall be substantiated by rational analysis.

Commenter's Reason: This modification addresses two issues that have posed barriers to effective use of the Detailed Design Procedure, pertaining to how users must determine allowable shear values. This change was developed in collaboration with industry representatives and multiple interested parties.

As currently written:

1. Users must determine allowable shear capacities of the profiled steel panels by testing.
2. Users must comply with ASCE 7 seismic provisions for light-frame bearing wall systems, which are only applicable to light-frame stud and wood sheathing/gypsum board shear wall assemblies.

As modified:

1. Users are provided the option to use established industry standard methodologies to determine allowable shear capacities, requiring testing only if those methodologies are not applicable.
2. Users are directed to AISI S100, which is directly applicable to profiled steel panel shear wall assemblies.

Cost Impact: The net effect of the public comment and code change proposal will decrease the cost of construction.

This change reduces mandatory material testing requirements under the detailed design procedure.

Notes: BCAC will vote to either co-sponsor or support with rest of public comments.