Uniform Building Code Commission
Staff Comment Form - BEBF 45

BEBF Technical Committee

Review of the 2021 Editions of the International Building Code® (IBC®), International Existing Building Code® (IEBC®), International Fire Code®

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Code Change Information

Originating Committee: BEBF 2018

Code Modified: 2018 IBC

Original Comment Form Number: CCF-125

Rule Number: 748:20-2-36 (1) through (24)

Which area of the code (Section, Table, Figure) was revised?

IBC Ch 31, Sections 3101.1 and all of 3114

Page Number: 2021 IBC 31-1 and 31-6 thru 31-7

Previous change:

3101.1 Scope. Was modified to include intermodal shipping containers in the list of special construction addressed in the chapter.

Sections 3114 through 3114.8.5.3 were added to address the construction of structures utilizing intermodal shipping containers as all or part of a structure. See next pages.

Historical information:

The section related to intermodal shipping containers was added by the 2018 BEBF Committee. The language added in the agency rules exists in as part of the 2021 code.

Staff recommendation is to delete the language from the agency's rules and if any section in the published 2021 code requires modification, to create a new comment form and proposes changes as needed to the 2021 code.

Chapter 31 – Special Construction – Section 3101 General

3101.1 Scope. The provisions of this chapter shall govern special building construction including membrane structures, temporary structures, *pedestrian walkways* and tunnels, automatic *vehicular gates*, *awnings* and *canopies*, *marquees*, signs, towers, antennas, relocatable buildings, swimming pool enclosures and safety devices, ~~and~~ solar energy systems and intermodal shipping containers.

Section 3114 - Intermodal Shipping Containers

3114.1 General. The provisions of Section 3114 and other applicable sections of this code, shall apply to intermodal shipping containers that are repurposed for use as buildings or structures or as a part of buildings or structures.

Exceptions:

1. Intermodal shipping containers previously approved as existing relocatable buildings complying with Chapter 14 of the International Existing Building Code.
2. Stationary storage battery arrays located in intermodal shipping containers complying Chapter 12 of the International Fire Code.
3. Intermodal shipping containers that are listed as equipment complying with the standard for equipment, such as air chillers, engine generators, modular data centers, and other similar equipment.
4. Intermodal shipping containers housing or supporting experimental equipment are exempt from the requirements of Section 3114 provided they comply with all of the following:

   4.1 Such units shall be single stand-alone units supported at grade level and used only for occupancies as specified under Risk Category I in Table 1604.5;

   4.2 Such units are located a minimum of 8 feet from adjacent structures and are not connected to a fuel gas system or fuel gas utility; and

   4.3 In hurricane-prone regions and flood hazard areas, such units are designed in accordance with the applicable provisions of Chapter 16.

3114.2 Construction documents. The construction documents shall contain information to verify the dimensions and establish the physical properties of the steel components, and wood floor components, of the intermodal shipping container in addition to the information required by Sections 107 and 1603.

3114.3 Intermodal shipping container information. Intermodal shipping containers shall bear an existing data plate containing the following information as required by ISO 6346 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
2. Date manufactured
3. Safety approval number
4. Identification number
5. Maximum operating gross mass or weight (kg) (lbs)
6. Allowable stacking load for 1.8G (kg) (lbs)
7. Transverse racking test force (Newtons)

8. Valid 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.

3114.4 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.

3114.5 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 with cellars, shall be provided with ventilation in accordance with Section 1202.4.

3114.6 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.

3114.7 Joints and voids. Joints and voids that create concealed spaces between intermodal shipping containers, that are connected or stacked, 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.

3114.8 Structural. Intermodal shipping containers which conform to ISO 1496-1 that 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 this section.

3114.8.1 Foundations. 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 of this code.

3114.8.1.1 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.

3114.8.2 Welds. All new welds and connections shall be equal to or greater than the original connections.

3114.8.3 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 3114.8.4 or 3114.8.5.

3114.8.4 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:** Intermodal shipping containers designed in accordance with Section 3114.8.5.

3114.8.4.1 Material properties. Structural material properties for existing intermodal shipping container steel components shall be established by material testing where the steel grade and composition cannot be identified by the manufacturer's designation.

3114.8.4.2 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 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,
2. Where all or portions of the corrugated steel container sides are retained, but are not considered to be 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, or
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 Section 3114.8.2 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.

3114.8.4.3 Allowable shear value. The allowable shear values for the intermodal shipping container corrugated steel sheet panel side walls and end walls shall be demonstrated by testing and analysis in 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.

3114.8.5 Simplified structural design of single-unit containers. Single-unit intermodal shipping containers conforming to the limitations of Section 3114.8.5.1 shall be permitted to be designed in accordance with the simplified structural design provisions of this section.

3114.8.5.1 Limitations. Use of Section 3114.8.5 is subject to all of 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.

3114.8.5.2 Simplified structural design. Where permitted by Section 3114.8.5.1, single-unit, stand-alone intermodal shipping containers shall be designed using the following assumptions for the corrugated steel shear walls:

1. The appropriate detailing requirements contained in Chapters 16 through 23.
2. Response modification coefficient, R=2
3. Over strength factor, *=2.5,
4. Deflection amplification factor, C=2, and
5. Limits on structural height, h=9.5 feet (2900mm).

3114.8.5.3 Allowable shear. The allowable shear for the corrugated steel side walls (longitudinal) and end walls (transverse) for wind design and for seismic design using the

coefficients of Section 3114.8.5.2 shall be in accordance with Table 3114.8.5.3 provided that all of the following conditions are met:

1. The total linear length of all openings in any individual side walls or end walls shall be limited to not more than 50 percent of the length of that side wall or end wall~~, as shown in Figure 3114.8.5.3(1)~~.
2. Any full height wall length, or portion thereof, less than 4 feet (305 mm) long shall not be considered as a portion of the lateral force-resisting system~~, as shown in Figure 3114.8.5.3(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 3114.8.5.3(3).~~
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 Chapter 16 and Chapter 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 a 6-inch (152 mm) diameter hose for conduits, pipes, tubes or vents, or not greater than 16 square inches (10 322 mm^2) for electrical boxes, is permitted for each individual 8 foot length (2438 mm) lateral force-resisting wall. Penetrations located in walls that are not part of the wall 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 3114.8.5.3(4).~~
6. End wall door or doors designated as part of the lateral force-resisting system shall be welded closed.

Table 3114.8.5.3
Allowable Shear Values For Intermodal Shipping Container
Corrugated Steel Walls For Wind Or Seismic Loading

CONTAINER DESIGNATION	CONTAINER DIMENSIONS (NOMINAL LENGTH)	CONTAINER DIMENSIONS (NOMINAL HEIGHT)	ALLOWABLE SIDE WALLS SHEAR VALUES (PLF) [a, c]	ALLOWABLE END WALSL SHEAR VALUE (PLF) [a, c]
1EEE	45 feet (13.7 m)	9.5 feet (2896 mm)	75	843
1EE	45 feet (13.7 m)	9.5 feet (2896 mm)	75	843
1AAA	40 feet (12.2 m)	9.5 feet (2896 mm)	84	843
1AA	40 feet (12.2 m)	8.5 feet (2591 mm)	84	843
1A	40 feet (12.2 m)	8.0 feet (2438 mm)	84	843
1AX	40 feet (12.2 m)	< 8.0 feet (2438 mm)	84	843
1BBB	30 feet (9.1 m)	9.5 feet (2896 mm)	112	843
1BB	30 feet (9.1 m)	8.5 feet (2591 mm)	112	843
1B	30 feet (9.1 m)	8.0 feet (2438 mm)	112	843
1BX	30 feet (9.1 m)	< 8.0 feet (2438 mm)	112	843

CONTAINER DESIGNATION	CONTAINER DIMENSIONS (NOMINAL LENGTH)	CONTAINER DIMENSIONS (NOMINAL HEIGHT)	ALLOWABLE SIDE WALLS SHEAR VALUES (PLF) [a, c]	ALLOWABLE END WALSL SHEAR VALUE (PLF) [a, c]
1CC	20 feet (6.1 m)	8.5 feet (2591 mm)	168	843
1CC	20 feet (6.1 m)	8.0 feet (2438 mm)	168	843
1CX	20 feet (6.1 m)	< 8.0 feet (2438 mm)	168	843
1DX	10 feet (3.0 m)	< 8.0 feet (2438 mm)	337	843

a. The allowable 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.

c. Limitations of Section 3114.8.5.1 shall apply.