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# CodeMaster - Seismic Design (2012 IBC / ASCE 7-10)



**CodeMaster** **SEISMIC DESIGN** **2012 IBC** **ASCE 7-10**

**Seismic Design**

The CodeMaster provides the most direct method in designing a structure according to the Category A, B or C for seismic loads in accordance with the 2012 International Building Code (IBC) and ASCE 7-10 seismic design provisions. Category A, B or C structures built after ASCE 7-10 construction code, the knowledge, building and other structural loading building and existing structures. The CodeMaster simply uses "Selection" to mean buildings and existing structures.

The seismic design provisions of the 2012 IBC are based on those of ASCE 7-10 and make a seismic reference in appropriate limits in both the 2012 IBC and ASCE 7-10 as well as checked against at <http://highperformance.construction.com>

**ASCE 7-10** **2012 International Building Code**

**SECRETS OF THE CODEMASTER: Sometimes the provisions of a referenced standard apply to ASCE 7-10 (IBC) with the requirements of the 2012 IBC, 2012 IBC Section 1621.1 apply for other than an alternative seismic assessment method and the IBC, the provisions of the IBC govern. One example where the provisions of a referenced standard apply to ASCE 7-10 (IBC) when the provisions of ASCE 7-10 (IBC) apply is where ASCE 7-10 (IBC) Section 1621.1 (Seismic Force and Effects).**

**STEP 1: Determine S<sub>e</sub>, S<sub>w</sub> and S<sub>1</sub>**

This first step is seismic design is determining the site-specific maximum considered earthquake (MCE), spectral response accelerations at short periods, S<sub>e</sub>, and at 1 second period, S<sub>w</sub>. These values are determined from the following sources:

1. 2012 IBC Figures 16.3.1.1 through 16.3.1.3 or ASCE 7-10 Figures 16.3.1.1 through 16.3.1.3 for the United States (not mapped values are provided). For 2012 IBC Section 16.3.1.1, S<sub>e</sub> and S<sub>w</sub> for Occupancy I, II and III, respectively. For Alternative Seismic Force values are 1.0g and 0.5g, respectively.
2. Web-based calculator available at the United States Geological Survey (USGS) website, <http://earthquake.usgs.gov/earthquakeinfo/>, by using the email address or the corresponding information of the location of the structure.

**SECRETS OF THE CODEMASTER: Why is there an S<sub>1</sub> instead of S<sub>w</sub>? The "S<sub>1</sub>" is for "resonance". The seismic force in the 2012 IBC and ASCE 7-10 is the "resonance" based. Therefore, the seismic spectral response accelerations must be adjusted for the same size of earthquake response at all locations. In other words, when the 2012 IBC and ASCE 7-10 are used in design, the seismic force is based on the adjusted force from the S<sub>w</sub> and S<sub>1</sub> parameters and is based on the same structure of 12 years.**

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**STEP 2: Determine # Structure in Earthquake Regions**

2012 IBC Section 1621.1 allows for building for exception that compliance with the 2012 IBC seismic design requirements.

Exception: see, see, see, "Seismic Building in Seismic Design Category (SDC) A, B, or C in Seismic zones I, II, or III for S<sub>e</sub>." (shown in green)

In this step, the IBC has not been determined "Seismic S<sub>e</sub> has been determined in Step 1. After Step 1 is completed, the earthquake map is provided.

**Exception No. 1**

Continental systems and structures complying with 2012 IBC Section 1621.1 may qualify for "Seismic Design Category" in 2012 IBC Section 1621.1.

**Exception No. 2**

Highly ductile structures intended for industrial hazard mitigation may not qualify for "Seismic Building" in 2012 IBC Section 1621.1.

**Exception No. 3**

Industrial bridges, electrical transmission towers, hydraulic structures, tunnel shafts and other structures, nuclear reactors and other safety-related structures are excluded.

**Exception No. 4**

Structures located in seismic zones I, II, III, IV, V, VI, VII, VIII and IX may qualify for "Seismic Building" in 2012 IBC Section 1621.1.

**2012 IBC Section 1621.1**

Areas of U.S. with S<sub>e</sub> ≥ 0.1g and S<sub>w</sub> ≥ 0.1g (shown in green)

To check, visit [www.usgs.gov](http://www.usgs.gov) or [www.lacodes.com](http://www.lacodes.com)

For further information, see ASCE 7-10 Sections 16.3 and 16.4.1



## Synopsis

This 6-page laminated reference guide provides an easy-to-follow 11-step procedure for seismic design in accordance with the 2012 IBC and ASCE 7-10, with emphasis on the seismic design of a typical one-to-three story building. Illustrations are provided for many of the difficult to understand requirements. Subjects addressed include determination of mapped spectral response accelerations; consideration of exceptions to the seismic code requirements; Seismic Design Category determination; consideration of plan and vertical structural irregularities; determination of seismic base shear, redundancy coefficient and seismic load effects; and compliance with drift control requirements.

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in Geology) Minimum Design Loads for Buildings and Other Structures, 3rd Printing (Standard  
ASCE/SEI 7-10) Flood Resistant Design and Construction ASCE/SEI 24-05 Minimum Design Loads  
and Associated Criteria for Buildings and Other Structures (Standards ASCE/SEI 7-16) Prestressed  
Concrete Transmission Pole Structures: Recommended Practice for Design and Installation (Asce  
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