



TOPIC: Seismic Certification OSSC/16/#6

CODE: Oregon Structural Specialty Code - 2022

REVISED: March 30, 2023 [Rebecca Esau], Director

REFERENCE: Oregon Structural Specialty Code – Chapters 16 and 17; Chapter 13, ASCE/SEI 7-10

SUBJECT: Seismic Certification of Mechanical, Electrical and Plumbing Components of Designated Seismic Systems

QUESTION: OSSC Sections 1705.11 and 1705.12 require seismic certification and special inspections for Designated Seismic Systems. What are the submittal requirements for mechanical, electrical and plumbing components of designated seismic systems and what are the methods of certification?

RESPONSE: OSSC Section 1705.12 requires seismic certification of Designated Seismic System to be in accordance with Section 13.2 of ASCE/SEI 7-10. Special inspection is required for all Designated Seismic Systems in accordance with OSSC 1705.11.4. Seismic certification of mechanical, electrical, and plumbing components of Designated Seismic Systems are applicable only for structures in Risk Categories III and IV as listed in OSSC Table 1604.5. These requirements apply only to new construction or the installation of new equipment that is part of a designated seismic system.

A. Definitions

The following words and terms shall have the following meanings for the purposes of this Code Guide.

Active equipment. Equipment containing moving or rotating parts, electrical parts such as switches or relays, or other internal components that are sensitive to earthquake forces and critical to the function of the equipment.

Certificate of Compliance. A certificate issued by the manufacturer stating that materials and products meet specified standards, and the work was done in compliance with approved construction documents. Certificate of compliance shall, among other things, specify the validity range for S_{ds} , Z/h , I_p and method of qualification.

Component Importance Factor, I_p . In accordance with ASCE/SEI 7 Section 13.1.3, all nonstructural components must be assigned a component importance factor as indicated in Section 13.1.3. The component importance factor, I_p , shall be taken as 1.5 if any of the following conditions apply:

1. The component is required to function for life-safety purposes after an earthquake, including fire protection sprinkler systems and egress stairways.
2. The component conveys, supports, or otherwise contains toxic, highly toxic, or explosive substances where the quantity of the material exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released.
3. The component is in or attached to a Risk Category IV structure, and it is needed for continued operation of the facility, or its failure could impair the continued operation of the facility.
4. The component conveys, supports, or otherwise contains hazardous substances and is attached to a structure or portion thereof classified by the authority having jurisdiction as a hazardous occupancy.

Designated Seismic Systems. Those nonstructural components that require design in accordance with Chapter 13 of ASCE 7 and for which the component importance factor, I_p , is greater than 1 in accordance with Section 13.1.3 of ASCE 7.

Label. An identification applied on a product by the manufacturer that contains the name of the manufacturer, model number, serial number, or definitive information describing the product material, the function and performance characteristics of the product or material, and the name of an approved agency, and that indicates that the representative sample of the product or material has been tested and evaluated by an approved agency.

Risk Category III and IV structures. Risk Category III structures are those structures that represent substantial hazard to human life in the event of failure whereas Risk Category IV structures are those structures designated as essential facilities. See OSSC Table 1604.5.

Rugged equipment. Past earthquakes have shown that certain types of equipment are inherently rugged. Rugged equipment refers to equipment able to withstand a strong earthquake without significant loss of function.

Seismic Design Parameters

a_p Component amplification factor as defined in ASCE 7.

R_p Component response modification factor as defined in ASCE 7.

Z/h Ratio of Height in structure of point of attachment of component with respect to the base to average roof height of structure with respect to the base. The value of Z/h need not be taken greater than 1. For items at or below the base, the value of Z/h shall be taken as 0.

B. Submittal Requirements

At the time of submittal for a building permit, in accordance with OSSC Section 1704.3.2 and 1705.12.3, the Registered Design Professional of record for the structure must specify on the construction documents the equipment and components of the Designated Seismic System that require special seismic certification.

The review and approval of the mechanical, electrical, or plumbing components of the Designated Seismic Systems requiring seismic certification may be deferred and submitted through a deferred submittal process.

Seismic certification can either be a project-specific approval or pre-qualified.

For both project-specific approvals and pre-qualified components, documentation submitted to the City for approval must include:

1. A Certificate of Compliance prepared by or reviewed and accepted by an Oregon licensed structural engineer demonstrating fulfillment of the Seismic Certification requirements from the manufacturer of each mechanical, electrical, or plumbing component of the Designated Seismic System. See Appendix A attached for a sample Certificate of Compliance letter.

2. Engineering calculations and details where required for the support and anchorage of the mechanical, electrical, or plumbing components of the Designated Seismic System prepared by an Oregon licensed structural engineer.
3. A copy of the label that will be affixed to the mechanical, electrical, or plumbing component. See Appendix B attached for a sample label.

In addition, the structural engineer of record for the structure shall review the Certificate of Compliance, engineering calculations for the support and anchorage of the mechanical, electrical, and plumbing components of the Designated Seismic System, and other supporting documentation and shall notate that the Designated Seismic System has been reviewed and found to be in general conformance with the design requirements for the building.

BDS will accept pre-qualified components from agencies such as OSHPD or other certification agencies accredited by International Accreditation Services (IAS) for product approvals. See the following link for list of pre-qualified components: <http://www.oshpd.ca.gov/fdd/Pre-Approval/OSHPDSpecialSeismicCertificationPreapproval.pdf>.

The City reserves the right to request the full basis of certification including test reports, deficient reports, analysis, etc.

C. Seismic Certification

In accordance with Section 13.2.1 of ASCE/SEI 7, an applicant must submit documentation verifying that the component is seismically certified by either:

1. analysis;
2. testing; or
3. experience data.

D. Special Seismic Certification

Special Seismic Certification in accordance with Section 13.2.2 of ASCE/SEI 7 is required for the following equipment and components that are part of the Designated Seismic System:

1. Active mechanical and electrical equipment that must remain operable following the design earthquake ground motion must be certified by the manufacturer as operable whereby active parts or energized components must be certified exclusively on the basis of approved shake table testing or

- experience data unless it can be shown that the component is inherently rugged by comparison with similar seismically qualified components.
2. Components with hazardous substances and assigned a component importance factor, I_p , of 1.5 must be certified by the manufacturer as maintaining containment following the design earthquake ground motion by:
 - a. analysis;
 - b. approved shake table testing; or
 - c. experience data.

E. Certification Methods

1. Certification by Analysis:

All analysis must be prepared by an Oregon licensed structural engineer. Where analysis is used to qualify a mechanical, electrical, or plumbing component, the seismic design parameter R_p/I_p must be taken equal to 1.0 and a_p must be taken as 2.5.

2. Certification by Testing:

Seismic certification by testing must be based upon a nationally recognized testing standard procedure, such as ICC-ES AC 156, acceptable to the Bureau of Development Services. Substantiated seismic capacities must equal or exceed the seismic demands determined in accordance with ASCE/SEI 7-10 section 13.3. Testing must be performed by an independent laboratory having International Standards Organization (ISO) accreditation standard 17025 by an organization such as the International Accreditation Service (IAS) of the International Code Council (ICC) or must be under the responsible charge of an independent licensed structural, civil, or mechanical engineer. Test reports and manufacturers' certificate of compliance must be reviewed and accepted by an Oregon licensed structural engineer unless they have been prepared by one.

Alternatively, testing at the manufacturer's facility will be accepted if it is performed under the responsible charge of a licensed structural, civil, or mechanical engineer, not permanently employed by the manufacturer, who must witness the tests and certify the report. Test reports and the manufacturers' certificate of compliance must be reviewed and accepted by an Oregon licensed structural engineer unless they have been prepared by one.

Use of test results must be limited to the specific configuration tested. The mounting brackets must be part of the equipment qualified by testing and shall contain provisions for anchorage of the equipment to the supporting structure. The components from the mounting bracket to the supporting structure must have similar flexibility and strength to what was used in the equipment qualification test and may be qualified by a supporting analysis. The flexibility of the support structure must be considered when certifying the anchorage by analysis.

3. Certification by Experience Data:

Seismic certification by experience data must be based upon nationally qualified procedures acceptable to the Bureau of Development Services. Substantiated seismic capacities must equal or exceed the seismic demands determined in accordance with ASCE/SEI Section 13.3. Rugged equipment listed below may be considered to satisfy the experience data requirements.

F. List of Equipment and Components Typically Requiring Special Seismic Certification

The following is a list of equipment and components that may require special certification. This is not an exhaustive list and is intended to provide guidance on types of equipment that may require special seismic certification.

1. Emergency and standby power systems equipment including generators, turbines, fuel tanks, and automatic transfer switches
2. Elevator equipment (except elevator cabs)
3. Components with hazardous contents, excluding pipes and ducts
4. Smoke control fans
5. Switchgear
6. Motor control centers
7. Built-up or field assembled mechanical equipment
8. X-Ray machines(s) in the fluoroscopy (as required to meet the minimum basic radiological/imaging service space requirements)
9. Air conditioning units
10. Air handling units
11. Chillers used in HVAC
12. Cooling towers designed as components
13. Transformers
14. Electrical substations
15. UPS and associated batteries

16. Distribution panels, including electrical panel boards
17. Control panels, including fire alarm, fire suppression, pre-action, and auxiliary or remote power supplies

G. Rugged Equipment and Components

The equipment and components listed below are considered inherently rugged and must be considered to meet the requirements for Seismic Certification by Experience Data.

1. Valves (not in cast-iron housings, except for ductile cast iron)
2. Pneumatic operators
3. Hydraulic operators
4. Motors and motor operators
5. Horizontal and vertical pumps (including vacuum pumps)
6. Air compressors
7. Sterilizers
8. Blanket warmers
9. Anesthesia power columns, ceiling or wall mounted
10. Refrigerators and freezers
11. Microwave ovens for patient service
12. Film illuminators
13. Elevator cabs
14. Underground tanks
15. Equipment and components weighing not more than 20 lbs. supported directly on structures (and not mounted on other equipment or components) with supports and attachments in accordance with Chapter 13, ASCE/SEI 7

Exemptions above are for factory-assembled discrete equipment and components only and do not apply to site-assembled or field-assembled equipment or equipment anchorage.

H. Labeling

Mechanical, electrical or plumbing components of the Designated Seismic System requiring seismic certification, except rugged equipment, must have a label permanently affixed to the product. A copy of this label must be submitted for review with the building permit application.

I. Special Inspections for Designated Seismic Systems

Special inspections in accordance with Section 1705.11 are required and must be identified in the Statement of Special Inspections. The special inspector must examine Designated Seismic Systems requiring special certification in accordance with Section 1705.11.4 and verify that the label, anchorage, or mounting conforms to the Certificate of Compliance.

J. Contractor Responsibility

Each contractor responsible for the construction of a Designated Seismic System listed in the Statement of Special Inspections must submit a written statement of responsibility to BDS and the owner prior to commencing work on the system. The contractor's statement of responsibility must contain an acknowledgment of awareness of the special inspection requirements outlined in the statement of special inspection.

APPENDIX A

Sample Certificate of Compliance Letter

**SPECIAL SEISMIC CERTIFICATION
CERTIFICATE OF COMPLIANCE
XXXXX-CC-001**

**Company
Logo**

Manufacturer:	Chiller'R'Us		
Model Line:	ABC Series Chillers		
Product Type:	Chiller XYZ		
Equipment Manufacturer:			
Company:	Chiller'R'Us		
Contact:	Jamie Doe		
Telephone:	123.456.7890		
E-mail:	jamie@chillersrus.com		
Seismic Certification Parameters:			
Building Code:	XXXX OSSC		
Certification Basis:	Shake table testing		
Test Criteria:	XXXXXXXX		
Tested	$S_{DS} = X.XX g$ for $z/h = X.X$ (groundlevel installation)		
Seismic Level(s):			
Importance Factor:	$I_p = 1.5$		
Structural integrity and functional compliance verified following testing.	Mounting: XXXXXXXXX		
Issue Date:	XX/XX/XXXX		
Site Specific Information:			
Address:	1234 Anywhere Rd Portland, OR 97201		
Latitude:	XX.XX		
Longitude:	-XXX.XX		
Site Class:	X		
Seismic Level:	$S_{DS} = X.XX$ (Site Specific Short Period Design Acceleration)		
Equipment Information:			
Project Specific Model Number(s):	• XXXXXXXX		
Compliance Report Notes:			
<ul style="list-style-type: none"> Refer to XXXXX-CR-001 for all requirements, limitations and special conditions of approval. This certificate of compliance is limited by, and necessarily dependent on, the construction of 			

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the product and the accuracy of the information provided by the Equipment Manufacturer. Therefore, this certificate is valid only for the components and systems as they were configured and manufactured at the time of testing or evaluation. Any alterations to the product or its components could result in a decrease in seismic performance and thus render the resultant conclusions void.

Manufacturer Approval:

Manufacturer Representative/Engineer: Jamie Doe

Telephone: 123.456.7890

Signature: _____ Date: _____

Licensed Structural Engineer Issuing Certification:

Company: XYZ Engineers

Contact: Jo Smith, SE

Address: XXXXXX

Telephone: 123.456.7890

E-mail: XXXXXXXX

I, <Engineer >, SE, certify that I have reviewed the documentation in support of this compliance report and have determined that this special seismic certification is in general conformance with the referenced code provisions.

**Oregon
SE Stamp**

APPENDIX B

Sample Label

Company Logo

Seismic Certification Label

Oregon Structural Specialty Code

Manufacturer : XXX

Product name and Type: XXX

Manufacturer's Identification/Model Number: XXXXXXXXXXXXXXXX

Seismic Certification Parameters:

Building Code: Oregon Structural Specialty Code, 2014

Supports and Attachments: XXXXX

Seismic Performance Characteristics: $SDS(g) = x.xx$, $z/h = 1.0$, $I_p = 1.5$