

DFCM GUIDELINES FOR SEISMIC RESTRAINT OF NONSTRUCTURAL COMPONENTS

1. General Comments:

- a) These guidelines shall apply to all nonstructural components installed in newly constructed buildings, building additions, and all new or replaced components in existing buildings. Nonstructural components consist of architectural, mechanical and electrical components that are permanently attached to the primary structure.
- b) When a change in occupancy occurs that causes an existing building to be re-classified to a higher Risk Category per IBC Table 1604.5, all existing nonstructural components shall be confirmed to meet the seismic restraint requirements of Chapter 13 in ASCE 7.
- c) These guidelines define the minimum submittal requirements to obtain DFCM approval for seismic restraint of nonstructural components. The guidelines noted herein shall not cancel or set aside more conservative requirements specified by the design professional in responsible charge.
- d) All references made to the IBC or ASCE 7 reference the 2012 and 2010 editions, respectively.

2. Checklist Requirements:

- a) All DFCM projects shall have the **“Nonstructural Component Checklist”** clearly shown on the front of the construction plans. Click [here](#) to download a PDF of this checklist.
- b) Each item within the checklists shall have the appropriate box checked and comments shall be provided noting the particular component(s) that require seismic restraint. See the example checklists provided at the end of this handout.
- c) The “Not Required” box should only be checked if the component is exempt from requiring seismic restraint by Section 13.1.4 of ASCE 7, or if the component in question will not be provided as part of the project.
- d) If the “Deferred Submittal” box is checked the additional requirements of Section 6 included in this handout must be met.

3. Submittal Requirements:

- a) The seismic restraint requirements for nonstructural components may be provided with the original construction documents submitted to DFCM or may be submitted later as a deferred submittal. Whether provided with the original plans or later, the requirements of this section must be met.
- b) Seismic restraint submittals shall include construction documents meeting the requirements of Section 4 of this handout as well as supporting design information discussed in Section 5 of this handout.

4. Construction Documents:

- a) The construction documents must include seismic restraint details providing specific information relating to the materials, type, size, and locations of anchorages; materials used for bracing; attachment requirements of bracing to structure and component; and locations of transverse and longitudinal sway bracing and rod stiffeners.
- b) The construction documents must provide a “Statement of Special Inspections” which addresses the special inspection and testing requirements for nonstructural components in accordance with IBC Chapter 17. Where seismic protections for vibration isolated equipment are designed utilizing a gap clearance of < 0.25” between

the support frame and restraint, the installation shall be subject to special inspection in order to verify the gap clearance.

- c) DFCM will accept products that have been tested and listed under the ICC Evaluation Service Program, as long as they are installed in accordance with the provisions and limitations of the ICC Listing Report.
- d) The requirements for anchorage/bracing of nonstructural components cannot be satisfied by a general reference to Design Manuals. Design professional may utilize these manuals as a basis of their design, but must provide all supporting documentation to ensure that the design conforms to the requirements of the IBC.
- e) Rod hangers shall not be used as seismic supports unless the length of the hanger from the supporting structure is 12 inches or less as measured from the top of the component to the point of connection to the structure. Rod hangers shall not be constructed in a manner that subjects the rod to bending moments. Displacement of the component shall not cause damaging impact with other utilities or the structure. Flexible connections are required between systems and equipment to accommodate differential displacements. This exception does not apply to HVAC systems having an $I_p > 1.0$.

5. Seismic Restraint Design Requirements:

- a) Per IBC 1613.1, the seismic restraint of nonstructural components shall meet the requirements of ASCE 7. If the component in question is exempted by Section 13.1.4 of ASCE 7, a seismic restraint submittal of that particular component is not required.
- b) The seismic restraint design must meet the requirements listed in Table 13.2-1 of ASCE 7. These requirements may be met by providing either a *project-specific design* prepared by a registered design professional, or a manufacturer's certification that the component is *seismically qualified*.
- c) For manufacturer's to certify that components are "seismically qualified" the following must be met:
 - An engineered analysis conforming to the requirements of Chapter 13 of ASCE 7.
 - Testing by a nationally recognized testing standard procedure such as ICC-ES AC 156. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.
 - Experience data conforming to a nationally recognized procedure. The substantiated seismic design capacities shall exceed the seismic demands determined by Section 13.3 of ASCE 7.
- d) Seismic qualification is not required for equipment and components listed below, which are considered rugged. This exception applies to factory assembled discrete equipment and components only. It does not apply to site assembled or field assembled equipment.
 - Valves (not in cast-iron housings, except for ductile cast iron).
 - Pneumatic operators.
 - Hydraulic operators.
 - Motors and motor operators.
 - Horizontal and vertical pumps (including vacuum pumps).
 - Air compressors
 - Refrigerators and freezers.
 - Elevator cabs.
 - Underground tanks.

- 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 7.
- e) Designated Seismic Systems ($I_p > 1.0$) must be “seismically qualified” in accordance with the following guidelines:
- “Active” mechanical and electrical equipment that must remain operable after the design earthquake:
 - Testing as detailed by Part ‘d’ above.
 - Experience data as detailed by Part ‘d’ above.
 - Equipment that is considered “rugged” per Part ‘d’ above.
 - Components containing hazardous materials shall be certified by the manufacturer as maintaining containment following the design earthquake:
 - Testing as detailed by Part ‘d’ above.
 - Experience data as detailed by Part ‘d’ above.
 - Engineering analysis utilizing dynamic characteristics and forces. Tanks (without vibration isolators) designed by a registered design professional in accordance with ASME Boiler and Pressure Vessel Code, 2004 (BPVC 2004), and satisfying the force and displacement requirements of Sections 13.3.1 and 13.3.2 of ASCE 7 with an $I_p = 1.5$.
- f) The following seismic restraint publications shall be considered “Accepted Engineering Practice”:
- Guidelines and details that have been evaluated and reported under the International Code Council Evaluation Service Program (ICC-ES).
 - Seismic restraint manuals, guidelines and details that have been approved by the California Office of Statewide Health Planning and Development (OSHPD) under their pre-approval program for seismic restraint systems. Only those systems listing a current “07” OSHPD number (i.e. OPA-0300-07) are acceptable.

6. Concrete Anchorage Design for Nonstructural Components:

- a) All anchorage designs must comply with the requirements listed in the ASCE 7, Chapter 13.
- b) All anchorage designs must also comply with Appendix D of ACI 318.
- c) All anchors requiring special inspection must specify special inspection is required within the submittal.
- d) Power actuated fasteners are prohibited from use in tension load applications for projects within Seismic Design Category ‘D’ or above unless they are specifically tested and approved for use.
- e) Expansion anchors shall not be used for mechanical equipment with motors rated over 10hp.
 - Exceptions:
 - Vibration isolated equipment utilizing springs for isolation
 - Undercut expansion anchors are used
- f) All post installed anchors must have a current ICC-ES report for the proposed application.

7. Deferred Submittals:

- a) Deferred submittals of seismic restraint of nonstructural components must be submitted to the DFCM Building Official a minimum of two weeks prior to the planned installation in order to allow for plan review and forwarding to inspectors. In the event that the submittal is deficient additional time may become necessary.
- b) Deferred submittals shall be clearly noted on the construction plans as required by IBC 107.3.4.1. Prior to submitting to the DFCM Building Official, the submittal must be reviewed by the design professional in responsible charge and approved for general conformance with the design of the building. Please note on the plans that no deferred submittal element shall be installed until DFCM approval has been received.
- c) All deferred submittals for seismic restraint of nonstructural components shall include a Special Inspection/Quality Assurance plan in accordance with IBC Chapter 17.
- d) When seismic restraint of nonstructural components is installed prior to receiving DFCM approval it shall not be covered or concealed until plan review and inspection approval. Further, installers are proceeding at their own risk until plan review and inspection approval occurs.

NONSTRUCTURAL COMPONENT CHECKLIST

ITEM DESCRIPTION	NOT REQUIRED	ON CONST. DOCUMENTS	DEFERRED SUBMITTAL	COMMENTS
Architectural Components:				
Interior Nonstructural Walls & Partitions		X		See sheet A502
Cantilever Elements (<i>i.e. parapets, etc.</i>)		X		See sheet A504
Exterior Nonstructural Wall Elements			X	Precast cladding system / curtain wall system
Veneer		X		See sheet A303
Penthouses	X			
Ceilings (<i>i.e. suspended grid or hard-lid</i>)		X		See sheet A302 & specifications
Cabinets (<i>i.e. storage cabinets, equip, etc.</i>)		X		See sheet A504
Access Floors	X			
Storage Racks	X			
Appendages & Ornamentations	X			
Signs & Billboards	X			
Other: Suspended ceiling clouds		X		See sheet A302 & specifications
Other:				
MEP Components:				
Fire Sprinklers			X	
Mechanical Equipment (<i>i.e. HVAC, fans, air handlers, boilers, furnaces, tanks, chillers, water heaters, heat exchangers, evaporators, engines, turbines, pumps, compressors, MFR equipment, etc.</i>)			X	Mechanical submittal
Electrical Equipment (<i>i.e. generators, batteries, inverters, transformers, MCC, panel boards, switch gear, cabinets, etc.</i>)			X	Electrical submittal
Elevator & Escalator Components			X	Elevator submittal
Communication Equipment, Computers, Instrumentation, and Controls	X			
Roof-mounted Chimneys, Stacks, Cooling & Electrical Towers	X			
Lighting Fixtures		X		See sheet A302 & specifications
Vibration Isolated Components	X			
Piping & Conduit Systems			X	Mechanical & Electrical submittals
Ductwork (<i>including in-line components</i>)			X	Mechanical submittal
Conveyors	X			
Cable Trays			X	Electrical submittal
Other: Refrigeration Equipment			X	Mechanical submittal
Other:				

NOTES:

1. Deferred submittals for seismic restraint of nonstructural components must be submitted to the DFCM Building Official a minimum of two weeks prior to the planned installation in order to allow for plan review and forwarding to inspectors. In the event that the submittal is deficient additional time may become necessary.
2. When seismic restraint of non-structural components is installed prior to receiving DFCM approval it shall not be covered or concealed until receiving both plan review and inspection approval. Further, installers are proceeding at their own risk until plan review and inspection approval occurs.
3. The requirements for seismic restraint of nonstructural components cannot be satisfied by a general reference to Design Manuals. The design professional may utilize these manuals as a basis of their design, but must provide all supporting documentation to ensure that the design conforms to the requirements of ASCE 7-05, Chapter 13.
4. Submittals must include details of the proposed seismic restraint of nonstructural components. These details must show specific information relating to the materials, type, size, and locations of anchorages; materials used for bracing; attachment requirements of bracing to structure and component; and locations of transverse and longitudinal sway bracing and rod stiffeners. Submittals may also require structural calculations, engineering reports, test data, and/or specifications to ensure code compliance.