

DELEGATED DESIGN FOR SEISMIC AND WIND LOAD ENGINEERING ON MECHANICAL AND ELECTRICAL COMPONENTS

IBC 2015 Section 107.3.4: "...The registered design professional in responsible charge shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building."

This section or something similar has been in all previous International Building Codes, in BOCA prior to IBC and in the UBC prior to BOCA.

It is well understood that a major construction project is complex, and that one engineer or engineering firm may not have the expertise or experience in all of the engineering requirements that go into such a project.

As such, the code allows the responsible engineer of record to delegate design work to other engineers or engineering firms when the project they are working on requires code compliance in areas that they themselves may not be completely familiar with.

This does not mean that a mechanical engineer must delegate design work to another mechanical engineer or that an electrical engineer must delegate design work to another electrical engineer; nor does the code cite specific disciplines for any engineering work performed. As with being allowed to sit for the PE exam itself in any discipline, the requirement is more about experience in doing the engineering work required.

When a mechanical or electrical engineer has a project with roof mounted equipment subject to wind loads requiring calculations on the maximum loading on the components, detailing of the minimum attachment requirements to resist these loads with standard safety margins and often requiring calculation on supplementary supports such as roof curbs, pipe supports, equipment stands, etc., they can perform these calculations themselves and provide the appropriate detailing/liability insurance. Similarly, if a project is designated as requiring seismic restraint (for life safety/high hazard only or for all mechanical and electrical components) the engineer can choose to perform the calculations/detailing themselves using their own liability insurance.

It is more typical for the engineer to include specification requirements for the installing contractors: electrical, plumbing, mechanical and/or sheet metal to include hiring an outside engineer or engineering firm which will perform this work for them and provide the necessary PE stamp and liability insurance.

There are many companies and individual engineers across several disciplines that have specialized in the seismic and wind restraint of mechanical and electrical components and distributed systems. If the mechanical or electrical engineer of record for the project chooses to delegate wind and seismic design and certification, VISCMA recommends including the following requirements:

- 1) A minimum of \$1,000,000 Errors and Omissions Insurance.
- 2) A minimum of 5 years' experience in wind and seismic restraint engineering.
- 3) A submittal package stamped by a PE licensed in the state in which the project is located.

Setting a minimum amount of insurance assures that the company or engineer hired by the contractor could handle the kind of financial responsibilities that are inherent in assuming the liability for this type of work. Requiring a minimum level of experience assures that the contractor cannot hire a company or engineer that may have some experience in this type of work but are essentially still potentially on a "learning curve." Requiring a PE licensed in the state in which the project is located assures that the engineer performing the delegated design work is familiar with the state and local codes which may vary from the national/international codes.

VISCMA does not recommend limiting the delegated design engineer to only a single discipline such as a mechanical or a structural engineer, as this simply serves to limit the number of qualified engineers that the contractor has to choose from and does not assure a competent code compliant design.

On the surface it may seem that a mechanical engineer should be specified for mechanical components or that a structural engineer should be specified because ultimately these wind and seismic loads on components and distributed systems must be brought back to the building structure. In reality the qualified wind/seismic design engineer provides the maximum

loads/moments the anchorage will apply to the structure for each component and each distributed system brace for review by the structural engineer of record for the project.

Typically, loads on the structure are “self-regulating” with loads from smaller, lighter suspended units or systems in the range of post installed concrete anchor capacities in the underside of concrete decking that do not require any special review or consideration while the higher loads from larger, heavier floor mounted units can frequently be accommodated by the dunnage already designed to be put in place to support the larger dead loads. Probably the most frequent issues relate to the anchorage interface where dunnage is not fitted and the equipment attachment is directly to concrete. In these cases, concrete anchors can require embedment depths and slab thicknesses that are beyond the norm for floor or roof slab designs.

On rare occasions the qualified wind/seismic engineer will work with the structural engineer of record for the project to reduce loads on the structure; adding anchors, adding bracing or re-designing support steel footprints to bring the applied loads within acceptable limits for the structure. This can avoid potentially costly structural reinforcement that could delay a project.

In conclusion; if the mechanical or electrical engineer of record does not specify the need for a qualified engineer or engineering firm to perform a delegated design that encompasses all of the wind and seismic requirements, and the engineer of record does not take on this work themselves, then the mechanical or electrical engineer by default assumes the responsibility and liability associated with these installations.

It should be noted that in any case the structural engineer of record will need to review and have final say on the impact of the local loads on the overall structure. If there is no global specified requirement for a qualified individual to perform such an analysis and the contractor is left to select components with no oversight or supervision, then the engineer of record will be held responsible for any errors found by the building official or owners representative as well as responsibility for any damages or loss incurred by components or systems that fail under a wind or seismic event.

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VISCMA is a non-profit association representing the manufacturers of seismic restraint, vibration isolation and noise control equipment. The primary objectives of the organization are to educate the construction industry on the proper use and application of vibration isolation and seismic restraint and to develop standards to continually improve the industry.

In partnership with FEMA and ASCE, VISCMA also publishes three Seismic Installation and Inspection Manuals designed to assist field personnel.

The association office is located at 994 Old Eagle School Road, Suite 1019, Wayne, PA 19087-1866 and can be reached at 610-971-4850 or info@viscma.com.

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