

PURPOSE, EXTENT AND LIMITATIONS OF A SEISMIC ANALYSIS

The primary purpose for a seismic analysis with regard to equipment, piping, ductwork and conduit is to offer a degree of confidence to the Engineer of Record that a competent individual has reviewed the application, specified appropriate componentry and documented that, properly installed, it is in compliance with code and specification requirements.

There are many inherent limitations as to the extent of such an analysis. The primary limitation is that, by law, an Engineer can only take responsibility for those components over which he has direct control or knowledge. The typical items that are addressed in an analysis are the determination of design seismic forces, the resulting reactions at the restraint connections to the structure (if the equipment remains rigid) and the capabilities of the hardware and anchorage to resist those forces.

The capabilities of equipment to withstand seismic forces must be determined by either the equipment manufacturer or by an independent party that has access to all of the technical information relative the equipment. As to it's structural durability, all material strengths, thicknesses, geometry and operating loads must be accounted for and added to the seismic load requirements. The issue becomes more complex when continued operation of the equipment is mandated. As the ability of an independent party to obtain this information is extremely limited, the manufacturer must normally address the equipment durability issues.

There are also building structural issues that must be considered. These relate to the ability of the building structure to withstand the local seismic forces placed on it by the equipment. In a similar fashion to the equipment, to properly analyze these factors, a detailed knowledge of both the building structure and the loads anticipated in that structure during a seismic event must be considered. These must be added to the forces generated by the equipment. As there is no one else with access to this information, this analysis falls into the domain of the Structural Engineer of Record.

Finally, in order for the system to work, it is assumed that all of the componentry is properly installed. Critical information on the installation of the various parts is provided and frequently once installed, it is extremely difficult to determine if the appropriate procedures were followed. As a result, after the fact inspections are based only on what can be observed in the final installation and are not comprehensive. The responsibility for following the appropriate procedures falls to the installation contractor with possible oversight by an independent on site observer.

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PAGE 1 OF 1

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