

Earthquake Preparation Guide

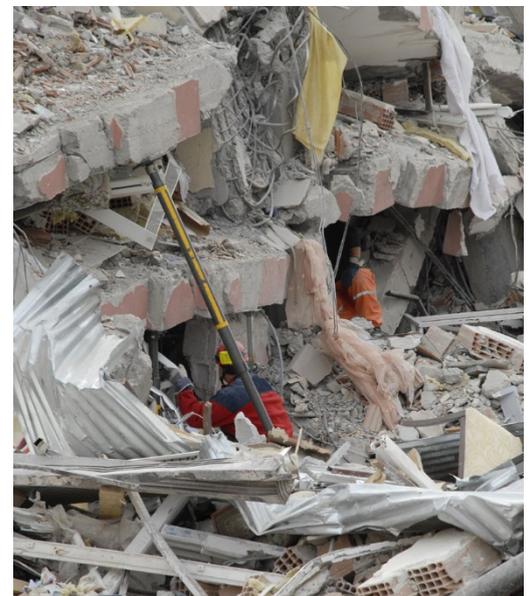
Earthquakes around the world are both frequent and costly and being prepared can dramatically change the outcome. **Are you prepared?** Use this guide to help you understand your Earthquake risks and to develop plans for mitigating Earthquake damage.

Understand Earthquake Exposure

- ❑ Understand site specific characteristics and identify potential magnitude/intensity at your location (past events, liquefaction, proximity to faults, geotechnical report, earthquake maps etc.) (Note: In US, this geotechnical information can be obtained from our local building department.)
- ❑ Understand earthquake hazards including; shake damage, fire, liquid/chemical/gas release, and interruption to services.
- ❑ Understand how earthquake hazards could impact your operation by conducting a earthquake hazard and operability study (HAZOP) focused on Life safety, Structural/Non-structural components, Equipment, and Business Interruption, etc.
- ❑ Understand your structural vulnerabilities and identify seismic retrofit needs for the existing foundation/ structural and non-structural components by consulting with a license structural engineer.
- ❑ Understand the Early Earthquake Warning (EEW) implemented in your region (early warning systems has been implemented in regions including Taiwan, Japan, California, Mexico, Romania, and Turkey), while still being perfected there is potential for advanced warning.

Implement Earthquake Mitigation

- ❑ Develop/train an Earthquake Emergency Response Team to initiate pre-Earthquake and post-Earthquake recovery actions.
- ❑ Develop plans for protecting and maintaining fire protection systems in service.
- ❑ Develop business continuity plans for rapidly resuming operations after a Earthquake including sourcing restoration / remediation companies/ critical spare parts inventory.
- ❑ Establish a list of contractors to aid in Earthquake preparedness and recovery. Place contractors on alert.
- ❑ Develop procedures for safe shutdown of utilities and operations (electricity, gas, flammable liquids operations, etc.)
- ❑ Provide anchorage, clearance, and flexibility for machinery and equipment.
- ❑ Provide bracing, clearance, and flexibility for liquid filled piping systems including domestic water, fire protection water, other liquids and gases.
- ❑ Provide Earthquake Actuated Automatic Seismic Shutoff Valves for flammable gas systems and flammable liquid dispensing systems.
- ❑ Retrofit structural members to adequately resist seismic forces under the direction of licensed engineers and contractors.
- ❑ Ensure emergency gear and equipment are ready and accessible.
- ❑ Maintain an adequate inventory of materials such as mops, brooms, squeegees, portable generators, etc.



Preparing for an Earthquake before the event occurs can dramatically decrease the amount of Earthquake damage. Those who are prepared with defined plans, adequate equipment and trained employees have a much better chance of rapidly restoring business operations. Are you prepared?

Total economic losses globally from natural catastrophes and man-made disasters were USD 337 billion in 2017.

At least 11,000 people died in natural catastrophe and man-made disaster events in 2017.

Annual insured losses have reached USD 59 billion from earthquake related damage in recent times.

Source: Swiss Re Sigma Dec 2018; EarthquakeSmart.gov: Statistics – Official NFIP Site.

Develop Post-Earthquake Procedures and Precautions

- Be aware of after-shocks, conduct safety evaluation before entering property. Stay aware of potential site hazards including live electrical wires, broken glass and sharp metals, leaking fuel gases or flammable liquids, damaged building features or contents that could shift or collapse.
- Notify relevant authorities and notify Swiss Re.
- Notify relevant contractors involved with resuming building operations, cleanup, repairs, and etc. (electrical, sprinkler, fire alarm, gas, machinery/equipment, HVAC, general contractor, and etc.)
- Perform a post earthquake assessment of facility to ensure structural integrity and to determine adequate restoration plans.
- Ensure all fire protection systems are functional and in service (fire pumps, automatic sprinklers, special protection systems fire alarms and security systems). Contact fire contractor if required.
- Verify integrity of all gas/chemical piping systems and ensure all automatic shut off valves have actuated. If your facility does not have automatic shut off units, Terminate the supply manually. **Do not** reset the gas shut off valves until HAZOP has been performed.
- Activate a Fire Protection Impairment Permit if required. Follow all guidance including implementing a designated fire watch in all impaired areas.
- Ensure a smoking ban is in place throughout the facility.
- Restore power by emergency generators or portable generators since public utilities could be unavailable for days/weeks.
- Begin salvage operations
- Prohibit Hot Work until fire protection is restored and HAZOP is performed. Utilize permit system for all hot work.
- Commence cleanup, such as removing Earthquake debris, liquid cleanup, building materials, and etc.



Create a Earthquake Emergency Response Plan (EERP)

- Formalize the pre-Earthquake and post-Earthquake procedures and precautions into a written EERP.
- Form a Earthquake response team, assign a leader, and assign specific tasks to members of the team.
- Document all hazardous operation shut down procedures in the EERP.
- Give authorization for the Earthquake response team to initiate equipment or process shutdowns.
- Provide external/internal Earthquake related training as required.
- Conduct drills of the EERP utilizing real-life simulation or computer simulation.
- Validate the EERP annually. Adjust/update as needed.

Swiss Re CatNet Natural Hazard Modelling Online:

- Earthquake and other natural hazards exposure profiles for any location worldwide are available through Swiss Re's CatNet online tool. Use the following link to register:
http://www.swissre.com/clients/client_tools/about_catnet.html

Useful Links

<https://earthquake.usgs.gov/>

<https://www.disasterassistance.gov/information/disaster-types/earthquake>

Contact

Contact your Swiss Re Corporate Solutions Risk Engineer or representative for additional information or assistance with quantifying earthquake severity, identifying hazards, and developing an Earthquake Emergency Response Plan.

The guidance contained in this document, in the opinion of Swiss Re Corporate Solutions, is sound, reasonable and may help reduce the risk of property loss and business interruption. Swiss Re Corporate Solutions does not warrant that all losses will be avoided or that all reasonable preventive measures have been taken if advice in this document is followed. By sharing its opinion as to certain sound and reasonable practices, Swiss Re Corporate Solutions does not relieve the insured of its own duties and obligations with respect to assessing and implementing loss prevention measures and Swiss Re Corporate Solutions disclaims any liability as respects loss prevention.

Earth experiences several hundred observable earthquakes daily, with a major one, magnitude 7 or greater, occurring monthly on average.

Sources: Bloomberg