



SAN FRANCISCO
STATE UNIVERSITY

Seismic Safety Practices

A tutorial for interpreting this category
on the lab safety checklist

Notes about this section

The seismic category requires some thought when inspecting labs or activity spaces.

Not all seismic safety issues are included in the numbered statements. Use the SEISMIC - OTHER line to record findings that are not specifically asked for in the other statements.

Sometimes it is a judgement call whether or not a particular set-up is in compliance with the intent of the statement.

If you think there is a safety issue but are not sure, contact EH&S for an evaluation.

SEISMIC *

1. Heavy items, including ≥ 1 gallon chemical containers, are stored on lower shelves.
2. High overhead storage is secure.
3. Shelves are equipped with restraints.
4. Cryogenic liquids - tanks and dewars are seismically secured.
5. Furniture taller than 60" is seismically anchored to avoid tipping over.
6. Chemical storage and flammable liquid storage cabinets are seismically anchored to prevent tipping over.
7. Large equipment such as refrigerators, freezers, that can fall blocking an exit have seismic restraints.
8. SEISMIC - OTHER

Statement #1

Heavy items, including ≥ 1 gallon chemical containers, are stored on lower shelves.

- Any items placed on higher shelves that are heavy, liquid or otherwise, should be placed in lower shelves unless:
 - Room is not meant for continuous occupancy (i.e., stockrooms or storage);
 - Item are secured to the shelf;
- Oftentimes, boxes in higher shelves are empty or items are lightweight. Use your judgement of risk to occupant if item falls.
- Note items that are too close to the ceiling in the Fire Safety category. It is okay to also mention it in the finding notes;



This box was full of heavy tools.

Statement #2

High overhead storage is secure.

- Check if high overhead storage cabinets or shelving is screwed in all the way;
- Assess if items in high overhead storage are in danger of falling off and injuring people;
- If items are heavy, contain substances that can be harmful or pose any threat of injuring, the high overhead storage should be marked down as non-compliant.
- Bottles or jars of chemicals on higher shelves should have an earthquake lip or other means of securing the items on the shelves.



Statement #3

Shelves are equipped with restraints.

- High priority is for units containing chemicals; These should contain restraints;
- The restraints are usually of plexiglass, metal, or pre-built into the unit;
- Straps, cords and bungees may be suitable for bulky items on shelves;
- Lightweight items are ok to be placed on a shelf without restraints;

Let's look at some examples on the next slide



Link

Seismic Bracing Resources
and Guides from Stanford

Statement #3 - Notes

- In this case, the shelves contain lightweight items.
- However, the shelf is located next to the exit door, and could disrupt evacuation processes during an earthquake.
- This is a storage room and not continuously occupied.

OK? or Non-Compliant?

- In an earthquake, can a person still get out if the items are falling off during the shaking?
- In this case, report as compliant, but photograph the unit and add a recommendation in the notes that a restraint should be added to top shelf.

Note that sometimes the line between "acceptable, *but could be better*" or "OK" and "non-compliant" is a matter of judgement.



Statement #3 – Notes

Some compliant examples



The upper shelf has restraints, but the lower one doesn't. This is still compliant because this set-up is above a large counter unit. However, it would be better if the lower shelf also had a restraint installed.

This unit contains chemicals and has restraints to protect them from falling off the shelf.



Note that items on the top of cabinet are not secured, but they are lightweight and don't pose a safety hazard if they fall.



Statement #4

Cryogenic liquids - tanks and dewars are seismically secured.

- Cryogenic tanks and dewars must be secured regardless of size, unless smaller units are being used at during the moment of the inspection;
- These units are usually secured by being chained to another piece of furniture or a rack;
- Most labs do not have any cryogenic units;
- While this dewar won't easily fall over, it is placed in a pathway, and someone could trip over it. It should not be stored in this location as shown.
- This unit was placed in the pathway, unchained. In this case, **it is not compliant.**



Statement #4 - Notes
Examples of compliant seismic
bracing for large nitrogen dewars

Double-chain attached
to wall bracket

Seismic dewar restraint cage
available for purchase that
can be secured to the floor,
if not located next to a wall.
Sold by Strand Consultants.



Statement #5

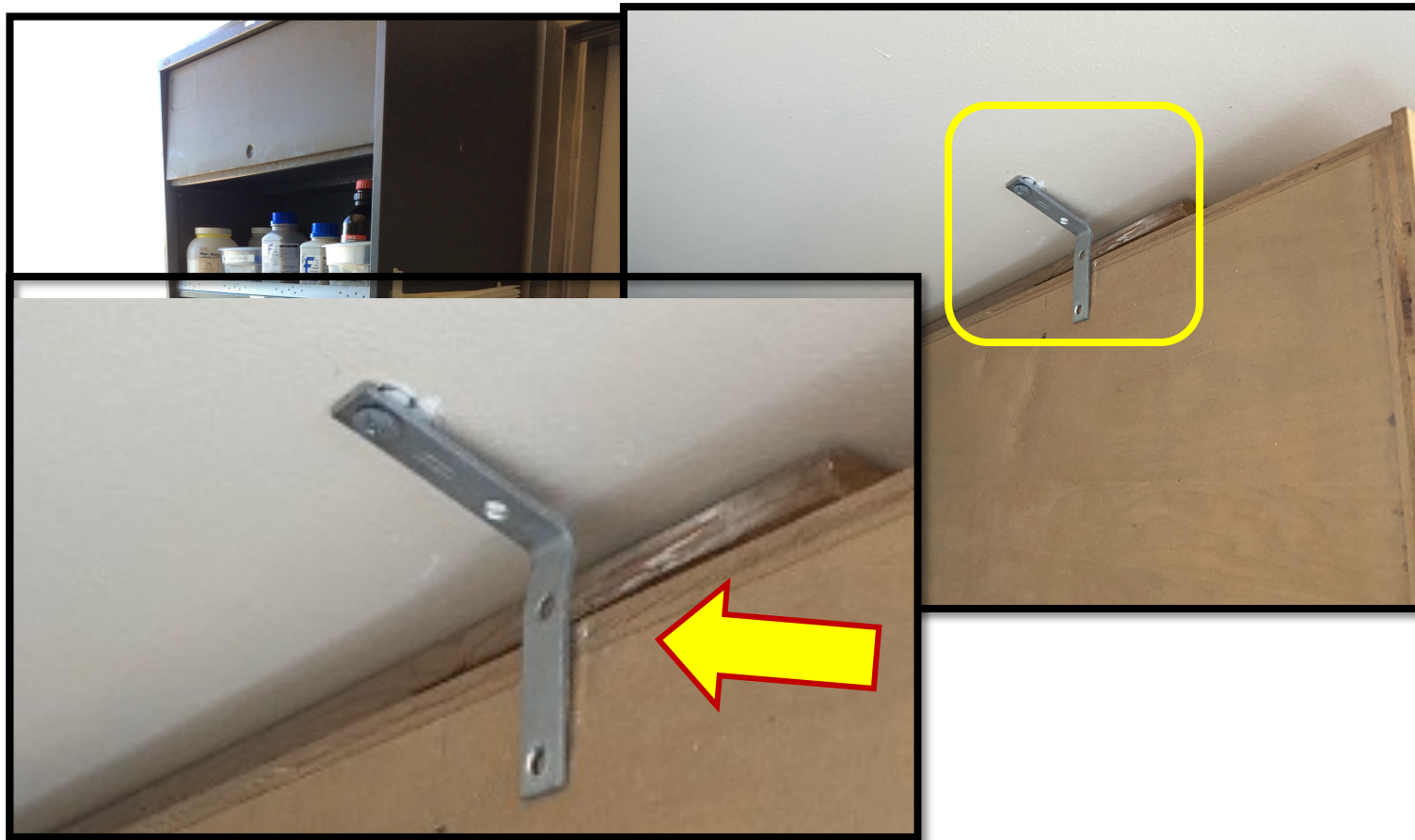
Furniture taller than 60" is seismically anchored to avoid tipping over.

- Furniture taller than 60" that is not built into the wall or the floor (furniture that can be moved around) must be secured;
- It can be secured by bracing the unit to the wall;
- It is especially dangerous when furniture is next to the door, as it could easily tip over and block the exit;



Not compliant

Statement #5 - Other non-compliant examples



Attention (!!!):

Check if furniture is fully braced. Some units get moved around and oftentimes, they don't get properly reattached to the wall or ceiling.

Statement #6

Chemical storage and flammable liquid storage cabinets are seimically anchored to prevent tipping over.

- Chemical storage units, regardless of size, should either be placed in a way where they will not tip over or be bolted to the floor or the wall;
- The most common securing method used on campus is *bracing it with brackets (same as furniture securing method)*;
- If unit is short (less than ~42 inches), it doesn't need to be secured, but it must be placed away from pathways and securely underneath fume hoods or any other piece of furniture.

Not compliant



Statement #7

Large equipment such as refrigerators, freezers, that can fall blocking an exit have seismic restraints.

- Most common issue on campus;
- Refrigerators and equipment that are tall **but are not near an exit**, should be marked under the OTHER line item (statement 8);
- EHS is still studying a way to secure refrigerators, but it should still be marked down if not compliant;
- If a refrigerator unit near an exit tipped over, it could block the exit and trap people inside a room or delay evacuation processes.

Let's look at some examples on the next slide.



Statement #7 - Compliant Examples of Refrigerator/Freezers that are secured

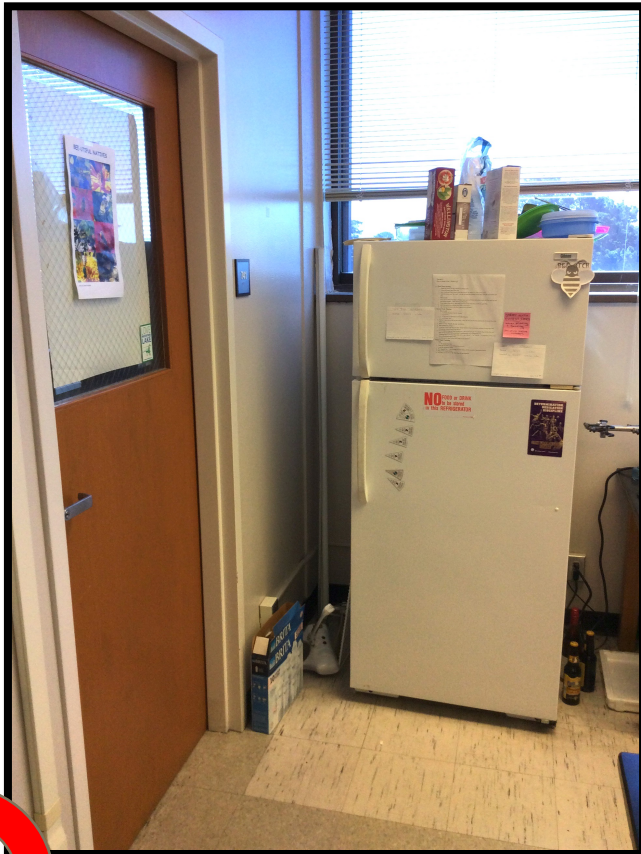


Types of earthquake fastening kits for refrigerator and freezers



Statement #7 – Notes Non-compliant examples

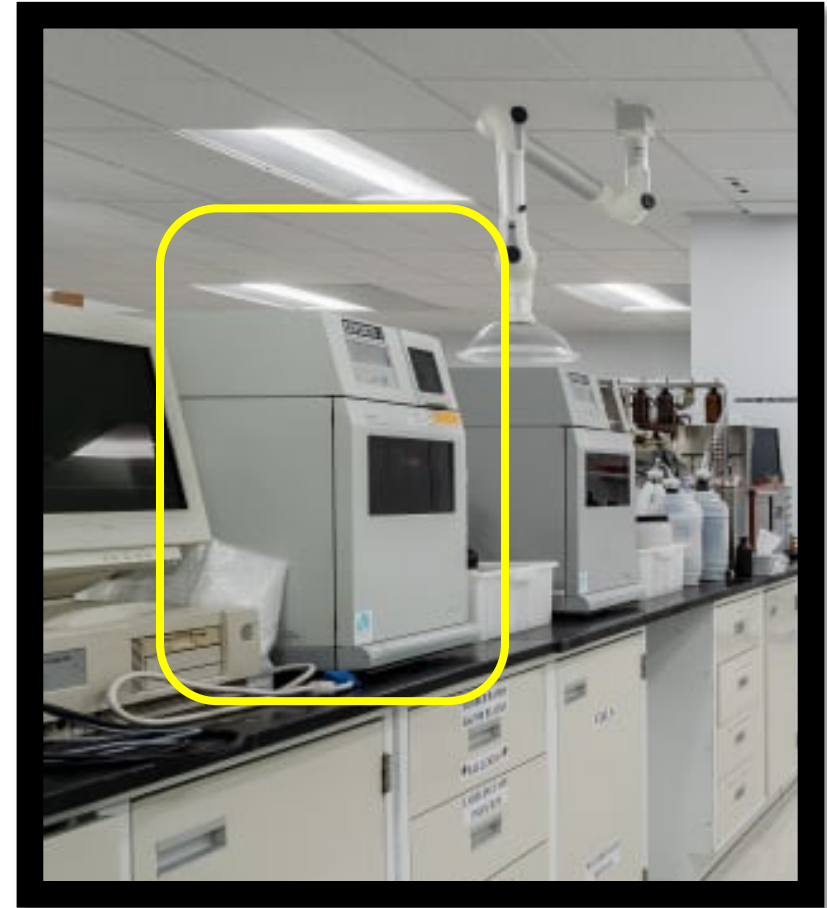
These large unsecured refrigerators and freezers are located next to exit doors. If these fall, occupants can't get out after an earthquake.



Statement #8

SEISMIC - OTHER

- Any other item not addressed in previous statements should be reported here;
- The issue should be described in detail in the notes; A suggestion can also be made in the notes;
- If nothing to report here, mark N/A.
- You must record something under "OTHER" or the inspection won't show as complete.



Lab equipment sitting on bench tops or tables are not specifically addressed.

Statement #8 - Notes

Other Issues Fall Under This Statement

These are examples of seismic issues that are not covered by the other statements. Include any findings in this section

- Heavy equipment stored on counters or bench tops
- Un-secured refrigerator units and other large equipment that are not near an exit,
- Equipment or instruments that are heavy and stacked on top of each other that look like they should be seismically secured



Statement #8 - Notes Stacked Equipment

- Units (refrigerators or equipment) stacked on top of each must be braced
- Both must also be braced to the wall or bench top
- Report non-compliant findings under "Other"

As a rule of thumb...

If lab equipment on a bench top or table is higher than ~42 inches from the surface, it **must** be braced.

Compliant

This is two units on top of each other safely secured



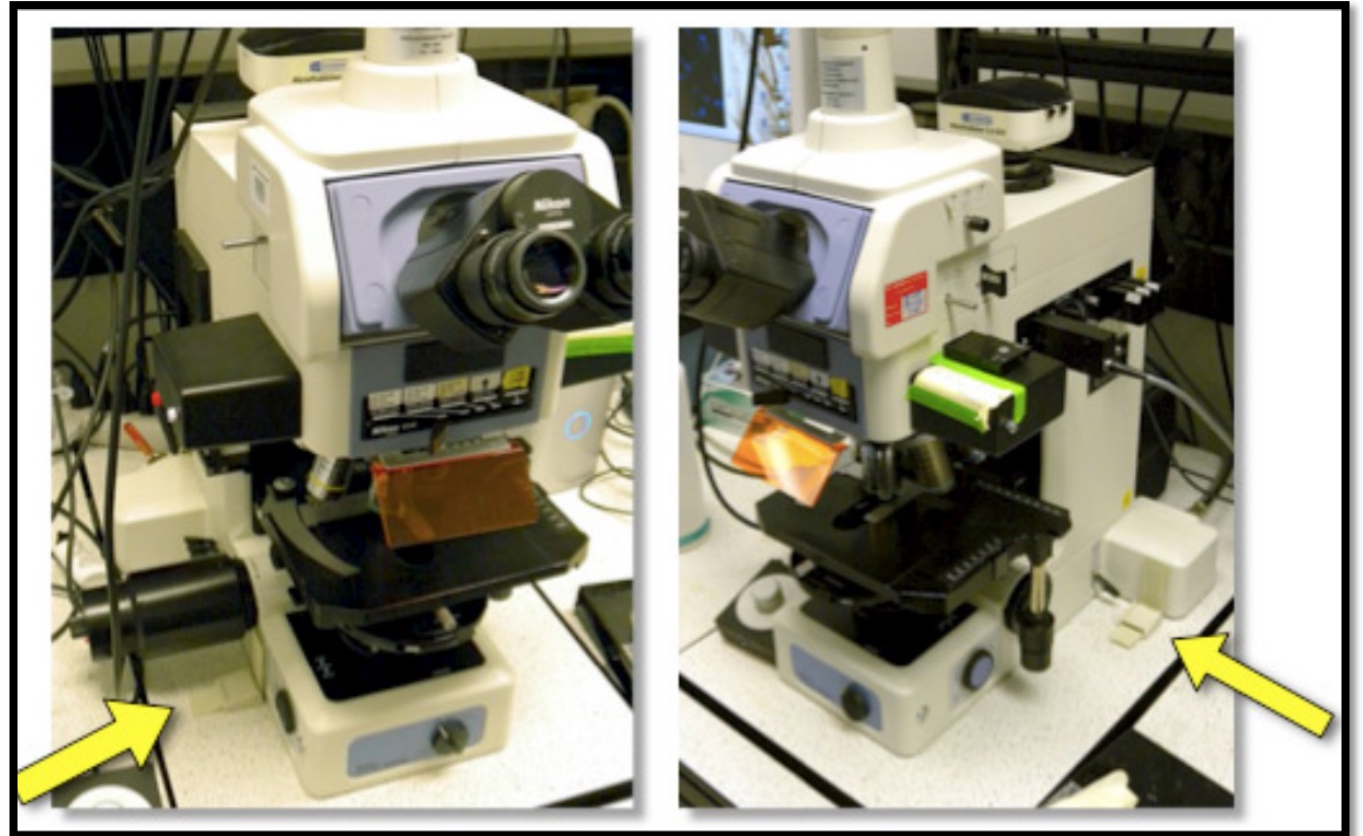
Statement #8 - Notes Seismic bracing for other lab equipment

Do not mark equipment on benchtops and tables as “non-compliant” unless the top of the equipment reaches ~42” high from the the surface.

Sometimes equipment is sitting on top of another item. If it looks unstable, note it as non-compliant and check the “needs verification” check box.

Recommendation if asked:
Consider using quake bracing straps like those used for computer/stereo components to fasten item to the table.

Generally, if heavy or expensive lab equipment on a benchtop is ~18 to ~42 inches high it *should* be braced.



Expensive and heavy microscope on benchtop is braced

Statement #8 – Notes More Examples of Compliant Seismic Bracing



Laminar flow hood



Metal guard on shelf to prevent sample vials from falling off

Things to consider

Checklist Options



Can mean "good", "okay", "compliant", "acceptable" "ok but not ideal"



Can mean "unsafe", "not acceptable", "not compliant", "maybe unacceptable, so requires verification"

There are so many unique situations and equipment setups in academic laboratories and activity spaces can't be adequately covered by a handful of safety statements in the INSPECT app.

Often it is a judgement call whether a situation is "in compliance" or not.