| Carnegie Mellon University Environmental Health & Safety FIRE \| LAB \| WORK | **Chemical Waste Vault Design and Construction Guideline** |
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| **Revision Number:** Initial | **Prepared by:** Environmental Health and Safety |

## 1. Purpose

The mission of Environmental Health and Safety (EHS) is to support the University's mission and values by sustaining and enhancing a safe and healthy environment within the CMU community. As part of this mission, EHS manages regulated chemical waste that is generated as part of the research and other day-to-day operations at the university. This service requires a central accumulation area (also known as a chemical waste storage room) to safely store and transfer chemicals before they are transported to a waste disposal facility.

## 2. Scope

All new and/or renovated buildings where EHS will be expected to manage chemical waste shall be equipped with a chemical waste storage room. This guideline provides the minimum requirements for the design and construction of chemical waste storage rooms and applies to any new construction or renovation of Carnegie Mellon University facilities (including leased properties) where chemical waste will be managed. This guideline should not be considered "all-inclusive" and EHS must be included in the design and construction process. This guideline does not address the minimum requirements for regulated medical and biological waste, radioactive waste, and electronic waste storage facilities.

## 3. Design Requirements

### a. Size

i. The chemical waste storage room shall be a minimum of 150 square feet in size, with no room dimension less than 10' in width or height.

### b. Location and Access

i. The chemical waste storage room shall be:
   1. located on or near a loading dock, capable of supporting a 26' long box truck;
   2. located greater than 50' away from any property line;
   3. equipped with lock that is key card accessible.

### c. Construction and Finishes

i. Walls and ceilings shall be:
   1. constructed of materials that have a minimum one-hour fire rating;
   2. constructed with durable, washable, and chemical-resistant paint or coverings that can resist spills and splashes from acids, caustics, solvents, and other hazardous materials.
   3. installed with protection on exposed corners to protect against equipment damage, and;

4. free of any penetrations or other unsealed openings (all penetrations and joints must be sealed with a listed firestop system).

ii. Floors shall be:
1. constructed of materials having a minimum one-hour fire rating;
2. resistant against spills and splashes from acids, caustics, solvents, and other hazardous materials;
3. liquid tight, monolithic/seamless, or with welded seams;
4. slip-resistant, and;
5. coved 4 inches up the wall or have a cove base that is installed to create a water-tight seal to the floor.

iii. Benches, shelves, and other working surfaces shall be:
1. durable, washable, and chemical-resistant;
2. liquid tight, monolithic/seamless, or with welded seams;
3. coved or have a backsplash when contacting walls, and;
4. appropriately rated to support equipment and stored items.

iv. Doors shall be:
1. constructed of materials that have a minimum one-hour fire rating;
2. equipped with panic hardware (crash bar) and viewing window;
3. equipped with magnetic door holders that release during building fire alarm or suppression system activation;
4. secured using key access only, and;
5. wide enough to admit a standard 48” x 40” pallet.

## 4. Systems and Equipment

### a. Electrical

i. All electrical and mechanical systems serving the chemical waste storage room shall be connected to building emergency power (generator), where provided.

ii. Switches, outlets, lighting systems, sensors, and all other electrical components within the chemical waste room shall:
1. meet Class I Division 2 requirements, and;
2. contain Ground Fault Circuit Interruption (GFCI) protection within 6 feet of a known or potential water source.

iii. A complete bonding and grounding system shall be provided for all flammable liquid cabinets and equipment used for transferring flammable liquids. Two additional grounding points that are reading accessible for daily use shall be provided throughout the room.

### b. Plumbing

i. Sinks
1. A stainless steel or epoxy sink with countertop space, backflow prevention and accessible isolation valves shall be provided.

ii. Emergency eyewash/shower

1. An emergency eyewash/shower station meeting American National Standards Institute (ANSI) Z358.1-2014 guidelines shall be provided inside of or within 10 second travel distance of the chemical waste storage room.

iii. Spill Containment and Drainage
   1. A self-contained sump capable of holding a minimum of 10% of the rooms total chemical storage capacity, but no less than 55 gallons, shall be provided at the entrance to the room.
   2. No floor drains or other "open" connections to the sanitary or storm sewer are permitted.

iv. Compressed Air Connection
   1. A minimum of one regulated compressed air outlet, capable of providing a minimum of 100 psi shall be provided.

**c. Mechanical Ventilation**

i. The chemical waste storage room shall be equipped with a conditioned air supply system capable of maintaining comfortable working conditions throughout the year.

ii. An exhaust system shall be installed that provides an inward flow of air without recirculation to spaces outside of the chemical waste storage room.
   1. Exhaust inlets shall be provided within 12" of the ceiling AND within 12" of the floor; configured in a way that provides air movement across all portions of the floor.
   2. All ductwork and associated mechanical components must be resistant to corrosive vapors.

iii. Provide at least 8 air changes per hour (ACH), or, a minimum of 1 CFM of airflow per 1 square foot of floor area, whichever is GREATER.

iv. Provide AT LEAST one of the following for localized fume capture/extraction during the dispensing of chemicals:
   1. Walk-in fume hood
   2. Overhead fume extraction canopy
   3. Moveable extraction arm (snorkel)
   4. Drum vapor extraction system

v. Electrically supervised isolation dampers (integrated with the rooms fire suppression system to close prior to system discharge) shall be installed in all duct work.
   1. Fire dampers or combination fire/smoke dampers with fusible link detection are not permitted. All dampers must be electrically actuated and supervised.
   2. Dampers in ductwork where airflow will not be shut down must contain a Class 1 leakage rating and be designated for operating in dynamic airflow environments.

**d. Fire Protection**

i. A non-water-based fire suppression system (e.g. inert gas, dry chemical, aerosol, etc.) shall be provided in all chemical waste storage rooms. Sprinklers or other water-based systems are not permitted. Fire suppression systems shall include all of the following features:
   1. Extinguishing agent capable of extinguishing Class A (ordinary combustible materials), Class B (flammable liquids and gases) and Class C (electrical) fires.

2. Reserve extinguishing agent chemical supply connected to a common manifold with manual main/reserve transfer switch.
3. Electronic control/releasing panel with rate-compensated heat detection.
4. Cylinder low pressure monitoring.
5. Manual agent release pull station with protective guard/cover.
6. Electric time delay with abort switch (pneumatic time delay required for total flooding systems that create an environment that is immediately dangerous to life and health).
7. Pre- and post-discharge alarm notification.

ii. Fire Extinguishers

1. Provide a minimum of (1) 10# ABC dry chemical fire extinguisher. Note: Additional fire extinguishers may be required based on the chemicals that will be stored within the room.
2. Install fire extinguisher within the chemical waste room or on the outside wall within 10' of the room entrance.

**5. Revisions**

| Date | Documented Changes | Initials |
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