

Health Hazard		High	Medium	Low
Ease of Exposure	High	HIGH Isolation	MEDIUM Engineering Controls	MEDIUM Engineering Controls
	Medium	HIGH Isolation	MEDIUM Engineering Controls	LOW Dilution Ventilation
	Low	MEDIUM Engineering Controls	MEDIUM Engineering Controls	LOW Dilution Ventilation

Source: Sullivan E and Malik O. 2007. Control Banding: Pharmaceutical Caterpillar to Mainstream IH Butterfly. American Industrial Hygiene Association *Diplomate* Article.

2.6 LABORATORY DESIGN

The primary purpose of these design criteria is to establish minimum design requirements for laboratories to provide a safe work environment and prevent undesirable exposures to chemical contaminants among students, faculty, and staff in laboratories.

These design criteria are minimum design standards required for all new construction and renovation projects involving laboratory furniture and fume hoods in Howard facilities. Individual institutions may have more stringent requirements.

Standard References:

- National Fire Protection Association (NFPA) 45, Standard on Fire Protection for Laboratories Using Chemicals
- NFPA 30, Flammable and Combustible Liquids Code
- NFPA 70, National Electric Code
- American National Standards Institute/American Industrial Hygiene Association (ANSI/AIHA) Z9.5, Standard for Laboratory Ventilation
- ANSI/AIHA Z358.1, Standard for Emergency Eyewash and Shower Equipment
- American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 55, Thermal Environment Conditions for Human Occupancy
- ASHRAE 110-R, Method of Testing the Performance of Laboratory Hoods

- OSHA 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories

New laboratory construction and renovation projects require a system test and balance report to verify proper heating, ventilating, and air-conditioning (HVAC) system and fume hood operation *before* the building or area will be accepted, or occupied, by the institution.

Fume hoods shall not be installed or used primarily for chemical storage. Laboratories where potentially hazardous chemicals or agents are used shall have negative air pressurization relative to surrounding space, and HVAC systems shall be designed to provide 6-10 air changes per hour, depending on use of laboratory space.

In addition, chemical storage cabinets (e.g., flammable, corrosive, acid, caustic) will be used to segregate chemicals and to provide additional protection in the case of an emergency.

2.7 STORAGE REQUIREMENTS

Chemicals must be stored in a manner suited for each chemical's properties. All chemicals have specific properties that may make them incompatible with other chemicals or materials. This section outlines several different types of chemicals and the storage requirements associated with each:

- | | |
|--------------------|-------------------------------|
| 1. Acids | 6. Pyrophorics |
| 2. Bases | 7. Peroxide Forming Chemicals |
| 3. Flammables | 8. Toxic Chemicals |
| 4. Oxidizers | 9. Carcinogens |
| 5. Water Reactives | 10. Teratogens |

The lists below are not all inclusive, but include many of the most-commonly used materials in research laboratories.

2.7.1 Acids

- Store on low shelves or in acid cabinets.