The National Institutes of Health | Division of Technical Resources | Office of Research Facilities

Design Requirements Manual **News to Use**

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The formulae $\frac{\partial \rho \bar{U}_i}{\partial t}+\frac{\partial}{\partial x_j}(\rho \bar{U}_i \bar{U}_j)=-\frac{\partial \bar{P}}{\partial x_i}+\frac{\partial}{\partial x_j}\left(\mu \frac{\partial \bar{U}_i}{\partial x_j}\right)+g_i(\rho-\rho_0)$ *for building* $\frac{\partial}{\partial x_j}(\rho \bar{U}_i \bar{U}_j)=-\frac{\partial \bar{P}}{\partial x_i}+\frac{\partial}{\partial x_j}\left(\mu \frac{\partial \bar{U}_i}{\partial x_j}-\rho \overline{u_i' u_j'}\right)+g_i(\rho-\rho_0)$ *state of the art* $\frac{\partial}{\partial x_i}(\rho \bar{U}_i \bar{H})=\frac{\partial}{\partial x_i}\left(\lambda \frac{\partial \bar{T}}{\partial x_i}-\rho \overline{u_i' h'}\right)$ *biomedical research facilities.*

Corrosive Storage Cabinets

Corrosive storage cabinets are an important component of laboratory safety. Corrosives are hazardous because they chemically destroy materials, including exposed body tissues, and emit vapors which can be harmful if inhaled. Because of this, DRM section 2.1.3.7.6C states that "laboratories where fume hoods are located or corrosives are handled shall be equipped with an emergency shower and corrosive storage cabinet." Most corrosives are strong acids or bases – due to their hazardous nature, many of the procedures using them are performed in a fume hood or other protective enclosure. Strong acids and bases must be stored separately, which may require multiple corrosive storage cabinets within a single laboratory. The NIH Chemical Safety Guide recommends storing acids in a dedicated corrosive storage cabinet beneath the chemical fume hood.[1]

Hazardous Chemicals

Hazardous chemicals are classified as primarily corrosive or flammable. If a classification is in doubt, the Division of Health and Safety shall be consulted. All hazardous chemicals should always be properly labeled, sealed and stored in appropriate cabinets; the storage requirements of corrosive and flammable chemicals are different, and both must be accommodated appropriately. Flammable chemicals are stored in flammable storage cabinets, which are non-vented to contain combustible vapors.[2] Corrosive chemicals are stored in corrosive storage cabinets, which are vented to evacuate hazardous vapors.

Corrosive Storage Cabinet Requirements

Due to their critical function, corrosive storage cabinets must be specified to meet special requirements, including the following:

- A single-piece, leak-proof floor pan is required to contain spills.
- A lock is required to maintain materials securely.
- The cabinet must be labeled for clear identification, including specification of the hazardous nature of its contents.
- Shelves must be strong enough to support heavy bottles.
- The cabinet must be vented to the fume hood or the lab exhaust system as appropriate.
- The cabinet interior must be constructed of corrosive-resistant materials.
- The capacity of the cabinet must be adequate for storing all chemicals anticipated to be used in the lab.

If the laboratory has a fume hood, the corrosive storage cabinet is typically located as a base directly below the hood and vented through the fume hood behind the baffle. If the lab does not have a fume hood, the corrosive storage cabinet is vented to the laboratory exhaust system and can be undercounter, benchtop, or free-standing.

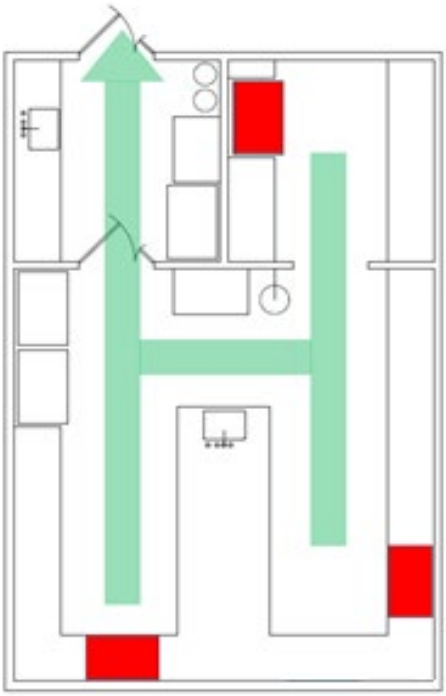

Figure 1: Possible corrosive cabinet locations at the ends of egress paths

In recognition of their hazardous nature, DRM section 1.11.3.4K requires that cabinets be located towards the back of the laboratory, away from the laboratory entrance. This ensures that they are at the end of egress paths so that no one will be trapped in case of a hazardous event at a cabinet (figure 1). Section 1.11.3.4K also requires that flammable storage cabinets and corrosive storage cabinets be located "diametrically opposed from each other." Although this is not always possible, it is a recognition of the hazardous nature of these items and the best practice of locating them as far from each other as is practical.

Reference

[1]Chemical Safety Guide, NIH Division of Occupational Health and Safety, 2015

[2]NIH Technical News Bulletin, Flammable Storage Cabinets, January 2016

'Design Requirements Manual (DRM) News to Use' is a monthly ORF publication featuring salient technical information that should be applied to the design of NIH biomedical research laboratories and animal facilities. NIH Project Officers, A/E's and other consultants to the NIH, who develop intramural, extramural and American Recovery and Reinvestment Act (ARRA) projects will benefit from 'News to Use'. **Please address questions or comments to:** shawm@nih.gov

Further details on this month's topic are available on the DRM website DRM Section 2.1.3, Laboratory Planning
https://www.orf.od.nih.gov/PoliciesAndGuidelines/BiomedicalandAnimalResearchFacilitiesDesignPoliciesandGuidelines/Pages/DesignRequirementsManual2016