Division of Technical Resources
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News to Use
Design Requirements Manual
The formulae for building state of the art biomedical research facilities.

'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: ms252u@nih.gov

Vibration Criteria

Vibration can be a serious issue if mitigation measures are not considered during the design of a Research and/or an Animal facility. The structural system shall be designed stiff to the extent that any transmitted vibration occurs at high frequencies, as these are effectively dampened with instrumentation vibration dampening systems and isolation tables than vibrations occurring at lower frequencies. The transmissibility curves for the isolation systems (active or passive) should be reviewed to choose the appropriate system.

The following are some options to control vibration within the laboratory and animal research facility space:

- Design a structural system with short column spacing.
- Isolate laboratory spaces from sources of vibration.
- Locate extremely vibration-sensitive equipment on grade-supported slabs.
- Locate vibration-sensitive equipment near columns on framed floors.
- Avoid combining corridors and laboratory spans in the same structural bay on framed floors.

The table in Chapter 5, Section 5-2-00 C recommends floor vibration velocity limits in (micrometers per sec) and structural criterion (kips/in-sec) for vibrations produced by footfall based on the following criteria.

- Walking pace for a closed corridor (a corridor with walls on both sides and doors on either or both wall) shall be 90 steps/minute.

- Walking pace for open or "ghost" corridor (a corridor with a wall on one side, with or without doors, and the ends of laboratory benches or other laboratory paraphernalia on the opposite side) shall be 75 steps/minute.
- Walking pace for cross aisles (walkways between laboratory benches) shall be 60 steps/minute.

The ambient vibration shall be limited to 20 micro meters per second (800 micro-inches per second) in research facilities. The structural design shall meet specific vibration limits specified by the manufacturer of the sensitive equipment.

Vibration stability is important to maintaining a constant experimental environment for sensitive animals such as rodents. Therefore, rodent holding and test rooms should be located away from areas such as a cage wash, major circulation corridors where racks are frequently in transit, mechanical rooms and elevator shafts. Vibration can adversely affect aquatic species and should be controlled and buffered as much as possible. The location of pumps and other mechanical equipment associated with the aquatic facility is a critical design feature and shall be located remotely from the holding rooms. Vibration stability is required where specialized equipment will be used such as animal imaging equipment, electron microscopy, and electrophysiology procedures including intracellular data collection equipment.

All elevators, rotating machinery, mechanical/electrical equipment, ductwork, piping and conduits shall be provided with appropriate vibration isolation as required by relevant sections of the DRM It is imperative to ensure that these vibration isolators are installed per project specifications.

Further details on this month's topic are available on the DRM website
http://orf.od.nih.gov/PoliciesAndGuidelines/BiomedicalandAnimalResearchFacilitiesDesignPoliciesandGuidelines/DesignRequirementsManualPDF.htm
DRM Chapter 5 Section 5.2.C Vibration, Chapter 6 Sections 6-2, 6-3, 6-5, Exhibit X6-5-A, Chapter 8 Section8-1.C.6 and Chapter 10 Section 10-7