Division of Technical Resources
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News to Use
Design Requirements Manual
The formulae $\frac{\partial \rho U_i}{\partial t}+\frac{\partial}{\partial x_j}(\rho U_j U_i)=-\frac{\partial P}{\partial x_i}+\frac{\partial}{\partial x_j}\left(\mu\frac{\partial U_i}{\partial x_j}\right)+g_i(\rho-\rho_0)$ for building $\frac{\partial}{\partial x_j}(\rho\overline{U_i U_j})=-\frac{\partial P}{\partial x_i}+\frac{\partial}{\partial x_j}\left(\mu\frac{\partial U_i}{\partial x_j}-\rho\overline{u_i u_j}\right)+g_i(\rho-\rho_0)$ state of the art $\frac{\partial}{\partial x_i}(\rho U_i H)=\frac{\partial}{\partial x_i}\left(\lambda\frac{\partial T}{\partial x_i}-\rho\overline{u_i H}\right)$ 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

Structural Load Requirements

Laboratory buildings should be designed with floor loading criteria to meet both current and future needs. Some instruments and research equipment are heavy, and their weight may exceed the floor loading of many buildings.

Live Loads: Floor design live loads shall be simplified to accommodate future load occupancy changes. Generalized live load categories shall be applied to large areas. Compliance with the International Building Code occupancy/use minimum concentrated live loads is required. The design live loads shall be indicated on all structural plans.

For renovation projects, the live loads of adjacent existing areas shall be noted on the structural plans to aid the contractor in determining construction live loads in staging areas or areas to be accessed during construction or demolition. Specialized equipment loads and requirements shall be verified with the equipment manufacturer. The following minimum live loads shall be used except when higher loads for specific projects are required to meet program requirements. Refer to the first table in DRM section 5-2 for other types of spaces.

Type of Space	Min Live Load (kPa)
Animal Research Facility	5.0
Animal Research Facility With Primates	6.0
Aquatic Facilities	6.0
Cagewash	10.0
Equipment Imaging Spaces	10.0
Frozen Storage, Refrigeration Areas	10.0
Laboratories	5.0
Loading Docks And Receiving Areas	12.0
Mechanical Areas (or weight of equipment if greater)	7.5

Live Load reduction: Columns supporting a building roof level shall not be subjected to live-load reduction. The A/E shall comply with the IBC for live-load reduction, or the current model building code for the area, whichever is more stringent.

For the structural design evaluation of sound existing buildings for renovation and reuse, the A/E may use the allowable live-load reduction allowed by the building code of the year during which the building was originally constructed, unless judgment of the registered professional engineer deems the live-load reductions too liberal.

Dead Loads: The building shall be designed to support the actual weights of all materials. These include structural materials, finishes, ceilings, partitions, shielding, piping, and ductwork. Assumed weights shall be indicated on the design documents.

Superimposed Dead Loads: The design of the structure shall specifically account for vertical loads imposed on the building by systems or elements that do not act as part of the primary structural system. The design shall also include anticipated superimposed dead loads in any seismic load calculation. Refer to the second table in DRM section 5-2 for minimum superimposed dead loads for building systems.

Hanging Loads: Loads exceeding 20 kg shall not be suspended from metal decking. All ductwork, piping, etc. shall be suspended directly from the structural steel framing or supplementary steel members. Loads suspended from steel joists shall be suspended from the top chords unless structural analysis allows otherwise.

For new concrete construction, cast-in inserts shall be considered for hanging items in mechanical rooms, attaching overhead lights and equipment in operating rooms, or hanging heavy loads.

For plaster ceiling panels, an area of 14 sq. m. shall not be exceeded without a structural separation from an adjoining panel section. Loads exceeding 2kPa shall be suspended independently of suspended ceiling construction.

For existing construction, expansion anchors shall not be used to carry significant load in tension, except with written approval of a registered professional engineer for the specific application. The A/E shall specify that anchors must be installed with drill bits and equipment recommended by manufacturer of the anchors.

The building shall be designed to meet IBC requirements for Wind, Seismic and Snow loads.

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 2