

# News to Use

## Design Requirements Manual

The formulae  $\frac{\partial U}{\partial x} + \frac{\partial}{\partial x}(\rho U) = -\frac{\partial p}{\partial x} + \frac{\partial}{\partial x}(\mu \frac{\partial U}{\partial x}) + \rho g_x$  for building  $\frac{\partial}{\partial x}(\rho U) = -\frac{\partial p}{\partial x} + \frac{\partial}{\partial x}(\mu \frac{\partial U}{\partial x} - \rho \overline{u'u'}) + \rho g_x$  state of the art  $\frac{\partial}{\partial x}(\rho U) = \frac{\partial}{\partial x}(\rho \overline{u'u'})$  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](mailto:ms252u@nih.gov)

### Applications of Sealants in Biomedical and Animal Research Facilities

Sealing of walls, windows, doors, mechanical ducts, pipes and other penetrations plays an important role in Biomedical and Animal research facilities. This minimizes air infiltration, moisture seepage, pest harborage, vermin infestation and escape of infected species. In addition, sealing promotes cleanliness of work surfaces in laboratory.

To effectively reduce encroachment of pests and vermin infestation within a building, the Design Requirement Manual (DRM) requires thorough sealing of areas that have the highest potential of encroachment, particularly in an animal research facility. These areas include: storage and staging area, loading docks, radioactive waste storage area, cage - washing area, autoclave area, glass wash area and laboratories. In addition, sealing of cage wash area including equipment pit area shall form a complete barrier between the clean and dirty cage area. All gaps between an environmental room and adjacent construction shall be sealed. Joint sealants shall be applied throughout for thermal and moisture protection as architectural practice dictates, and as required for fire stopping penetrations per industry standards.

Containment of biohazards is an important consideration in the design of biomedical laboratories. Depending on the types of research involved, some Biosafety Level 3 (BSL3) and Animal Biosafety Level 3 (ABSL3) areas may need to be completely sealed to allow gaseous decontamination. Sealing of laboratory casework including work surfaces shall prevent contamination of surrounding spaces. Autoclaves integral to the containment barrier require biological seal. BSL3 facilities usually employ: sealed windows, sealed penetrations, sealed access panels, sealed (electrical, communication and fire alarm) device boxes and sealed lighting fixtures. In addition to these requirements, ABSL3 facilities utilize sealed and break resistant vision panels. In animal facilities, wall and corner guards, used for protection against impact damage, shall be sealed to the mounting surfaces.

All utilities installation within BSL3 and ABSL3 facilities shall be sealed to the containment barrier and shall be constructed to meet NIH Biosafety Level 3 –

Laboratory Certification Requirements. Heating Ventilating and Air Conditioning system ductwork penetrations shall be sealed with appropriate sealants. Insulation in containment spaces shall be sealed at each end and must have a smooth and cleanable jacket. Exhaust plenums in ABSL3 containment area shall be sealed to prevent escape of microorganisms if the ventilation system becomes static.

Water, sewer and fire protection piping seals shall preclude concealed fouling and allow easy cleaning. Penetrations thru containment barriers shall meet the room-tightness integrity testing requirements. All drainpipes shall have seals to prevent infiltration of sewer gases and other contaminants. Hot water piping shall not use seals constructed of natural rubber, which often serves as nutrient to bacteria.

Lighting fixtures used in ABSL2, BSL3 and ABSL3 facilities shall be factory sealed and gasketed. These fixtures shall be designed to ensure that biohazards are contained within the containment area. In addition, penetrations of electrical conduits, cables, and boxes in those spaces shall be completely sealed. Conductors for power, data or any other system in BSL3 and ABSL3 areas shall be sealed to meet room-tightness integrity testing. Exposed conduits shall be separated from the surrounding surfaces either by standoffs or by sealing both sides to the adjacent surfaces.

The types of sealants used are very important as the sealants used need to be low emitting type, non-corrosive and non-deleterious to insulation of the wires. The Project team shall contact the Division of Occupation Health and Safety (DOHS) Community Health Branch (CHB), during early planning stages of any design project to ensure that the design addresses all areas relative to pest management. Animal facilities present some of the most challenging circumstances to an effective pest management program and the performance of integrated pest management (IPM) services. Selection of types of sealants and installation details require approval of DOHS CHB. Refer to DRM for the recommended sealant types and sealant application locations. Finally, all penetrations of fire stoppings shall maintain integrity of the fire rating of construction.