

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 $\frac{\partial}{\partial x_j} (\rho U_j \bar{H}) = -\frac{\partial P}{\partial x_i} + \frac{\partial}{\partial x_j} \left(\mu \frac{\partial \bar{H}}{\partial x_j} - \rho \bar{u}_i \bar{u}_j \right) + g_i (\rho - \rho_0)$ state of the art $\frac{\partial}{\partial x_j} (\rho U_j \bar{H}) = \frac{\partial}{\partial x_i} \left(\lambda \frac{\partial \bar{H}}{\partial x_i} - \rho \bar{u}_i \bar{H} \right)$ biomedical research facilities.

Emergency Eye Wash (EEW) Equipment and Backflow Prevention

There are several factors to consider when designing for EEW and facewash installations. These include but are not limited to: ensuring the location, specific type, and quantity of fixtures are sufficient to mitigate the risk; ensuring all devices are properly accessible; and, significantly, ensuring that the water supply serving the emergency fixture distribution loop and potable water system is adequately protected from potential contamination. This last consideration is the focus of this article.

The DRM 8.3.6.A states that “the design intent for water supply to the ARF and lab facilities is to minimize provision of testable backflow preventers within laboratories, ARFs, and other sensitive areas.” This is key to maintaining safety and minimizing ongoing operational costs and flood risks in laboratories; proper application of backflow prevention devices reduces both these factors. Despite this requirement, DTR is seeing an increase in the number of backflow preventers being specified in new designs. Part of the effort to reduce the overall number of maintainable backflow preventers involves ensuring the correct application of backflow prevention on eyewash units.

Backflow Preventer Application

There are numerous requirements for proper backflow preventer application, all outlined in the DRM. These requirements vary based on equipment and device type. DRM 8.2.10.2 states that the vertical pull-down type of eyewash is the preferred type of unit for in lab applications. This type of fixture benefits in that no additional backflow protection is required at the point of use for pull-down and swing away type emergency fixtures when connected to a domestic potable water system, or dedicated passive purge water loop. Neither point-of-use or central backflow preventers are required for units located outside of laboratories (DRM 8.3.7), except where required by code because of the type of fixture selected. Emergency fixtures outside of laboratories are fed directly from potable hot and cold water supplies. Per DRM 8.3.7 and ANSI Z358.1,

emergency fixture units, including those within laboratories, are to be served only from potable (not laboratory) water systems. The DRM also states that the supply is to be configured as a passive purge water loop and shall be protected centrally by ASSE 1013 backflow preventers located at the start of the loop.

ASSE 1013 backflow preventers require adequately sized drain receptors, annual testing/certification, and routine inspections, which creates an added burden on facility maintenance. The presence of such drains within laboratories can also pose a significant facility flood risk. This is why the DRM requires the RPZ backflow preventers to be located centrally outside of the laboratory, and in limited quantity; a common location would be at an interstitial floor or adjacent mechanical space. Generally, DRM Section 8.3.7 is not intended to require ASSE 1013 preventers at each local application unless necessary due to the specific eye wash fixture selected (e.g. drench hoses). Drench hoses incorporate a non-fixed, hose connected outlet that has an inherent risk of submergence, and thus by code must have adequate backflow preventer at the point of use. Where drench hose type units are used, additional requirements are necessary to ensure safety and comply with code. Many of the backflow prevention devices offered as optional or incorporated features for some models do not meet plumbing code or specific backflow preventer listing requirements, so it’s important to check the DRM for specific guidance on preferred type and acceptable configurations.

Conclusion

Careful consideration of the types and locations of eyewashes and their associated backflow prevention devices can reduce overall maintenance, flood risks, and installation costs for the project while promoting water supply safety. Further information on these issues relative to backflow protection are available by reviewing USC FCCCHR and ASSE backflow preventer listing requirements and test reports.