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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'.
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# Vinyl Composition Tile

Vinyl Composition Tile (VCT) has been a reliable flooring material in NIH laboratories for decades, with a good record of durability. Although new products are available VCT is still a good choice for many laboratory applications.

VCT is composed of vinyl (polyvinyl chloride) binder mixed with a filler; the binder gives the tile strength and flexibility and the filler gives the tile color and volume. VCT installed prior to the mid-1980s is typically 9" x 9" squares, and may contain asbestos as a filler. Old VCT, as well as mastic, should be treated as a potentially hazardous material. Newer 12" x 12" VCT generally does not contain asbestos, but its mastic may contain asbestos, so should be treated with caution. The Division of Environmental Protection should be contacted whenever a potentially hazardous material is encountered.

Most of the volume of VCT is filler (usually limestone) which extends though the thickness. The resulting tile is monolithic, which allows shallow scratches and abrasions to be buffed out. The quality of VCT is dependent, in part, on its vinyl content. Higher vinyl content tiles are usually harder, more durable and more flexible.

Specialty VCT is available with a number of properties to address laboratory requirements, including nonslip, antimicrobial, non-conductive and static dissipative tiles.

Before VCT is specified for a project, a number of performance issues should be considered:

**Water Resistance:** Although VCT is water resistant, it is porous and can swell and delaminate from the floor if saturated by water. To increase performance in damp environments VCT must be installed with tight joints and have regular sealant application. VCT is not recommended in rooms subject to very high humidity, repeated wash down or other wet conditions.

**Joints:** VCT tiles are installed with open joints, which can be very tight if installed by a skilled installer. Even very tight joints are difficult to clean, however, so VCT floors are unacceptable in containment labs, clinical applications and rooms requiring clean or aseptic conditions. VCT tiles are installed with an applied vinyl or rubber base, which introduces another joint around the room perimeter.

**Testing:** VCT is available from a number of manufacturers, and produced with a range of formulations, which result in different physical properties. It is recommended that the product data sheets be reviewed to ensure that the specified product matches the requirements of the lab.

**ASTM F-1700,** Standard Specification for Solid Vinyl Floor Tiles. This standard provides dimensional and performance criteria. Minimum requirements include binder content, dimensional tolerance, residual indentation, flexibility, resistance to chemicals and resistance to heat and light.

**ASTM F-925,** Test Method for Resistance to Chemicals of Resilient Flooring. This standard tests surface deterioration when exposed to a number of common chemicals.

**ASTM F-1265,** Test Method for Resistance to Impact for Resilient Floor Tile. This standard tests the reliance of a floor tile to impacts.

**ASTM F-1304,** Test Method for Deflection of Resilient Floor Tile. This standard tests the ability of a floor tile to bend and conform to an uneven surface without cracking or breaking.

**Patterns:** VCT is installed as individual tiles and is available in a wide range of colors, so there are opportunities for multi-colored patterned installations at very low cost premiums. Tiles can be cut, though complex shapes should be avoided. Damaged tiles can be easily replaced.

**Workmanship:** VCT tiles have very tight dimensional tolerances, allowing flooring to be installed with hairline joints. The quality of the installation, however, is dependent on the skill of the installer

**Sustainability:** The manufacture of polyvinyl chloride used in VCT is associated with the release of environmentally hazardous chemicals. More environmentally-friendly alternatives, including rubber and linoleum, should be considered on a case-by-case basis, based on the function and use of the lab and the properties of the flooring. When VCT is used, manufacturer's recycling programs and low volatile organic compound (VOC) tiles and mastics should be used to reduce environmental impact.

**Cost:** VCT is generally among the lowest-cost laboratory floor options.

**Maintenance:** VCT floors must be periodically stripped and sealed. Low VOC maintenance products are available.

**Conclusion:** Although not appropriate for all conditions and not a sustainable option, VCT is a durable product which has a long history of service. VCT should be considered as an economical option for many laboratory projects.

Further details on this month's topic are available on the DRM website:
Design Requirements Manual
DRM Chapter 4, Section 4 Interior Finishes