

U	Undesirable attribute
D	Desirable attribute
A	Acceptable attribute

CHARACTERISTICS OF SCHOOL FLOORING MATERIALS

Characteristics	CARPET		RESILIENT FLOORING		HARD FLOORING		
	Broadloom Carpet	Vinyl cushion tufted textile (VCTT)	Linoleum	Vinyl composition tile (VCT) and sheet flooring	Terrazzo	Ceramic Tile	Concrete
Effects on IAQ							
Installation requires VOC emitting coatings and adhesives	U	D Peel-and-stick dry adhesive	A Low VOC adhesive and sealer available	U	Depends on type ⁱ	Adhesives emit very low VOC levels	No adhesives; some sealers emit VOCs, but best ones do not. ⁱⁱ
Material itself emits VOCs	Depends on carpet	D Does not emit VOCs	U Linseed oil may offgas. Odor may persist long after installation.	U	Depends on type. Epoxy emits toxic VOCs during installation, and possibly after; cementitious does not	Depends on type. Portland cement grout and mortar do not support mold and mildew; epoxy systems might	D No VOCs
Maintenance requires VOC emitting products	A No, but unrinsed detergent may kick up irritating particles	A No, but unrinsed detergent may kick up irritating particles	U/A buffing compound may emit VOCs; use low-VOC alternative	U some require sealants and waxes; VCT waxing/stripping requires school to be unoccupied for at least 48 hours.	A No, if use water-based sealer. No waxing or stripping. Wash with neutral detergent weekly; seal annually or less	No. Clean with neutral cleaner and water	Maintain with water and mild detergent
Allows water in a room to penetrate down to subfloor, supporting mold and mildew	U Is common problem with carpet	D Backing is impermeable to water	U Water can penetrate seams; sealer may reduce this	U VCT seams allow water through; sealer may reduce this. VCT itself is impermeable	D Does not allow water to penetrate	U Water can penetrate some tiles and grouts; sealer may reduce this	Concrete is porous; sealer should prevent penetration, though boundary to wall may allow it
Allows moisture (vapor) to escape from slab, preventing water build-up that can damage buildings and support mold/ mildew ⁱⁱⁱ	U Allows escape, but supports mold and mildew if subfloor gets wet	U Impermeable backing does not allow vapor to escape	U Even if moisture escapes, linoleum itself supports mold and mildew if subfloor gets wet	U Impermeable; water can pool beneath it and pop tiles	D Cementitious terrazzo (and sealers) allow moisture out; epoxy does not	D Tile and grout can both be porous or non-porous; ^{iv} Sealer is breathable	D Concrete and sealer are somewhat breathable
Cost/ maintenance considerations							
Durability	2-15 yrs	20+ years	High (data not available)	High (data not available)	40-80 years	40-80 years	Very high (data not available)
Up-front cost/ Lifetime cost	Low/ High	Higher than broadloom carpet/ High	Low/ Medium	Varies/ Medium	High/ Low	High/ Low	High/ Low
Maintenance cost	Highest	High	Medium	Medium	Low	Low	Low
Easy to clean			D	D	D	D	D

Characteristics	Broadloom Carpet	Vinyl cushion tufted textile (VCTT)	Linoleum	Vinyl composition tile (VCT) and sheet flooring	Terrazzo	Ceramic Tile	Concrete
Quality of the room							
Controls noise	D	D	A	A	U	U	U
Effect on room light	Reduces glare and reflection	Reduces glare and reflection	Reflective surface enhances daylight	Reflective surface enhances daylight	Light reduction depends on choice of color	Glare reduction depends on choice of color and texture	Glare reduction depends on choice of color and texture ^v
Comfort and Safety							
Comfortable to sit, stand or fall on	D	D	A comfortable to stand	A comfortable to stand	U Very hard to stand, sit or fall on	U Very hard to stand, sit or fall on	U Very hard to stand, sit or fall on
Limits Slips and fall	D	D			Sealer helps reduce them	Depends on type ^{vi}	D especially if textured
Environmental considerations^{vii}	Poor	Poor	Medium	Poor	Medium	Medium	Medium
Other Considerations	Use low VOC adhesive; ask manufacturer for emissions data; control humidity in areas using carpet. Ask installer to air it out before installation or for 2 weeks after. Vacuum daily, clean monthly with hot water extraction. Avoid solvents and soaps.	Ask manufacturer for emissions data; control humidity in areas using VCTT. Ask installer to air it out before installation or for 2 weeks after. Vacuum daily, clean monthly with hot water extraction. Avoid solvents and soaps.	Ask installer to use minimum adhesive, to use low VOC adhesive, and to air product before installation, or for 2 weeks after; make sure adhesive is not too wet on installation, or it will become an ongoing VOC problem; use low VOC coatings and maintenance products; ask manufacturers for emissions data	Ask installer to use minimum adhesive, to use low VOC adhesive, and to air product before installation, or for 2 weeks after; make sure adhesive is not too wet on installation, or it will become an ongoing VOC problem; use low VOC coatings and maintenance products; ask manufacturers for emissions data	Avoid using epoxy types due to toxic VOC's during installation and afterwards if curing is incomplete, though epoxy types have wide array of colors and allow for inserting logos and designs. Surface should be sealed to prevent absorption of dirt and stains. Use low VOC sealers.	Glazed and high fired tile usually does not require sealers, though the grout may. Use low VOC adhesives, sealers and grout.	<i>Pro:</i> Rich array of colors and textures (textures for cap slab or new construction); can stamp logo or patterns in cap slab or new construction.

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ⁱ Most cementitious types use no adhesive or primer. Non-VOC emitting primers (for epoxy terrazzo) or adhesives (for some cementitious type) are available. Non VOC-emitting sealers are available for terrazzo.

ⁱⁱ There are two types of sealers: penetrating ones, and surface coatings that form a membrane. Penetrating ones such as sodium silicates are recommended, as they are mineral (no VOCs), they are permanent as they absorb into the concrete. Membrane sealers may contain acrylics, urethanes or epoxies, which present a VOC problem to installers, may yellow with age, they wear off with time, and can become disbonded if there is water from the slab. The sealer controls dust from concrete, prevents stains and makes the surface of the concrete 50% stronger.

ⁱⁱⁱ The issue of water and the slab is complex and beyond the scope of this factsheet. If major problems exist, consult a good industrial hygiene and/or architectural firm.

^{iv} Quarry tile is porous and allows moisture to escape (breathe) from slab, porcelain doesn't breathe at all, other ceramic tiles breathe a little; cementitious grout is porous; sealer can keep water from surface entering it, though sealer breathes, allow evaporation from slab; epoxy grout is non-porous. All tile allows some water penetration from the surface (except porcelain), though very little. Tile should not be considered a waterproofing system.

^v If the floor is the slab, color is applied by acid-staining the slab. Only in new construction can textures be stamped in. In old buildings with damaged or beat-up slabs, a cap slab (3 to 4 inches of new concrete) can be added, and can be stained and textured.

^{vi} Ceramic tile can have grit added by manufacturer to create non-slip surface. The grit acts like a walk-off mat to abrade dirt from shoes. Quarry tile can be textured for non-slip surface. Quarry tile has a rough, non-slip surface. Sealer adds non-slip quality to any tile.

^{vii} Includes: harmfulness to workers in manufacturing, contains recyclable material, made from sustainable resources, low in embodied energy, and recyclable.

A note on sources:

Where possible, information was obtained from neutral parties, such as state health departments and architectural firms with school experience. When such information was unavailable or limited, trade associations were consulted, and manufacturers only as a last resort.