

5.7 Flooring

5.7.1 Resilient Flooring

5.7.1.1 General Requirements

1. Applies to Resilient Flooring and Bases.
2. Performance Standards, include but are not limited to:
 - a. National Floor Covering Association (NFCA): Floor Covering Specification Manual.
 - b. Applicable product Standards including CSA, CGSB and ASTM.
3. Before Start of Work
 - a. List of each proposed material for review, and color samples for selection and final approval.
 - b. Material Safety Data Sheets (MSDS) for review and posting at jobsite.
 - c. Manufacturer requirements for bond and moisture tests, and reports of test results to indicate substrate conformance.
4. At Completion
 - a. Maintenance data shall be an itemized list c/w manufacturer/distributor name, product type and color.
 - b. Maintenance material shall be a minimum 5% of each product/color used (no cuttings), 2% if the standard materials listed below are utilized.
 - c. Include sufficient adhesive in unopened containers. Package and label, including Project Name and Number, and hand over at a UofC location to UofC Project Manager; obtain receipt.
 - d. Maintenance Manual shall be manufacturers' recommended maintenance procedures and products.
5. For sheet material, installer to be a certified manufacturer-trained "Master Mechanic" (or similar term), completely familiar with the products, seam welding, and the manufacturer currently recommended methods and conditions of installation. Submit certificate of qualification for "Master Mechanic" and other resilient flooring installers when available. Adhesives and auxiliary products to be as recommended in writing by each resilient flooring manufacturer.
6. Manufacturer preference shall be a registered ISO 9001 quality system. The manufacturer's representative shall inspect the work when required during the contract, and at completion prior to submitting the manufacturer's warranty. Install resilient flooring only when moisture emission from concrete substrate is at or below the maximum permissible level of 3 lbs. of water per 1000 sq.ft, based on qualitative tests using calcium chloride test kits developed by the Resilient Flooring Institute, and to manufacturer's requirements.

7. In addition to a 2-Year subcontractor warranty, submit a 5-Year manufacturer limited warranty for sheet flooring work.
8. Provide adequate instruction to appropriate UofC FM personnel on recommended maintenance procedures and products, by manufacturer representative in presence of trade contractor.

5.7.1.2 Materials

1. All resilient flooring must be certified as compliant with the FloorScore standard by an independent third-party.
2. All components of resilient flooring systems, including but not limited to, adhesives, sealants, and backing, must comply with the requirements of the South Coast Air Quality Management District (SCAQMD) Rule #1168.
3. Products to conform and perform to Manufacturer published literature.
4. Manufacturer preference for registered ISO 14001 Environmental Management System.
5. Preference should be given to sustainably sourced products and materials (i.e. containing recycled content, regionally manufactured, and/or containing rapidly renewable materials).
6. Disposal - Products containing PVC are NOT to be incinerated. Recycle wherever possible.

5.7.1.3 Prescriptive Requirements

1. Linoleum/marmoleum with heat-welded seams
 - a. Linoleum/marmoleum is not suitable for locations where water may collect such as below grade, entrances, washrooms and laboratories.
 - b. Install linoleum/marmoleum wherever undergraduates work, (not carpet).
 - c. Linoleum/marmoleum must be used in corridors, lecture theatres and classrooms; do not install on concrete slabs below grade, slabs on grade without a vapour barrier, wet areas such as entrance lobbies, where walk-off mats on troweled concrete is preferred, in washrooms, and laboratory areas due to staining and deterioration under prolonged water saturation.
2. Sheet Vinyl with heat-welded seams – to be used typically for labs and wet areas as discussed above; include flash-coved base where cleanliness is critical (toxic or radiation areas: discuss with UofC EH&S).
3. Slip-Resistant Sheet Vinyl with Heat-Welded Seams – may be used in washrooms and wet areas as option to ceramic or similar tile with approval from UofC FM&D. To be used in food service areas, janitor rooms, and laboratories. Include flash-coved base.
4. Vinyl Composition Tile (VCT)
 - a. Can only be installed in less-used, low-traffic areas such as storage rooms, electrical rooms, comm. rooms, vaults etc.

- b. Do not install VCT in well-used public areas, such as classrooms, lecture theatres, and corridors. UofC experience indicates VCT shrinks over time in some applications because the fillers dry the product out. VCT does not have the reinforcement strength that the old asbestos filler used to have. This allows water or traffic to release edges causing delimitation. In lab areas where hazardous materials are constantly transported, VC tiles have proved to be potentially dangerous and have caused tipping and tripping hazards. VCT has not proved to be satisfactory under life-cycle analysis.

5. Rubber Cove Base shall typically be 102 mm (4") high and black.

5.7.1.4 Other

1. Contractor to protect resilient flooring in doorways with un-dyed, untreated building paper or un-dyed cardboard until floor has been handed over to and accepted by UofC Project Manager.
2. UofC Project Manager to receive 2% overage before accepting flooring finish. UofC Project Manager must contact UofC FM, Caretaking Services after handover from contractor and before user occupancy to allow for burnishing and finishing plus general cleaning unless work will be carried out by contractor to UofC Caretaking Services' specifications.

5.7.2 Carpet

5.7.2.1 General Requirements

1. Applies to Carpet Tile (preferred), Direct Glue-Down Carpet, and Carpet Accessories.
2. Carpet tiles are preferred for their ease of installation, their ease of changeability, and their comparable price to broadloom.
3. Performance Standards, include but are not limited to
 - a. Alberta Building Code.
 - b. NFCA National Floor Covering Association Floor Covering.
 - c. Specification Manual, including the CCI Canadian Carpet Institute Supplement.
 - d. CAN/CGSB-4.129: Carpet for Commercial Use.
 - e. CAN/CGSB-4.155: Flammability of Soft Floor Coverings.
 - f. CGSB 4-GP-156: Direct Glue-Down Carpet, Guide to Selection and Installation.
 - g. ASTM E648: Radiant Panel Test.
 - h. ISO #6925: Methylamine Pill Test.
 - i. CAN/ULC-S102.2: Standard Method of Test for Surface Burning.
 - j. Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.
 - k. WCB Workers Compensation Board, Industrial Health and Safety Regulations.

- I. WHMIS Workplace Hazardous Materials Information System.

5.7.2.2 Design Requirements

1. Carpet colouration shall be mottled, multi-coloured, feathered look; preferably dark colour with lighter accent colours or mid to dark colours. Luster shall be dull.
2. Carpet coloration must hide dirt and clearly demonstrate requirement for minimal maintenance and cleaning.
3. Carpet provided shall be first quality commercial grade carpet for heavy traffic usage as manufactured by a nationally recognized manufacturer.
4. Yarn - 100% first quality, type 6/6 or 6 bulk continuous filament (BCF) nylon.
5. Carpet construction shall meet the following minimum requirements:
 - a. Construction shall be level loop or textured level loop.
 - b. Dye Method - Solution dyed or other method providing permanent stain resistance (i.e., inherent in or bonded to nylon fiber) with low luster colour(s).
 - c. Plies shall be a minimum of three (3).
 - d. Pile height shall be 5.0 mm (0.197") maximum; 4.0 mm (0.144") minimum.
 - e. Tuft Bind shall be a minimum 12 pounds, wet or dry.
 - f. Gauge shall be minimum 39.4 col/10 cm (1/10") or better (a looser gauge may be allowed if Kilotex rating is sufficiently high).
 - g. Stitch count shall be a minimum 40 / 10 cm (10 per inch).
 - h. Yarn face weight shall be a minimum 950 gm/m² (28 oz/sq.yd.) or better (a lesser weight may be allowed with a Type 2 or 3 backing system).
 - i. Pile density factor (ASTM D418) shall be a minimum 12 Kilotex/cm².
6. Adhesives - premium grade, waterproof type for direct glue down carpet application as recommended by carpet manufacturer for backing system and substrate / grade level and usage conditions, complete with guarantee against adhesive bond failure. Spread rates stipulated by the manufacturer to be strictly adhered to.

5.7.2.3 Materials

1. All carpet shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program. FMD approval is required for any carpet with styrene butadiene rubber (SBR) latex backing materials.
2. All carpet cushion shall meet the requirements of the Carpet and Rug Institute Green Label program.

3. All carpet adhesive must comply with the requirements of the South Coast Air Quality Management District (SCAQMD) Rule #1168.
4. Soil and stain protection shall be an integral life long stain proofing, i.e., inherent in or bonded to nylon fiber. Topical treatments are not acceptable.
5. Stain resistance (STR) shall be a minimum level of 8 in high traffic areas and 6 in low traffic areas based on AATCC 138 test for 5 washings to simulate removal of topical treatments by hot water extraction followed by AATCC 175 test.
6. Soil resistance (SR) with an average of three (3) fluorine analyses to CRI TM-102, of a single composite sample shall be a minimum of 500 ppm fluorine by weight and a minimum of 400 ppm fluorine by weight after two (2) AATCC 171 (Hot Water Extraction) cleanings.
7. Static control shall be a permanent anti-static filament, and without chemical treatment, with maximum static generation below 3.0 kV after hot water extraction under standard conditions of 21° C and 20% relative humidity.
8. Anti-microbial protection shall be permanent (not topical) treatment to prevent fungi and bacteria growth lasting life of carpet.
9. Flammability CAN/ULC-S102.2 shall be Flame Spread Rating of 300; Smoke Developed Classification of 500.
10. Radiant panel test shall be class I (0.45 watts/m² or greater).
11. Pill test shall pass.
12. Preference should be given to sustainably sourced products and materials (i.e. containing recycled content, regionally manufactured, and/or containing rapidly renewable materials).

5.7.2.4 Quality Control and Assurance

1. Before Start of Work, submittals include:
 - a. Manufacturer's product data verifying compliance with specification requirements for carpet types and accessories specified.
 - b. Manufacturer's full range (large set) of carpet colors and patterns available for carpet types meeting specification requirements for review and selection.
 - c. Two 400 mm (16") square samples of each type and of each color of carpet to be used. For carpet with pattern repeat, submit a minimum of three repeats of the pattern.
 - d. Manufacturer's product data and material / color range of carpet accessories for review and selection.
 - e. Seaming Plan for all areas clearly indicating materials, patterns / colors, pile direction, joint (seam) locations (i.e. locations of length and cross seams and open edges) and other details including type and finish / color of trims and moldings used, required to clarify the work for review before commencing installation. Cross seams shall be avoided

and will only be permitted where made unavoidable by carpet width or roll length. Avoid seams at doors and pivot points.

- f. Certificate from carpet manufacturer stating that each roll of carpet furnished has been manufactured in accordance with specification requirements along with roll registration numbers.
2. At Project Completion, submittals include:
 - a. Manufacturer's maintenance data and cleaning instructions for each type of carpet installed.
 - b. Two percent (2%) of total carpeted area from same production run of each type, color and/or pattern of carpet installed, in full roll width x length as required, and sufficient adhesive to install this carpet, in unopened containers.
 - c. In addition to the above, turn over to the UofC Project Manager all carpet pieces remaining at job completion. No carpet scraps shall be removed from the site without the UofC Project Manager's written approval.
 3. Conduct hygrometer moisture tests on concrete shall not to exceed 65% per CCI Manual, or stricter manufacturer requirements.
 4. Test new and suspect concrete floors for alkalinity and neutralize in accordance with NFCA/CCI recommendations. Carpet manufacturer's representative to review carpet seaming and installation to ensure conformance with guarantee requirements and submit a written report to the Consultant and UofC Project Manager confirming same.

5.7.2.5 Warranties

1. In addition to any other required warranties, provide the following written minimum guarantees or warranties to commence at Date of Substantial Performance, and details of guarantees or warranties that exceed noted minimum requirements.
2. By Fiber Manufacturer:
 - a. Ten (10) year abrasive wear guarantee that carpet fiber will provide specified level of appearance, subject to proper care and maintenance.
 - b. Ten (10) year color fastness to light.
 - c. Ten (10) year color fastness to atmospheric contaminants.
3. By Carpet Manufacturer - ten (10) year against unraveling, zippering, and delimitation / deterioration of backing not to exclude wet or steam cleaning methods.
4. By Carpet Installer - one (1) year that all seams will remain sound and tight and carpet will not break away from adhesive.
5. By Adhesive Manufacturer - ten (10) year, including labor and material, against adhesive failure.

5.7.2.6 Disposal

1. Carpet face must be 100% recyclable.
2. Submit manufacturer's recycling program with each product.

5.7.2.7 Other

1. Contractor to ensure that glued carpets are protected against damage from rolling loads for 48 hours after installation and protected by covering with plywood or hardboard where rolling traffic will occur (i.e. moving of equipment, etc.).
2. Contractor to ensure that carpet is protected from traffic damage with suitable covering (undyed untreated paper) until floor has been turned over and accepted by UofC Project Manager. Typically also provide two large sections of surplus carpet cuttings and place at entry doors so that they can be used as doormats by other trade personnel entering the carpeted area.

5.7.3 Special Flooring

5.7.3.1 General Requirements

1. Waterproof membrane flooring and base to be applied at all Mechanical Rooms, Penthouses, and similar locations where leaks in building systems may occur and cause water damage, such as to floors below. Chosen system to have been specifically designed for this purpose.
2. Waterproof traffic topping as corrosion protection for all concrete parking slabs. Chosen system to have been specifically designed for this purpose.
3. Submittals include:
 - a. MSDS data sheets; installation instructions.
 - b. Sample, to include base upturn; color samples for selection.
 - c. Maintenance data and instructions.
4. Installation to be by manufacturer licensed applicator.
5. Strictly conform to Manufacturer written instructions, including preparation of substrates.

5.7.3.2 Materials

1. Membrane Flooring
 - a. All membrane flooring must comply with the requirements of the South Coast Air Quality Management District (SCAQMD) Rule #1113.
 - b. Urethane elastomeric solvent-free liquid-applied seamless waterproof flexible flooring, extended up to a suitable uniform height.

- c. System typically consists of a primer, primary coating, and top coat. Min. 40 mil dry thickness. Coloring is optional.
- d. Sample systems shall be Duochem Inc. "Resoclad Type II System" only when installed without Duroplast 942 topcoat.

2. Traffic Topping

- a. All traffic toppings must comply with the requirements of the South Coast Air Quality Management District (SCAQMD) Rule #1113.
- b. A waterproof traffic coating consisting of a flexible, liquid applied, elastomeric membrane topped with a liquid applied polyurethane wearing course containing hard aggregates and a urethane topcoat.
- c. The system to be totally water-proof, flexible and thermally compatible with the concrete substrate under applicable service conditions. The system to exhibit zero chloride permeability when tested in accordance with the test procedure developed by the Portland Cement Association on behalf of the Federal Highway Administration for the rapid determination of the chloride permeability of concrete.
- d. Finished surfaces to be skid resistant, wet or dry. Sample system: Duo deck I (heavy duty) and Duo deck II (medium duty) all urethane traffic system as manufactured by Duochem or equal.

3. Life Cycle Costing - 25-Year.

5.7.4 Exposed Concrete

5.7.4.1 General Requirements

1. Applies to Exposed Concrete Flooring, either slab or topping.
2. The final product must be durable and require little maintenance, as such the budget must be responsibly established and adhered to. Three levels of polish can be attained with a diamond grit: 800 grit will give a matte semi-gloss finish, 1500 grit will give a medium gloss finish, and 3000 grit will give a high gloss finish. Increasing levels of finish add time and cost to the project. A medium finish, ie, the matte finish is typically used in warehouses, is adequate.
3. Performance Standards, include but are not limited to:
 - a. Alberta Building Code.
 - b. CSA A23.1 - Concrete Materials and Methods of Concrete Construction
 - c. CFCA (Concrete Floor Contractors Association] Technical Bulletins
 - d. OSHA 1910.22 – Static Coefficients of Friction for Walking/Working Surfaces
 - e. ADA Accessibility Guidelines, Appendix A.5
 - f. Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

- g. WCB Workers Compensation Board, Industrial Health and Safety Regulations.
- h. WHMIS Workplace Hazardous Materials Information System.
4. Prior to completion of design, submittals to FD/PM include:
 - a. 12"x12" sample of finished product including chosen colour and aggregate, indicating final grind and polish
 - b. Recommended refinishing/maintenance schedule including material/products required. Prefer periodic resealing to be done by hand, for example, using a mop.
 - c. List of supplementary impacts to schedule/budget, ex: protection to slab
 - d. Joints between the slab and other floor types requires careful detailing, to be reviewed by FD.
 - e. Recommendations to address and mitigate effects of superficial cracking of slab, for example through use of control joints or other means
 - f. Indication of bonding agent to be used (in the case of a topping) and relative effects
5. Prior to Start of Work, a full mock-up is to be installed on site and reviewed by FM&D.
6. After completion of work, contractor is required to submit recommended maintenance procedures to UofC Project Manager. Trade to conduct meeting with FM personnel [Caretaking Services] to explain and demonstrate recommended maintenance and care procedures.

5.7.4.2 Materials

1. All floor coatings, floor finishes, and/or concrete-curing compounds must comply with the requirements of the South Coast Air Quality Management District (SCAQMD) Rule #1113.
2. Explore use of alternate aggregates such as glass, metal, rubber, etc. Could provide an opportunity to use recycled material. An exposed aggregate finish will add some texture to the floor and can help minimize the perception of an unfinished appearance.
3. Before starting the concrete must be broom clean and dry
4. Dry grinding/polishing systems are preferred. A vacuum bag is to be used to absorb dust.
5. Impregnator should be added as final step to provide surface resistance to oil and water
6. Edges require finish using hand powered angle grinder thus appearance of edges may differ due to the weight difference between the equipment used to do edges vs. main floors. Slab finishing should occur prior to the installation of interior partitions to minimize the requirement for the use of hand grinders to finish around edges of slab. Finishing around penetrations in the slab for conduit, drains, etc. may not be avoided in many situations thus careful attention must be paid to quality and consistency. Good craft is required - any noticeable differences can be minimized through good craft. Note that extremely fine finishing will give a higher degree of reflectivity.

7. Although color can be added via a superficial application prior to polishing, preference should be given to integral admixtures applied to the concrete mix prior to the pouring of the slab/topping.

5.7.4.3 Prescriptive Requirements

1. Topical/film-forming systems, including acrylic resins, chlorinated rubber, urethanes, epoxies, and alpha methyl styrene are not to be used in UofC buildings.
2. Require combined use of densifier with penetrating/impregnating sealers (ex: penetrating siliconates, fluoro-polymers, and siloxanes, or impregnating silanes/modified silanes)
3. No aspect of the installation and finishing techniques/processes are to be sacrificed through value management. If the desired finish cannot be achieved, alternate flooring options need to be considered.
4. Lifecycle – 100 years for slab/topping, refinishing to occur minimum 5 year intervals.
5. Although the dry grind/polish is virtually dust-free, IAQ measures must be employed to ensure mechanical ducts are not contaminated with dust. IAQ measures to be reviewed by FD.

5.7.5 Wood Flooring

5.7.5.1 General Requirements

1. Applies to:
 - a. Wood Flooring and Related Accessories.
 - b. Finishing of Wood Sports Floors.
2. Performance Standards, include but are not limited to:
 - a. NFCA National Floor Covering Association, Floor Covering Specification Manual
 - b. Sports Floor Systems (Resilient Systems) - performance criteria standards and requirements to be determined with Sports Associations and users for each particular sport, and specialist sports floor system manufacturers.
 - c. DIN 18032-2-2004, Sports Halls – Halls for Gymnastics, Games and Multi-Purpose Use
 - d. Maple Flooring Manufacturers Association (MFMA)
3. Confirm with UofC [Kinesiology] that gym floor markings are to current regulations and meet UofC requirements.
4. Trade to have recognized specialized experience, and have successfully completed a minimum of 5 similar wood floor and/or Sports Floor System installations.

5.7.5.2 *Materials*

1. All wood flooring must be certified as compliant with the FloorScore standard by an independent third-party.
2. Clear wood finishes, floor coatings, stains, primers, and shellacs applied to interior elements must comply with the requirements of the South Coast Air Quality Management District (SCAQMD) Rule 1113.
3. New wood floors (other than Sport Floors) to be factory pre-finished, c/w acrylic impregnation of the wood cells to improve indentation and wear resistance, and finish coat of extra-hard mineral crystals suspended in multiple coats of ultra-violet cured urethane with stain injected throughout the wear layer, all to minimize maintenance.

5.7.5.3 *Finishes*

1. New Sports Floors
 - a. Sealer shall be 2 coats water based or moisture cured urethanes - Basic Coatings Hydroline Sealer or equal.
 - b. Line marking paint to be compatible with sealer and top coat.
 - c. Top Coat shall be water based or moisture cured urethane - Basic Coatings Street Shoe 275 or equal.
2. Refinishing of Existing Sports Floors
 - a. Sand of existing floor finishes with 16 or 24 grit paper.
 - b. Second Cut shall be with 36 grit of old finish is still present.
 - c. Follow rough sanding with 60 grit paper.
 - d. Skim fill entire floor with latex wood sealer.
 - e. Final sand with 100 grit paper.
 - f. Vacuum floor prior to first coat of finish.

Revision History

Revision Date	Version	Description
Feb 2014	1.0	Baseline version
August 9, 2023	1.0	Added Revision History table to end of document and reset to Version 1.0.