

**SECTION 09 65 16
RESILIENT SHEET FLOORING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Welded seam sheet flooring (WSF) with heat welded seams and integral cove base.

1.2 RELATED REQUIREMENTS

- A. Adhesive VOC Limits: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Color, Pattern and Texture: To be determined.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
1. D4259-88(2012) - Abrading Concrete.
 2. E648-15e1 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 3. E662-15a - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
- C. International Concrete Repair Institute (ICRI):
1. 310.2R-13 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, and Concrete Repair.
- D. SCS Global Services (SCS):
1. FloorScore.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
1. Show size, configuration, and fabrication and installation details.
- B. Manufacturer's Literature and Data:
1. Description of each product.
 2. Application, Installation and instructions.
 3. Warranty.
- C. Samples:
1. Sheet material, 38 mm by 150 mm (1-1/2 inch by 6 inch), of each color and pattern with welded seam using specified welding rod 300 mm (12 inches) square for each type, pattern and color.

2. Cap strip and cove stick (fillet strip), 150 mm (6 inches) for integral base. Minimum radius for 3 mm thick WSF to be 1 ¼" radius.
 3. Shop Drawings and Certificates: Layout of joints showing patterns where joints are expressed, and type and location of obscure type joints. Indicate orientation of directional patterns.
 4. Certificates: Quality Control Certificate Submittals and lists specified in paragraph, QUALIFICATIONS.
 5. Edge strips: 150 mm (6 inches) long each type.
 6. Primer: Pint container, each type.
- D. Sustainable Construction Submittals:
1. Low Pollutant-Emitting Materials:
 - a. Sheet Flooring: Submit FloorScore label.
 - b. Identify volatile organic compound types and quantities.
- E. Certificates: Certify products comply with specifications.
1. Heat welded seaming is manufacturer's prescribed method of installation.
 2. Cold welded seaming at dissimilar types of resilient sheet flooring per manufacturer's recommendations.
- F. Qualifications: Substantiate qualifications comply with specifications.
1. Manufacturer with project experience list 3 years minimum with hospital surgical service spaces.
 2. Installer with project experience list for WSF installation.
- G. Quality Control Qualifications
- A. Manufacturer Qualifications:
1. Manufactured specified products with satisfactory service on five similar installations for minimum ten years.
- a. Project Experience List: Provide contact names and addresses for completed projects.
- B. Installer Qualifications:
1. Regularly installs specified products and is approved and certified by the manufacturer.
- H. Mock-ups
1. Provide 2 foot by 2 foot mock-ups of each flooring material indicating welding at joints between materials (each color), transitions strips between different materials, flash cove details, inside and outside corners, and cap strips. Mock-up should be stored onsite will require review and approval by Design Team and VA's designated team. Mock-up to be provided with adequate time for review and comments to be addressed prior to installation of final flooring.

2. DELIVERY

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

I. Owners and Maintenance Manual.

A. The Contracting Officer shall approve products or service of proposed manufacturer, suppliers, and installers, and the Contractor shall submit certification that:

1. Heat welded seaming is manufacturer's prescribed method of installation.

2. Installer is approved by manufacturer of materials and has technical qualifications, experience, trained personnel, and facilities to install specified items.

3. Manufacturer's product submitted has been in satisfactory operation.

A. Store products indoors in dry, weathertight and conditioned facility.

B. Protect products from damage during handling and construction operations.

C. STORAGE AND HANDLING

3.1. Store sheet flooring on end.

3.2. Move sheet floor coverings and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

C. FIELD CONDITIONS

A. Environment:

1. Maintain temperature and humidity at service levels or 68° F (20° C), ± 5° F (3° C), and 50% RH ± 10% in areas to receive resilient flooring. Specified temperature should be maintained at least 48 hours before, during, and 8 hours after installation.

2. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

3. Construction in or near areas to receive flooring work shall be complete, dry and cured. Do not install resilient flooring over slabs until they have been cured and are sufficiently dry to achieve a bond with adhesive. Follow

flooring manufacturer's recommendations for bond and moisture testing.

4. Building shall be permanently enclosed. Schedule construction so that floor receives no construction traffic when completed.

D. WARRANTY

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

A. All labor and materials will have a warranty period of two (2) years.

PART 2 - PRODUCTS

2.1 RUBBER SHEET FLOOR COVERINGS

- A. Rubber Sheet Floor Coverings: Smooth face, minimum thickness nominal 3 mm (0.12 inch). Sheet flooring shall conform to the material requirements specified in ASTM F1589, Type I, Grade 1, backing classification not applicable. Foam backed sheet flooring is not acceptable.
- B. Size: Provide maximum size rubber sheet material produced by manufacturer to provide minimum number of joints. Minimum size width acceptable - 1200 mm (48 inches).
- C. Each color and pattern of sheet flooring shall be of same production run.
- D. Color and Pattern as shown on drawings.

2.2 WELDED SEAM SHEET FLOORING

- A. Welded Seam Sheet Flooring (WSF): ASTM F1859; Type I without backing.
 1. Wear Surface: Smooth.
 2. Total Thickness: Thickness: 3 mm (0.12 inches), ASTM F386, ± 0.006 inches (± 0.15 mm) is required
 3. Vulcanized rubber compound with environmentally compatible color pigments that are free of toxic heavy metals like lead, cadmium or mercury.
 4. Homogeneous rubber compound with a random scattered design.
 5. Back of Sheet: Double-sanded smooth
 6. Dimensional Stability: ASTM F2199, $\leq 0.15\%$ in both directions
 7. Flammability: ASTM E648; NFPA 253; NBSIR 75 950, 0.82 achieved, ≥ 0.45 watts/sq. cm for Class 1 is required
 8. Smoke Density: ASTM E662; NFPA 258; NBS, 282 (flaming) and 155 (non-

- flaming) achieved, < 450 is required
9. CAN/ULC-S102.2: Surface Burning, FSC1 of 200 and SD of 1850, achieved
 10. Burn Resistance: Resistant to cigarette and solder burns
 11. Slip Resistance: ASTM D2047 Static coefficient of friction, Neolite dry 0.93, Neolite wet 0.91 achieved, $\geq .5$ required (not recommended for ramps)
 12. Bacteria Resistance: ASTM E2180 and ASTM G21, resistant to bacteria, fungi, and micro-organism activity
 13. Latex Allergies: ASTM D6499, Inhibition Elisa, below detection level
 14. Sound Absorption: ASTM E2179 Δ IIC 14, ISO 140 Δ Lw 10dB (compare only Δ values)
 15. Sound Generation: 67.2 dBA, 68.9 dBC and 20.9 Sones, Independently tested
 16. Hardness: ASTM D2240, Shore type "A", 92 achieved, ≥ 85 is required
 17. Static Load: ASTM F970, Residual compression of 0.003" with 800 lbs. achieved, ≤ 0.005 " with 250 lbs. required
 18. Rolling Load Limit: ≤ 550 lbs. / sq. inch, with no forklift traffic
 19. Abrasion Resistance: ASTM D3389, 1.1 lbs. (500g) load on H-18 wheel with 1000 cycles, 0.003 oz. (0.09g) weight loss achieved, ≤ 0.035 oz. (≤ 1.0 gram) is required
 20. Elongation: ASTM D412 Modulus @ 10% is 1299 lbs. per sq. inch achieved, ≥ 300 lbs. per sq. inch is required.
 21. Heat Resistance: ASTM F1514, Avg. $\Delta E \leq 8.0$ is required, easily achieved with all batches and regular maintenance
 22. Light Resistance: ASTM F1515, Avg. $\Delta E \leq 8.0$ is required, easily achieved with all batches and regular maintenance
 23. Static Generation: AATCC 134, < 2000 Volts at 20% RH, achieved
 24. Thermal Transmission: ASTM C518, R-value 0.77, achieved
 25. Cleaning: Cleaned and maintained effectively using the nora pro clean system; water, nora pads and a suitable machine, without the use of any factory and/or field-applied coatings. No need to use harsh chemicals that may be hazardous or containing any teratogenic, mutagenic or any other ingredients known to be carcinogenic.
 26. Shine: Higher shine achieved by buffing without any artificial topical applied coatings.
 27. Stain Removal: Samples of the product should be provided for stain removal testing by the owner. Sample size should be 24 inches by 24 inches, pre-cleaned by manufacturer per published recommendations. Samples should have no coatings, sealers, floor finish or other

manually or mechanically applied finish on the surface of the product. Stain testing should consist of application of common disinfectants and chemicals to include, but not limited to, Betadine, Methylene Blue, Silver Nitrate, black marker and alcohol based hand sanitizer. Duration of test period should be no less than one week. Removal of chemicals should be in accordance with manufacturers published cleaning and maintenance recommendations. ASTM F925 Suggested Test Reagents plus the common chemicals used in healthcare and education facilities were used.

- B. Sheet Size: Provide maximum size sheet produced by manufacturer to minimize joints.

- 1. Minimum Width: 1200 mm (48 inches).

2.3 ACCESSORIES

- C. Bonding Chemical: Flooring manufacturer's standard seam bonding chemical.
- D. Welding Rod: Flooring manufacturer's standard, in color matching field color of sheet flooring.
- E. Adhesives: Water resistant type recommended by flooring manufacturer to suit application. VOC not to exceed 50g/L.
- F. Comply with applicable regulations regarding toxic and hazardous materials Gren Seal (GS-36) for commercial adhesive.
- G. Use low-VOC adhesive during installation. Water based is preferred over solvent based adhesives.
- H. Base Accessories:
 - 1. Extrude vinyl cove strip 70 mm (2-3/4 inch) radius compatible with sheet flooring.
 - 2. Cap strip "J" shape with feathered edge flange approximately 25 mm (one inch) wide; top designed to receive sheet flooring with 13 mm (1/2 inch) flange lapping top of flooring to match existing adjacent areas. Metal cap strip compatible with sheet flooring
- I. Leveling Compound:
 - 1.
 - 2.
- J. Primer: (For concrete subfloors)
 - 1. Type recommended by adhesive or flooring manufacturer.
 - 2. 28 mm (1-1/8 inch) wide, 6 mm (1/4 inch) thick, bevel one edge to 3 mm (1/8 inch) thick.

Leveling Materials: Pourable portland cement based, cementitious underlayment material.

- 3. Drill and counter sink edge strips for flat head screws.

Water: Potable and free from impurities that affect setting of floor leveling

material.

H. Sealant:

1. As specified in Section 07 92 00, JOINT SEALANTS.
2. Compatible with flooring.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Maintain temperature of sheet flooring above 36 °C (65 °F), for 48 hours before installation.
- B. Maintain temperature of rooms where sheet flooring work occurs above 36 °C (65 °F), for 48 hours, before installation and during installation.
- C. After installation, maintain temperature at or above 36 °C (65 °F.)
- D. Building is permanently enclosed.
- E. Wet construction in or near areas to receive sheet flooring is complete, dry and cured.

3.2 SUBFLOOR PREPARATION

- A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710.
 1. Installer shall examine surfaces on which resilient sheet flooring is to be installed, and shall advise Contractor, in writing, of areas which are unacceptable for installation of flooring material. Installer shall advise Contractor which methods are to be used to correct conditions that will impair proper installation. Installation shall not proceed until unsatisfactory conditions have been corrected.
 2. Slab substrates dry, free of curing compounds, sealers, hardeners, and other materials which would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by Resilient Floor Covering Institute recommendations in manual RFCI-MRP.
- B. Broom or vacuum clean substrates to be covered by sheet vinyl floor coverings immediately before installation. Following cleaning, examine substrates to determine if there is visually any evidence of moisture, alkaline salts, carbonation, or dust.
- C. Primer: If recommended by flooring manufacturer, prior to application of adhesive, apply concrete slab primer in accordance with manufacturer's directions.
- D. Correct conditions which will impair proper installation, including trowel marks, pits, dents, protrusions, cracks or joints.
- E. Fill cracks, joints, depressions, and other irregularities in concrete with leveling compound.

1. Do not use adhesive for filling or leveling purposes.
 2. Do not use leveling compound to correct imperfections which can be corrected by spot grinding.
 3. Trowel to smooth surface free of trowel marks, pits, dents, protrusions, cracks or joint lines.
- F. Clean floor of oil, paint, dust and deleterious substances. Leave floor dry and cured free of residue from existing curing or cleaning agents.
- G. Moisture Testing: Perform moisture and pH test as recommended by the flooring and adhesive manufacturers. Perform test locations starting on the deepest part of the concrete structure. Proceed with installation only after concrete substrates meet or exceed the manufacturer's requirements. In the absence of specific guidance from the flooring or adhesive manufacturer the following requirements are to be met:
1. Perform moisture vapor emission tests in accordance with ASTM F1869. Proceed with installation only after substrates have a maximum moisture-vapor-emission rate of 1.36 kg of water/92.9 sq. m (3lb of water/1000 sq. ft.) in 24 hours.
 2. Perform concrete internal relative humidity testing using situ probes in accordance with ASTM F2170. Proceed with installation only after concrete reaches maximum 75 percent relative humidity level measurement.
- H. Preparation shall include the removal of existing resilient floor and existing adhesive. Do not use solvents to remove adhesives. Coordinate with Asbestos Abatement Section if asbestos abatement procedures will be involved.
- I. Remove existing resilient flooring and adhesive completely in accordance with Resilient Floor Covering Institute recommendations in manual RFCI-WP. Solvents shall not be used .

3.3 INSTALLATION OF FLOORING

- A. Install work in strict compliance with manufacturer's instructions and approved layout drawings.
- B. Maintain uniformity of sheet vinyl floor covering direction and avoid cross seams.
- C. Arrange for a minimum number of seams and place them in inconspicuous and low traffic areas, but in no case less than 150 mm (6 inches) away from parallel joints in flooring substrates.
- D. Match edges of resilient floor coverings for color shading and pattern at seams.
- E. Where resilient sheet flooring abuts other flooring material floors shall finish level.
- F. Extend sheet vinyl floor coverings into toe spaces, door reveals, closets, and similar openings.

- G. Inform the Resident Engineer of conflicts between this section and the manufacturer's instructions or recommendations for auxiliary materials, or installation methods, before proceeding.
- H. Install sheet in full coverage adhesives.
 - 1. Air pockets or loose edges will not be accepted.
 - 2. Trim sheet materials to touch in the length of intersection at pipes and vertical projections; seal joints at pipe with waterproof cement or sealant.
- I. Keep joints to a minimum; avoid small filler pieces or strips.
- J. Follow manufacturer's recommendations for seams at butt joints. Do not leave any open joints that would be readily visible from a standing position.
- K. Follow manufacturer's recommendations regarding pattern match, if applicable.
- L. Installation of Edge Strips:
 - 1. Locate edge strips under center lines of doors unless otherwise indicated.
 - 2. Set aluminum strips in adhesive, anchor with lead anchors and stainless steel Phillips screws.
- M. Integral Cove Base Installation:
 - 1. Set preformed fillet strip to receive base.
 - 2. Install the base with adhesive, terminate exposed edge with the cap strip.
 - 3. Form internal and external corners to the geometric shape generated by the cove at either straight or radius corners.
 - 4. Solvent weld joints as specified for the flooring. Seal cap strip to wall with an adhesive type sealant.
 - 5. Unless otherwise specified or shown where sheet flooring is scheduled, provide integral base at intersection of floor and vertical surfaces. Provide sheet flooring and base scheduled for room on floors and walls under and behind areas where casework, laboratory and pharmacy furniture and other equipment occurs, except where mounted in wall recesses.

3.4 INSTALLATION OF INTEGRAL COVED BASE

- A. Set preformed cove to receive base. Install base material with adhesive and terminate exposed edge with cap strip. Integral base shall be 150 mm (6 inches) high.
- B. Internal and external corners shall be formed to geometric shape generated by cove at either square or radius corners.

3.5 WELDING

- A. Heat weld all joints of flooring and base using equipment and procedures

recommended by flooring manufacturer.

- B. Welding shall consist of routing joint, inserting a welding rod into routed space, and terminally fusing into a homogeneous joint.
- C. Upon completion of welding, surface across joint shall finish flush, free from voids, and recessed or raised areas.
- D. Fusion of Material: Joint shall be fused a minimum of 65 percent through thickness of material, and after welding shall meet specified characteristics for flooring.

3.6 CLEANING

- A. Clean small adhesive marks during application of sheet flooring and base before adhesive sets, excessive adhesive smearing will not be accepted.
- B. Remove visible adhesive and other surface blemishes using methods and cleaner recommended by floor covering manufacturers.
- C. Clean and polish materials per flooring manufacturer's written recommendations.
- D. Vacuum floor thoroughly.
- E. Do not wash floor until after period recommended by floor covering manufacturer and then prepare in accordance with manufacturer's recommendations.
- F. Upon completion, Resident Engineer shall inspect floor and base to ascertain that work was done in accordance with manufacturer's printed instructions.
- G. Perform initial maintenance according to flooring manufacturer's written recommendations.

3.7 PROTECTION:

- A. Protect installed flooring as recommended by flooring manufacturer against damage from rolling loads, other trades, or placement of fixtures and furnishings.

- B. Keep traffic off sheet flooring for 24 hours for foot traffic after installation and heavy rolling traffic for 72 hours.
- C. Where construction traffic is anticipated, cover sheet flooring with reinforced kraft paper properly secured and maintained until removal is authorized by the Resident Engineer.
- D. Where protective materials are removed and immediately prior to acceptance, repair any damage, re-clean sheet flooring, lightly re-apply polish and buff floor.

3.8 REPLACE AND REPAIR

- A. Replace and repair all damaged and/ or uneven flooring to the Architect's satisfaction and at no additional cost to the Owner. Any flooring with bubbles or ripples shall not be acceptable.

3.9 EXTRA STOCK

- A. Furnish an extra 3% of each pattern and color of resilient flooring, floor base and accessory material for maintenance use. Clearly label extra stock to identify contents and deliver to the Owner as directed by the Owner's Representative.

3.10 LOCATION

- A. Unless otherwise specified or shown, install tile flooring, on floor under areas where casework, laboratory and pharmacy furniture and other equipment occurs, except where mounted in wall recesses.
- B. Extend tile flooring for room into adjacent closets and alcoves.

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