SURFACE APPLIED DETECTABLE/TACTILE WARNING SURFACE TILE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Special Conditions and Division 1 Specifications Section, apply to this Section.

1.02 DESCRIPTION

A. This Section specifies furnishing and installing Surface Applied Detectable/Tactile Warning Surface Tiles where indicated.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.

B. Samples for Verification Purposes: Submit one (1) 6" x 6" or 12"x12" size tile sample.

C. Shop drawings are required for products specified showing fabrication details, composite structural system, tile surface profile, fastener locations, plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.

D. Material Test Reports: Submit complete test reports from qualified accredited independent testing laboratories to qualify that materials proposed for use are in compliance with requirements and meet or exceed the properties indicated on the specifications. All tests shall be conducted on a Surface Applied Warning tile (or approved equal) as certified by a qualified independent testing laboratory.

E. Maintenance Instructions: Submit copies of manufacturer's specified installation and maintenance practices for each type of Warning tile and accessory as required.

1.04 QUALITY ASSURANCE

A. Provide Surface Applied Warning tiles and accessories as produced by a single manufacturer with a minimum of three (3) years' experience in the manufacturing of Surface Applied Warning tiles.

B. Installer's Qualifications: Engage an experienced installer certified in writing by Surface Applied Warning tile manufacturer as qualified for installation, who has successfully completed installations similar in material, design, and extent to that indicated for the project.

C. Provide Surface Applied Warning tiles which are in compliance with the following standards (or most recent):

   a. Americans with Disabilities Act (Title III Regulations, 28 CFR Part 36 ADA STANDARDS FOR ACCESSIBLE DESIGN, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES).
   b. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR) Title 24, Chapter 2,

Section 202 definition of ”Detectable Warning”. Section 11B-247 and 11B-705 “Detectable Warnings And Detectable Directional Texture”

D. Vitrified Polymer Composite (VPC) Surface Applied Warning tiles shall be an epoxy polymer composition with a ultra-violet coating employing aluminum oxide particles in the truncated domes; “Armor Tile” as distributed under license by Engineered Plastics (1-800-682-2525), or equivalent product approved prior project award.

E. Dimensions: The tile shall incorporate an in-line pattern of truncated domes measuring nominal 0.2” height, 0.9” base diameter, 0.45” top diameter spaced center-to-center 2.35” as measured on a diagonal and 1.67” as measured side by side in-line; except for tiles installed in California. Tiles installed in California shall incorporate an in-line pattern of truncated domes measuring nominal 0.2” height, 0.9” base diameter, 0.45” top diameter spaced center-to-center 2.35” as measured side by side in-line as required by the California Building Code, Title 24. For wheelchair safety the field area shall consist of a non-slip surface with a minimum of 40 - 90° raised points 0.045” high, per square inch. Surface Applied Warning tiles shall be held within the following dimensions and tolerances:

Part No.	Size [in x in]
ADA-S-1212	12 x 12
ADA-S-2424	24 x 24
ADA-S-2436	24 x 36
ADA-S-2448	24 x 48
ADA-S-2460	24 x 60
ADA-S-3648W	36 x 48
ADA-S-3660W	36 x 60
Note: Dimensional tolerances ± 5%	

F. Product Data: Vitrified Polymer Composite (VPC) Surface Applied Warning tiles shall meet or exceed the following test criteria:

Test Reference	Test Description	Value
AASHTO-HS 20	Wheel Load Tests	No Failure
ASTM D 695	Compressive Strength	≥ 28,000 psi
ASTM D 790	Flexural Strength	≥ 25,000 psi
ASTM D 638	Tensile Strength	≥ 19,000 psi
ASTM D 5420	Impact Resistance	≥ 550 in-lbf/in

ASTM D 696	Coefficient of Thermal Expansion	2.78 x 10^{-6}/°F
ASTM C 1028	Static Coefficient of Friction	≥ 0.80
ASTM E 84	Flame Spread Index	≤ 25
ASTM D 570	Water Absorption	≤ 0.05%
ASTM C 501	Abrasive Wear Index Iw	≥ 500
ASTM D 2486	Abrasive Scrub Test	≤ 0.06
ASTM B 117	Salt Spray (300 hrs)	No Failure
ASTM D 1037	Accelerated Aging Cycle Testing	No Failure
ASTM D 543	Chemical Resistance	No Failure
ASTM G 155	Accelerated Weathering	ΔE < 3

1.05 DELIVERY, STORAGE AND HANDLING

A. Surface Applied Warning tiles shall be suitably packaged or crated to prevent damage in shipment and handling.

B. Surface Applied Warning tiles shall be delivered to location at building site for storage prior to installation.

1.06 SITE CONDITIONS

A. Environmental Conditions and Protection: Maintain minimum temperature of 41°F in spaces to receive Surface Applied Warning tiles for at least 24 hours prior to installation, during installation, and for not less than 24 hours after installation.

B. The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the general public. Provide barricades or screens to protect the general public.

1.07 MANUFACTURER'S WARRANTY

A. Surface Applied Warning tiles shall be warranted in writing for a period of five (5) years from date of substantial completion. The guarantee includes factory defects, breakage, and deformation.

1.08 INSTALLATION WARRANTY

A. Surface Applied Warning tile installation shall be warranted in writing for a period of two (2) years. Alternate products approved during the tendering process must be guaranteed for an additional three (3) years. Product must be guaranteed from defective work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The Vitrified Polymer Composite (VPC) Surface Applied Detectable/Tactile Warning Surface Tile specified is based on Armor Tile as distributed under license by Engineered Plastics (1-800-682-2525). Existing engineered and field tested products, which have been in successful service for a period of three (3) years are subject to compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.

B. Color: Color shall be homogeneous throughout the tile.

Color	Federal Color No.
Federal Yellow	33538
Light Gray	26280
Dark Gray	36118
Onyx Black	17038
Pearl White	37835
Brick Red	22144
Ocean Blue	15817
Ochre Yellow	23594
Colonial Red (Brown)	20109

2.02 MATERIALS

A. Fasteners: Color matched sleeve (where appropriate), corrosion resistant, flat head drive anchor: ¼" diameter x 2" long Stainless Steel fastener as supplied by Engineered Plastics Inc..

B. Adhesive: Tactile Bond and Seal (TBS) as supplied by Engineered Plastics Inc.

C. Sealant: Tactile Bond and Seal (TBS) as supplied by Engineered Plastics Inc..

PART 3 EXECUTION

3.01 INSTALLATION

A. During all surface preparation and installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.

B. The application of all tiles, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers. Not recommended direct asphalt applications.

C. Coordinate with the Contractor or Engineer to ensure that the surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review manufacturer and contract drawings with the Contractor prior to the construction and refer any and all discrepancies to the Engineer.

D. Set the tile true and square to the curb ramp area as detailed in the design drawings, so that its location can be marked on the concrete surface. A thin permanent marker works well. Remove tile when done marking its location.

E. The surface to receive the Surface Applied Warning tile is to be mechanically cleaned with a diamond cup grinder or shot blaster to remove any dirt or foreign material. This cleaning and roughening of the concrete surface should include at least 4 inches around the perimeter of the area to receive the tile, and also along the cross pattern established by the corresponding areas on the backside of the tile. Those same areas should then be cleaned with a clean rag soaked in Acetone ensuring all dust and debris are removed.

F. Immediately prior to installing the Surface Applied Warning tile, the concrete surfaces must be inspected to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oil, grease, sealers and determined to be structurally sound and cured for a minimum of 30 days.

G. Using Acetone, wipe the backside of the tile around the perimeter and along the internal cross pattern, to remove any dirt or dust particles from the area to receive the adhesive.

H. Apply TBS to the backside of the tile, following the perimeter and internal cross pattern established by the tile manufacturer. Sufficient adhesive must be placed on the prescribed areas to have full coverage across the 2” width of the adhesive locator and shall be applied to within ¼” continuously around the perimeter edge of the tile. The entire tube of adhesive shall be applied to the back of each tile, sizes 24 x 36 in. and greater.

I. Set the tile true and square to the curb ramp area as detailed in the design drawings.

J. Working from the center of the tile outwards, proceed to drill and install all fasteners in the tile’s molded recesses.

K. Standing with both feet applying pressure around the molded recess provided in the tile, drill a hole true and straight to a depth of 3 ½” using a ¼” masonry drill bit. Drill through the tile without hammer option (on the drill) until the tile has been successfully penetrated, then with hammer option (on the drill) to drill into the concrete. Maintaining foot pressure on both sides of the hole while drilling prevents concrete dust from accumulating between the tile and concrete which can affect the tile being installed flush and may compromise installation integrity.

L. Immediately after drilling each hole, before moving on to the next, and while still applying foot pressure, mechanically fasten tiles to the concrete substrate using a leather bound or hard plastic mallet to set the fasteners. Ensure the fastener has been placed to full depth in the dome, straight, and flush to the top of dome. Drive the pin of the fastener with the mallet, taking care to avoid any inadvertent blows to the truncated dome or tile surface.

M. Following the installation of the fasteners, the concrete dust should be vacuumed, brushed or blown away from the tile’s surface and adjacent concrete. Using Acetone on a rag, wipe the concrete around the tile’s perimeter to ensure a clean, dry surface to receive perimeter sealant.

N. TBS perimeter caulking sealant should be applied following the sealant manufacturer's recommendations. Tape all perimeter edges of the tile back 1/16" from the tile's perimeter edge and tape the adjacent concrete back ½" from the tile's perimeter edge to maintain a straight and even caulking line. Apply sealant around tile perimeter using care to work sealant into any void between the tile and concrete interface. Tool the perimeter caulking with a rounded plastic applicator or spatula to create a cove profile between the tile and adjacent concrete. Remove tape immediately after tooling perimeter caulking sealant.

O. Do not allow foot traffic on installed tiles until the perimeter caulking sealant has cured sufficiently to avoid tracking. Curing time is weather dependent (average cure time at 75° F is 30 minutes). Adhesive or caulking on the surface of the Armor-Tile can be removed with Acetone.

P. If installing adjacent tiles, note the orientation of each tile. Careful attention will reveal that one of the long edges of the tile is different than the other in regard to the tiny dotted texture. You may also note a larger perimeter margin before the tiny dotted texture pattern begins. Consistent orientation of each Armor-Tile is required in order that the truncated domes on adjacent tiles line up with each other.

Q. In order to maintain proper spacing between truncated domes on adjacent tiles refer to the drawings for correct installation. The use of a continuous rim Diamond blade and a straightedge to guide the cut if required. All cuts should be made prior to installation of the tiles. If installing adjacent tiles, care should be taken to leave a 1/8" gap between each tile to allow for expansion and contraction.

R. If tiles are custom cut to size, if pre-molded recesses (to receive fasteners) are removed by the cut, or to maintain a tight installation to the substrate then any truncated dome can be center-drilled with a ¼" masonry drill bit to create a through hole, and the through hole must be countersunk with a suitable carbide countersink bit to receive mechanical fasteners. Care should be taken to not countersink too widely or deeply. Fasteners should be flush with the top of the truncated dome when countersunk properly.

3.02 CLEANING, PROTECTING AND MAINTENANCE

A. Protect tiles against damage during construction period to comply with Warning tile manufacturer's specification.

B. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.

C. Clean tiles not more than four days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean tile by method specified by tile manufacturer.

D. Comply with manufacturer's maintenance manual for cleaning and maintaining tile surface and it is recommended to perform annual inspections for safety and integrity.

END OF SECTION