

A product of: Unity Creations, LTD.



"Unity" Surfacing Systems™

Interlocking, Unitary, Rubberized Safety Surfacing, Flooring and Pavers.

ATHLETIC & RECREATIONAL SURFACES: 32 18 00 (02791)

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Construction Specification Institute (CSI) and Construction Specifications Canada (CSC) 3-Part Format,
MasterFormat, SectionFormat and PageFormat. (April 2016 Edition)
Section 32 18 16.33 (02791). Playground Protective Surfacing

PART 1: GENERAL

1.1 Section Includes:

Resilient, self-interlocking (with "Button-Lock™ Technology") unitary, rubberized safety surfacing, flooring and paver products in the tile/mat/block/paver form with bolt-down capabilities.

1.2 Related Sections:

Division 32

Sub: **32 18 00 Athletic and Recreational Surfaces .**

Specifically; 32 18 16 Synthetic Resilient Surfaces.

Specifically; 32 18 16.33 Playground Protective Surfacing.

Specifically; 32 18 23 Athletic Surfaces.

Division 9

Sub: **09 65 00 Resilient Flooring**

Specifically: 09 65 19 Resilient Tile Flooring.

Specifically: 09 65 19.33 Rubber Tile Flooring.

Specifically: 09 65 66 Resilient Athletic Flooring.

Division 11

Sub: **11 68 00 Playfield Equipment and Structures .**

Specifically; 11 68 13 Playground Equipment.

Specifically: 11 68 16 Play Structures.

1.3 References

- A.) Applicable Standards:
 - American Standard for Testing Materials (ASTM)
 - Consumer Product Safety Commission (CPSC)
 - American National Standards Institute (ANSI)
 - Factory Mutual (FM)

- B.) ASTM F1292-04 and F355-95 Drop Test
 - Standard Test Method for Impact Attenuation of Surface Systems Under and Around Playground Equipment.

- C.) ASTM C67 Weathering/Aging
 - Standard Test Method for Weathering and Aging of Surface Systems and Materials.
 - Standard Test Method for Rubber – Deterioration in an Air Over.

- D.) ASTM E108: Class A Fire Test/Flammability
 - Standard Test Method for Fire Tests of Surface Systems and Materials.

- E.) ASTM E108 Class A Fire Test/Flammability - Modified For Roof Coverings:
 - Modified Test Methods for Fire Tests of Roof Covering Materials.

- F.) ASTM E648 Self Extinguishing Fire Test/Flammability
 - Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source (NFPA Designation No. 253).

- G.) ASTM D2859 Burn Pill
 - Standard Test Method for the Surface Flammability of Products (Burn Pill Test).

- H.) ASTM E303-93 (2013) Skid Resistance
 - Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.

- I.) ASTM F1951-99 ADA Accessibility
 - Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.

- J.) ASTM C518-98 Insulation/R-Values
 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus. Measuring = Insulation/R-Values.

- K.) ASTM E903, E891, E1980 Solar Reflectance
 - Hemispherical Spectral Reflectance and Total Emittance Test. Presents results of spectral reflectance and total emittance of products tested.

- L.) CPSC-CH-E1002-08 Lead Content
 - LEAD Test - For compliance with US Public Law 110-314 (HR 4040 “Consumer Product Safety Improvement Act of 2008”), lead in accessible substrate materials.

- M.) Water Penetration Test:
 - For compliance with Sustainable Storm Water Run-off in a testing environment to determine how much water flows through the product based on real world scenarios.

- N.) Leadership in Energy and Environmental Design (LEED):
- 1.) Criteria development by the United States Green Build Council (USGBC):
 - a.) Materials and Resources:
Up to 6 points / credits toward LEED certification.
 - b.) Indoor Environmental Quality:
Up to 1 point / credit toward LEED certification.
- O.) ANSI/FM 4474 Wind Up-Lift
Simulated Wind Up-lift Pull-Force Test Procedure (adhered), to allow design pressure that is estimated to be 277.5 psf. (2:1 Factor of Safety) for systems installed in this manner.
- P.) ASTM D 3161-09 Non-Adhered, Over-Top and at Kick-Plate) Modified for Rubber Pavers
Standard Test Method for Wind Resistance (Fan-Induced) via air velocity of 150 MPH.
- Q.) UL 2218, Class 4 Impact Resistances, 2010.
Standard Test Method for Impact Resistance of Prepared Roof Covering Materials.
- R.) ASTM D 412(13) Tensile Strength, Elongation at Break and Modulus
Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
- S.) ASTM D 624 Tear Resistance
Standard Test Method for Tear Strength of Conventional.
- T.) ASTM D 3389 (10) Taber Abrasion Index
Standard Test Method for Walking Surface Based on Abrasion Cycles.
- U.) ASTM D 2240 Durometer Hardness
Standard Test Method for Measuring the “Hardness” of Rubber Elastomers and Plastic.
- V.) ASTM D 1667 Compression Deflection
Standard Test Method for Flexible Cellular Materials.
- W.) ASTM E-831 Coefficient of Thermal Expansion
Standard Test Method for Thermal Expansion of Materials by Thermomechanical Analysis
- X.) ASTM D 3574 Compression Resistance
Standard Test Method for Flexible Cellular Materials.
- Y.) ASTM D 3676 (13) and D 395 Mass and Density Per Unit Area, including Compression Set
Standard Specification for Rubber by way of Mass, Density and Recovery Per Area.
- Z.) Tensile Strength at Interlocking Joint
For compliance with Pull Force in a testing environment to determine how much pressure it takes to unlock the interlocking joints based on real world scenarios.

1.4 Submittals:

- A.) General:
- 1.) Submit listed submittals in accordance with Conditions of the Contract and Division pertaining to Submittal Procedures Section.

B.) Product Data:

- 1.) Submit manufacturer's product data, specifications, detailed drawings and installation Instructions, as well as manufacturer's maintenance and cleaning instructions.

C.) Verification Samples:

- 1.) Submit manufacturer's standard verification samples of 4"X4" minimum. Two of the submitted samples must show the male/female self-interlocking connection (with "Button-Lock™ Technology") and Bolt-down capabilities.

D.) Manufacturers Project References:

- 1.) Submit reference list of at least 20 years of projects on all sizes, types and scopes.
- 2.) Include project name, location and contact person of three (3) projects that are similar in size, type and scope as specified herein.

E.) Installer's Project References:

- 1.) Submit a copy of manufacturers issued installation warranty certification.
- 2.) Installers must have 5 years' experience with projects of similar scope & complexity.

F.) Closeout Submittals: Submit the following:

- 1.) Warranty documents as specified herein.
- 2.) Repair & Maintenance documents as issued by the manufacturer.
- 3.) Photographs of completed installation, with close-up shots of cut tiles.
- 4.) Submit listed "Closeouts" in accordance with Conditions of the Contract and Division pertaining to Closeout Procedures Section.

G.) Approvals:

- 1.) Contact manufacturer for information on approvals by major owners, agencies, architects, engineers, municipalities and other industry entities.

H.) Environmental Considerations:

- 1.) These resilient, rubberized safety surfacing flooring and paver products in the tile/mat/block/paver form makes extensive use of clean recycled tire rubber and other recycled rubber products as a major component of its operation that are sourced/ recycled in the United States of America.

I.) Testing Data Results:

- 1.) Submit certified test reports from qualified independent testing agency indicating results of the following testing:

a.) Applicable Standards:

- b.) Impact Attenuation (ASTM F1292-04 & F355.95)
- c.) Weathering/Aging (ASTM C67, D573 & F1292-04)
- d.) Flammability/Fire Test (ASTM E108)
- e.) Flammability (ASTM E108 Modified for roof covers)
- f.) Flammability (ASTM E648)
- g.) Flammability/Burn Pill Test (ASTM2859)
- h.) Skid Resistance (ASTM E303-93 / 2013)
- i.) ADA Accessibility (ASTM F1951-99)
- j.) R-Value, Thermal Conductivity (ASTM C518-98)
- k.) Reflectance/SRI and Emittance (ASTM E903, E891, E1980)
- l.) Lead In Materials/Children's Products (CPSC-CH-E1002-08)
- m.) Water Penetration Test (Sustainable Storm Water MGT/Run-off)

- n.) Leadership in Energy and Environmental Design (LEED)
- o.) Pull Force Test (ANSI/FM 4474 Approval, Appendix B)
- p.) Wind Resistance (ASTM D3161-09)
- q.) Class 4 Impact Resistance (UL 2218, 2010)
- r.) Tensile Strength, Elongation at Break and Modulus (ASTM D 412)
- s.) Tear Resistance (ASTM 624)
- t.) Taber Abrasion Index (ASTM D3389)
- u.) Durometer Hardness (ASTM 2240)
- v.) Compression Deflection (ASTM 1677)
- w.) Coefficient of Thermal Expansion (ASTM 831)
- x.) Compression Resistance (ASTM 3574)
- y.) Mass & Density (ASTM 3676) with Compression Set (ASTM D395)
- z.) Tensile Strength at Interlocking Joint (Pull Force)

1.5 Quality Assurance/Control:

- A.) Manufacturers Qualifications: Manufacturer shall meet a minimum of one (1) of the following two (2) requirements:
 - 1.) Consistently engaged in manufacturing of self-interlocking rubber tiles/mats/blocks/pavers of similar type that is specified, with a minimum of fifteen (15) years of experience under the same business name and EIN (Employer Identification Number)
 - 2.) Furnished/Supplied a minimum of ten-million (10,000,000) square feet of self-interlocking rubber tiles/mats/blocks/pavers of similar type that is specified.
- B.) Installers Qualifications:
 - 1.) Installers must have 5 years' experience with projects of similar scope & complexity.
 - 2.) Certificate of qualifications from the product installer verified by manufacturer.

1.6 Delivery, Storage and Handling

- A.) Delivery:
 - 1.) All materials shall be delivered in good condition in its original unopened packages, bound and shrink wrapped with all labels intact clearly identifying manufacturer, product series/name, color and type.
- B.) Storage:
 - 1.) All materials and accessory items shall be protected from weather; and shall be stored at temperatures of 50 degrees Fahrenheit (10 degrees C) and rising for 24-hours min.
 - 2.) Protect all materials and accessory items from direct sunlight before and during installations.
- C.) Handling:
 - 1.) Protect all materials and accessory items during handling and installation to prevent unnecessary damage.

1.7 Environmental Requirements

- A.) Tile and Air Temperatures:
 - 1.) Ensure both the tile and air temperature is a minimum of 50 degrees Fahrenheit (10 degrees C) and rising for 24-hours min.

- 2.) Consult with manufacturer's installation guide/manual for installations in conditions less than 50 degrees Fahrenheit (10 degrees C) and/or greater than 85 degrees Fahrenheit (29 degrees C).

1.8 Warranty Information

A.) Manufacturer's Warranty:

- 1.) Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.

B.) Material Warranty Period:

- 1.) Standard Five (5) Years from date of product shipment; or a Ten (10) Year Pro-rated Warranty from date of product shipment shall be selected prior to ordering. A default Five (5) Year Pro-rated Warranty shall be issued if no other warranty is selected prior to ordering.

C.) Installation/Workmanship Warranty Period:

- 1.) Standard Three (3) Years from date of product installation; or a Five (5) Year Pro-rated Warranty from date of product shipment shall be selected from the certified installer prior to ordering. A default One (1) Year Warranty shall be provided by the contractor directly if no other warranty is selected prior to ordering.

PART 2: PRODUCTS

2.1 Manufacturer

A.) Unity Surfacing Systems, A Product of Unity Creations, Ltd. 3997 Route 9W (PO Box 9) Saugerties, New York 12477. Toll Free: (1-877) 41-UNITY, Phone (845) 246-2700, Fax: (845) 246-1700, E-mail: productinfo@surfacingystems.com, Internet: www.surfacingystems.com

2.2 Playground Protective Surfacing

A.) Description:

- 1.) Self-Interlocking Tile/Mat/Block/Paver size: 22" X 44" = 6.72 sq. ft. per unit (pre-cured). Cured products will measure 21.75" X 43.5" = 6.57 sq. ft. per unit.
- 2.) Transitional Ramp Edge size: 22" X 44" (slope can be found in the 22"). Cured products will measure 21.75" X 43.5" = 6.57 sq. ft. per unit.

B.) Basic Use:

- 1.) Designed for playgrounds, rooftops, walkways, recreational areas, weight rooms, patios, pools of all types. It is installed over poured asphalt (blacktop), concrete (cement) or compacted crushed stone substrate. It is also suited for rooftop applications. The product line features an extensive range of standard tile/mat/block/paver colors and thicknesses with many design capabilities and accessory pieces.

C.) Composition and Materials:

- 1.) The Unity, self-interlocking (w/Button-Lock™ Technology), resilient, rubberized safety surfacing flooring and paver products in the tile/mat/block/paver form offers shock resistance. Comes in seven (7) standard thicknesses and can be produced from ½" to 4"

(4.0”) in thickness. Consists of three product families: Post-Consumer Black Recycled SBR (Styrene Butadiene Rubber) - recycled in-house, Pigmented Dye and/ or TPV (Thermoplastic Vulcanized Rubber)/ EPDM (Ethylene Propylene Diene Monomer).

- a.) Pigmented top tiles are produced with 100% post-consumer black recycled SBR (Styrene Butadiene Rubber) coating said recycled rubber granules to achieve a desired color.
- b.) The TPV/EPDM top tiles/mats/blocks/pavers are recycled post-industrial TPV/EPDM rubber, available in a variety of colors and color combinations.
- c.) All of which, are mixed with a polyurethane and molded with heat and pressure into finished products.

2.) Unity offers a solid layer construction with bottom designs consisting of solid cones (feet and/or legs) for maximum surface contact offering a built-in self-interlocking system with Button-Lock™ technology and bolts down. This allows maximum contact between the tile/mat/ block/ paver bottom and base as well as between adjacent products.

3.) The type of playground equipment, athletic and recreational and/or roof specifications determines the required tile/mat/block/paver thickness. Depending on ASTM F1292-04 requirements for critical fall height from 0’-12’ (feet), select tile thickness from optional thicknesses: ½” & ¾” thick “Tough-Land” Series, 1 ¾” (1.75”) thick “Pave-Land” series for a five (5’) foot fall rating, 2 ½” (2.5”) thick “Play-Land” series for a seven (7’) foot fall rating, 3” thick Soft-Land” series for an eight (8’) foot fall rating, 3 ½” (3.5”) thick “Soft-Land” series for a ten (10’) foot fall rating, and the 4” thick “Soft-Land” series currently testing to achieve a twelve (12’) foot fall rating respectively.

4.) Accessories include:

- a.) Unity’s Chemrex 948 Urethane Adhesive (Large Tubes) – For gluing interlock-to-interlock adhesion as well as product-to-solid sub-base installations.
- b.) Unity’s Transitional Ramp, Standard Beveled Edge – For above grade installations. Slope is standard at 22”, but can also be set at 44” for ADA.
- c.) Unity’s Geotextile Fabric, Landscaping Mesh – For rooftop installations and loose-filled ground level installation only. **MUST CUT AWAY FROM DRAINS.**
- d.) Unity’s Anchor Bolts (for bolt-down installations) – For solid sub-base ground level installations only. **DO NOT USE ANCHOR-BOLTS ON ROOFTOPS.**

D.) Thickness and Weights:

| | |
|--------------------------|--|
| ½” thick..... | ~ 10 lbs. each or ~ 2.5 lbs. per sq. ft. (2ft. X2ft. only). |
| ¾” thick..... | ~ 15 lbs. each or ~ 3.75 lbs. per sq. ft. (2ft. X2ft. only). |
| 1 ¾” (1.75”) thick. | ~ 37 lbs. each or ~ 5.5 lbs. per sq. ft. (22”X44” only). |
| 2 ½” (2.50”) thick..... | ~ 40 lbs. each or ~ 6.0 lbs. per sq. ft. (22”X44” only). |
| 3” thick..... | ~ 44 lbs. each or ~ 6.5 lbs. per sq. ft. (22”X44” only). |
| 3 ½” (3.5”) thick..... | ~ 47 lbs. each or ~ 7.0 lbs. per sq. ft. (22”X44” only). |
| 4” thick..... | ~ 50 lbs. each or ~ 7.5 lbs. per sq. ft. (22”X44” only). |

Note: Adjustments can be made with reference to weight related issued for each unit.

E.) Wear Layer for 1 ¾”, 2 ½”, 3”, 3 ½” & 4” thick products to be standard at one (1”) inch thick

F.) Base Layer: Integral solid cone pedestal design/pattern underside forming channels for water drainage between protective surfacing and substrate to drainage outlet.

G.) Color:

- 1.) Pigmented Color (minimum 3/8" thick):
 - a.) Black, Splash (Black with 10% to 50% TPV/EPDM granules sprinkled on top), Slate Gray, Red (Terra Cotta), Grass Green, Sky Blue, Sandy Tan, Mystic White, Choc Brown.

- 2.) TPV/EPDM Colors (minimum 1/4" thick):
 - a.) Red (Terra Cotta), Brt. Red, Green, Brt. Green, Dark Green, Blue, Lt. Blue, Azure Blue (Teal), Purple, Lt. Purple, Turquoise, Beige, Eggshell (Cream), Brown, Dark Brown, Mustard Yellow, Brt Yellow, Orange, Dark. Gray, Mid-Gray, Lt. Gray, Virgin Black. *Can be blended for a solid TPV top using up to three (3) color(s) at any percentage(s) desired for a custom look.*

H.) Limitations:

- 1.) The following chemicals may cause damage to the rubberized safety surfacing, flooring and paver products, and should be avoided:
 - a.) disinfectants, concentrated chlorine bleach, gasoline, diesel fuel, hydraulic and lubricating oils, acids and organic solvents.

- 2.) In water play areas, pool surrounds and similar applications; dissolved minerals and other chemicals (hydrochlorides) may cause surface discoloration over time. This condition, should it occur, is not considered to be a product failure.

- 3.) Due to the elastic characteristics of recycled rubber products, some variation in dimensions may be expected. Plan for product dimensions of 21³/₄" X 43¹/₂" on items 1³/₄" thick and higher.

I.) Testing Data Results:

- 1.) Shock Attenuation (ASTM F1292-04 & F355.95):
 - a. G-max – Less than 200 =PASSED.
 - b. Head Injury Criteria – Less than 1000 =PASSED.
 - c. 1³/₄" = 5 foot fall rating, 2¹/₂" = 7 foot fall rating, 3" = 8 foot fall rating, 3¹/₂" = 10 foot fall rating and 4" = 11 foot fall rating.

- 2.) Weathering/Aging (ASTM C67, D573 & F1292-04): =.....PASSED.
 - a. 1³/₄" = 5 foot fall rating, 2¹/₂" = 7 foot fall rating, 3" = 8 foot fall rating, 3¹/₂" = 10 foot fall rating and 4" = 11 foot fall rating.
 - b. Rubber Deterioration in an Air Over (ASTM D573).....NO DETERIORATION

- 3.) Flammability/Fire Test (ASTM E108).....MEETS "CLASS A" RATING.
 - a. At 1minute 45 seconds the flames traveled four feet along the tip of the sample. At 2 minutes 29 seconds the flames receded to two feet. After 10 minutes of flame exposure at a deck slope of one-quarter in per horizontal foot in 12 mph wind velocity, the burner was shut off. The sample stopped burning 38 seconds after the flame was shut off.

- 4.) Flammability (ASTM E108 Modified for roof covers):.MEETS "CLASS A" RATING
 - a. Ignition Time = 7:24, Maximum Spread of Flame = 40", Time of Maximum Spread = 8:25. Observations = The Burner Flame was shut off at 10 minutes and the specimen self-extinguished at 13 minutes and 55 seconds, meeting Class A.

- 5.) Flammability (ASTM E648).....MEETS “CLASS I” RATING.
 - a. Each Specimen was laid flat over a ¼” Etera board (a cement asbestos substitute using PC: 96H. Critical Radiant Flux (watts/cm2) averaged = 0.58.
- 6.) Flammability/Burn Pill Test (ASTM2859)..... W/NO OFF GASSING @ 3.7”
 - a. Distance (inches) shall be greater than 1” for all eight test samples to comply.
- 7.) Skid Resistance (ASTM E303-93 / 2013).....PASSED.
 - a. Dry =80.25.
 - b. Wet =67.
- 8.) ADA Accessibility (ASTM F1292-99): =PASSED.
 - a. Firmness =0.26.
 - b. Stability =0.28.
- 9.) R-Value, Thermal Conductivity (ASTM C518-98): =2.4 COMPLIANCE.
 - a. Hot (F) = 96.78, Cold (F) = 50.68, Average = 73.73, Thermal Conductivity Btu-in/hr-ft2-F.
- 10.) Reflectance/SRI and Emittance (ASTM E903, E891, E1980)....VARIES (see below)

| Specimen Code | % Solar Reflectance | SRI | Reflectance (p) Measured | <u>Near-Normal Emittance € Calculated</u> |
|----------------------|----------------------------|------------|---------------------------------|--|
| EPDM Blended Top | 58.8 | 72 | 0.05 | 0.95 |
| Mystic White | 20 | 22 | 0.04 | 0.96 |
| Sandy Tan | 11.9 | 12 | 0.03 | 0.97 |
| Sky Blue | 7.8 | 7 | 0.03 | 0.97 |
| Wheat | 39.4 | 46 | 0.05 | 0.95 |
| Choc. Brown | 5.1 | 3 | 0.04 | 0.96 |
| Slate Grey | 6.7 | 5 | 0.06 | 0.94 |
| Terra Cotta RED | 5.9 | 3 | 0.06 | 0.94 |
| Grass Green | 6.7 | 5 | 0.06 | 0.94 |
| TPV White | 68.6 | 86 | 0.04 | 0.96 |
| TPV Blended Colors | 46.4 | 55 | 0.04 | 0.96 |

- 11.) Lead In Materials/Children’s Products (CPSC-CH-E1002-08):.....NOT DETECTED
 - a. CPSIA Section 101: Rubber Tile/Mat/Block/Paver: Lead Content (ppm) = ND. MDL = 2 ppm, Permissible Limit = 300 ppm, Conclusion = Pass.
- 12.) Water Penetration Test (Sustainable Storm Water MGT/Run-off).....VARIES
 - a. BODY = Penetration is .13 Gallons Per Minute, Per Square Foot of surface area
 - b. SEAM = Penetration is .21 Gallons Per Minute, Per Square Foot of surface area
- 13.) Leadership in Energy and Environmental Design (LEED):
 - a. Criteria development by the United States Green Build Council (USGBC):
 - 1.) Materials and Resources:
 - Up to 6 points / credits toward LEED certification.

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|-------------------------------|---------|
| Recycled Content..... | MR. 4.1 |
| Recycled Content..... | MR. 4.2 |
| Local/Regional Materials..... | MR 5.1 |
| Local/Regional Materials..... | MR 5.2 |
| Construction Waste Mgt..... | MR 2.1 |
| Construction Waste Mgt..... | MR 2.2 |

2.) Indoor Environmental Quality:

Up to 1 point / credit toward LEED certification.

| | |
|-----------------------------|--------|
| Low Emitting Materials..... | EQ 4.1 |
|-----------------------------|--------|

- 14.) Pull Force Test On Solid Sub-Base (ANSI/FM 4474 Approval, App. B)....277.5 psf.
 - a. Allowable design pressure (2:1 Factor of Safety) for systems installed in the manner described.

- 15.) Wind Resistance (ASTM D3161-09), Over-Top and At Edge Kick-Plate):..150 MPH
 - a. Over Top = No movement observed after 2 hours continuous exposure.
 - b. Kick Plate = Lifting observed in center of specimen. Sample remained intact and on roof membrane after 2 hours of continuous exposure.

- 16.) Class 4 Impact Resistance (UL 2218, 2010)PASSED.
 - a. Six different drop zones observed no damage. No evidence of tearing, fracturing, cracking, splitting, rupturing, crazing, or other evidence of opening of the rubber paver system.

- 17.) Tensile Strength, Elongation at Break and Modulus (ASTM D 412)[MPa] &.[%]
 - a. Tensile Strength.....0.87 MPa
 - b. Tensile Strength at Break.....0.76 MPa
 - c. Elongation.....71.5%
 - d. Elongation at Break.....92.4%
 - e. Modulus.....3.49 MPa

- 18.) Tear Resistance (ASTM 624).....[N] &.[kNm]
 - a. Peak Tearing Load.....156 N
 - b. Peak Tearing Strength11.3 kNm

- 10.) Taber Abrasion Index (ASTM 624).....0719 WC

- 20.) Durometer Hardness (ASTM 2240).....Shore A = 54

- 21.) Compression Deflection (ASTM 1677).....577 kPa @ 25%

- 22.) Coefficient of Thermal Expansion (ASTM 831).....0013 in/ft. per degree

- 23.) Compression Resistance (ASTM 3574).....[kN] &.[kPa]
 - a. Load at Preset point.....2.78 kN
 - b. Compression Resistance.....1030 kPa

- 24.) Mass & Density (ASTM 3676).....psf & pcf/kg/m3
 - a. Mass Per Area.....2.92 psf
 - b. Density Per Area.....78.8 pcf/1282 kg/m3
 - c. Recovery (D395).....90-100% w/No Cracking

- 25.) Tensile Strength at Interlock Joint (Pull Force To Separate Interlock).....Two Ways.
a. Vertical Pull Force Test.....127 PSI or Greater.
b. Horizontal Pull Force Test.....38 PSI or Greater.

PART 3: EXECUTIONS

3.1 Examinations/Inspections

A.) Prior to application of the Unity's products, the architect, engineer, municipality, general contractor, safety surfacing manufacturer and installer shall evaluate the substrate's structural performance. Notify all contactors, architects and engineers of all displacements or stress cracks. Work shall not proceed until unsatisfactory conditions are corrected and signed by the contractors, architects and engineers; And Unity's installation manual/guide has been read.

3.2 Preparations

A.) Do not proceed with safety surfacing, flooring and/or paver installation until all applicable site work, including substrate preparation, fencing, playground equipment installation, roofing and other relevant work, has been fully completed and approved. Verify that substrate conditions are suitable for installation of the safety surfacing, flooring and pavers; and do not proceed with installation until unsuitable conditions are corrected, verified and approved.

B.) Recessed installations are strongly encouraged to avoid the use of transitional ramps (edging) as this allow for the entire area to be ADA accessible and not just one ramp/zone/area. It is both helpful and advised to plan accordingly when preparing for a counter-sunk installation.

1.) Crushed Stone Base: Shall be 3-5" thick (depending on application and use). Contractor shall prepare a compacted level sub-grade using a "stone blend" material. Stone base shall be uniformly mixed on a mixing table or by other mechanical means (such as quarry blending operations) prior to placement on the compacted earth surface sub-grade. Stone base shall be bladed and evenly compacted and shall be a minimum of five (5") inches deep at all locations. Stone base shall be wetted during mixing operations if necessary for proper blending. Moisten and compact with a flat plate vibratory compactor to 95% proctor. Tolerance: 1/4" in any 10ft. direction. Ensure stone base is a minimum of fifteen (15) days old. Moisten and compact again if necessary. A Landscaping Fabric/Mesh shall be installed prior to finished products being applied.

2.) Concrete Sub-base: Shall be as specified in the Division pertaining to the appropriate Section. Apply a light broom finish to "lightly rough" the concrete sub-base. Ensure concrete is sound with no loose materials or cracks over 1/8" (inch) wide in size. Ensure concrete is a minimum of ten (10) days old. Test concrete for any moisture in accordance with manufacturer's installation guide/manual to ensure it has successfully and sufficiently cured and is dry. Existing concrete sub-bases shall be pressure washed and dried in accordance with manufacturer's installation guide/manual.

3.) Asphalt Sub-bases: Shall be as specified in the Division pertaining to the appropriate Section. Ensure asphalt is sound with no loose materials or cracks over 1/8" (inch) wide in size. Ensure asphalt is a minimum of fifteen (15) days old. Test asphalt for any moisture in accordance with manufacturer's installation guide/manual to ensure it has successfully and sufficiently cured and is dry. Existing asphalt sub-bases shall be

pressure washed and dried in accordance with manufacturer's installation guide/manual. Scarify existing asphalt in accordance with manufacturer's installation guide/manual.

4.) Variations In Elevations: Shall repair variations in elevation of sub-base surfaces greater than +/- one-quarter (1/4") inch over ten (10) feet in any direction.

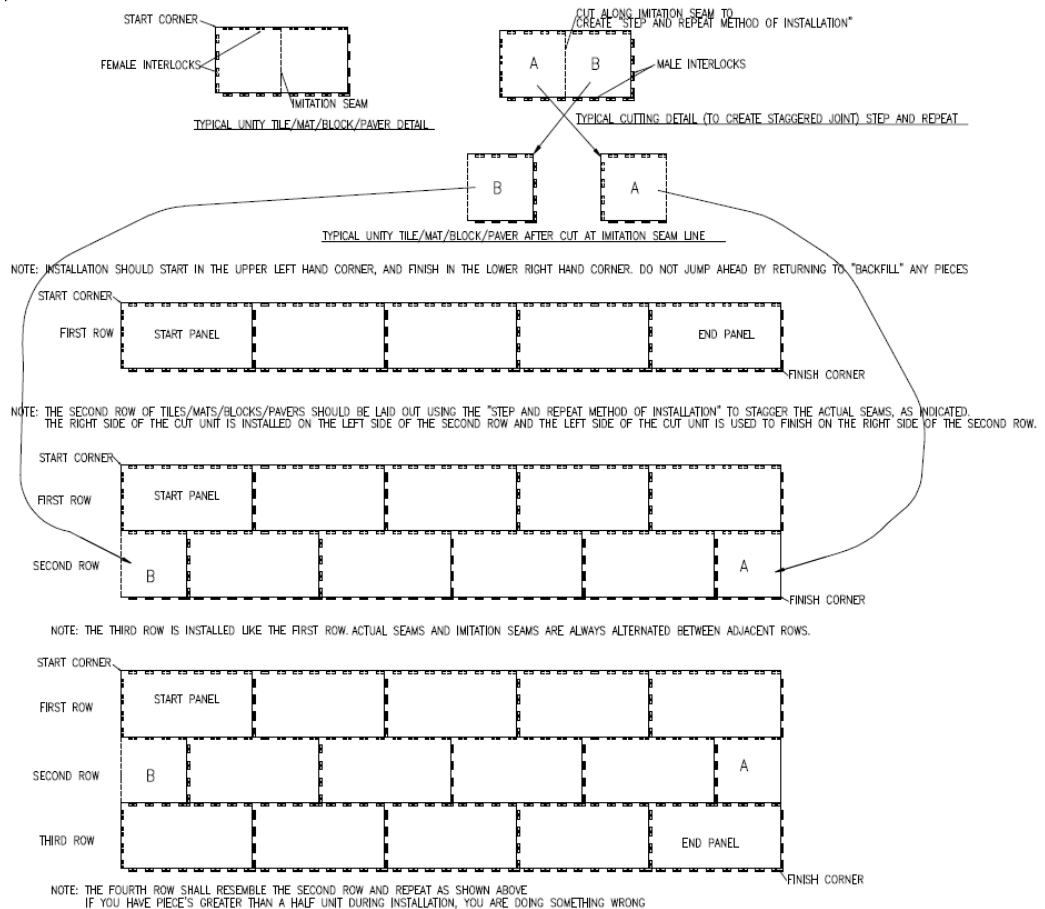
3.3 Installations:

A.) The installation manual / guide shall also be read in full by the General Contract's foreman and all parties of the installation crew.

B.) Recessed installations are strongly encouraged to avoid the use of transitional ramps (edging). The height of the finished area (i.e. concrete/asphalt walkway, edging, wood, etc.) and the sub-base material shall be consistent with the thickness of the tiles/mats/blocks/pavers being installed all the way around the entire installation area, prior to the installing the Unity products. This shall be tested every 44" with a full size sample tile/mat/block/paver given to the contractor prior to commencement of installation.

C.) Tiles/mats/blocks/pavers shall be installed on a rectangular configuration of 22" (inches) by 44" (inches) in size [*+/- quarter (1/4") tolerance*] with a shadow-center (fake seam) joint to achieve the use of the "step-&-repeat" systems to stagger the seams as if you were installing brickwork (zigzag). As a result, symmetry of 22" by 22" squares will be seen on properly completed jobs (installations). Off-setting the joints/seams can also be achieved and shall be approved by the architect of record and the manufacturer, in writing, prior to installation.

D.) Step & Repeat Method of Installation noted below:



E.) For solid sub-base installations (NOT ROOFTOPS), apply adhesive to the underside, outside edge, of EACH unit being installed at a rate of approximately 75 square feet per 825 ml tube. Adhesive consumption will increase as solid sub-base porosity increases. *Note: When one (1) and five (5) gallon pails are used for the transitional ramps (edging), apply adhesive to the underside of said transitional ramp (edging) and base using a notched trowel.*

F.) For recessed installations with a boarding system, apply adhesive to the sides of either the edging, or the products themselves at a rate of approximately 50 linear feet per 825 ml tube.

G.) Apply adhesive to the interlocks, both in the joint (inside wall) and on top of the interlocking joint (outside edge) for added strength and security at a rate of approximately 75 square feet per 825 ml tube. Such application will allow for proper rainwater drainage.

H.) Maintain a straight line at the product joints. To keep lines straight, adjust products using a rubber mallet as they are installed. Apply a string line on the first couple of rows installed to maintain a straight line of installation. Repeat string-line process every so often to make sure you continue a straight line/run of installed products.

I.) Screw-bolts shall be applied through the male interlocks and counter-sunk every 22” inches into the solid sub-base material. **DO NOT USE SCREW-BOLTS ON ROOFTOPS.**

J.) All posts and protrusions, etc., shall be cut and aligned as required to fit without any gaps. Said cuts, including lead-in cuts, shall be on a 30-degree angle to allow for glue to maintain on the cut unit for added adhesion.

K.) Precautions:

- 1.) The sub-base must be level with a slight pitch for drainage, or uniformly sloped since variations will be telegraphed through to the tile surface. Avoid installation when large temperature swings during the time between adhesive application and final curing (12 - 36 hours, depending on temperature and humidity) are expected, as gapping between tiles/mats/blocks/pavers may result.
- 2.) Protect the newly installed safety surface, flooring and paver material from damage resulting from subsequent construction activity on the site. Temporary applications are possible because products can be loose-laid with interlock-to-interlock gluing, both inside the joint and on top.
- 3.) Remove adhesive (glue) spills from installation area using a clean dry rag and mineral spirits in accordance with manufacturer’s installation guide/manual.
- 4.) If applicable, cut geo-textile fabric/landscaping mesh away from any and all drains. Do not cover drains, drain covers, drainage outlets what-so-ever.

3.4 Field Quality Control:

A.) Prior to installation, Contractor shall provide the architect of record and the owner a signed copy of the “Installation Warranty” in writing prior to installation commencement.

B.) Contractor shall “certify” in writing that the sub-base material(s) have been properly compacted, cured and dry as per Section pertaining to Preparations, prior to installation.

C.) Contractor shall “certify” in writing that the “Installation Guide/Manual” has been read by Project Manager and by Lead Installer prior to installation commencement.

D.) Contractor shall “certify” in writing that the flush test (if applicable) has been completed and verified with photographic images sent to the: architect, engineer, municipality, safety surfacing manufacturer.

3.5 Protection

A.) Protect the installation area from any and all types of subsequent construction and/or foot traffic whether it is human, animal or machine for a minimum of twenty-four (24) hours after installation has occurred.

END OF SECTION 32 18 00 (02791)

Specifiers Notes:

Introduction:

This specification product guide is written according to the Construction Specification Institute (CSI) and the Construction Specifications Canada (CSC) 3-Part Format, MasterFormat, SectionFormat and PageFormat, as described in The Project Resource Manual – CSI Manual of Practice (April 2016 Edition).

The Section(s) must be carefully reviewed and edited by the Architect to meet the requirements of the project and local building code requirements. Coordinate the related Section(s) with other specifications section(s) and the Drawings accordingly. Delete all Specifiers Notes when editing.

1.1 Section Includes:

This covers Unity’s Tough-Land, Pave-Land, Soft-Land and XL Series of resilient, unitary, rubberized safety surfacing, flooring and paver products in the tile/mat/block/paver form. Contact Unity for assistance in editing any of these Sections for a specific application.

1.2 Related Sections:

Edit the list of related Section(s) as required for the project. List other Section(s) with work directly related to this Section(s).

Include the Section(s) number(s) and title(s) of the Division(s) Section(s), if they are referenced in this section.

1.3 References:

List standards referenced in this Section(s), complete with designation(s) and title(s). This article does not require compliance with standards, as it is merely a listing of those used.

1.8 Warranty Information:

Refer to conditions of the overall Contract for project warranty provisions.

2.1 Manufacturer:

If a local representative is to be the key contact for questions and/or pricing on a local level, their company name, contact person information, address, phone number and e-mail address should be included herein.

2.2 Playground Protective Surfacing:

C.) Composition and Materials

3.) Specify thickness(es) of product based on the Critical Fall Height (CFH) and coordinate with working drawings.

D.) Thicknesses & Weights:

Specify weights and thickness based on Pigmented and or TPV top of each product/unit/series being used.

E.) Wear Layer:

Specify 1 ¾"-4" thick products at 1" thickness.

G. Colors:

1.) Specify Pigmented and "Splash Design" top products on general applications where custom color combinations are not a primary design consideration. Made with Aromatic Binder. Splash Design can be used to create a speckled appearance.

2.) Specify Solid TPV top products when increased color retention and stability, a wider range of blending in design and/or matching an overall scope of the project is desired. Can be blended using up to three (3) colors at any percentages desired. Solid TPV top products can be used to create a marble or granite appearance. Made with Aliphatic Binder.

I.) Testing Data Results:

Specify Test Results in accordance with project details accordingly.

Actual test reports, additional testing and additional product information are available upon written request.

3.2 Preparations:

Due to the Porosity of the Unity products, it is essential that a proper sub-base drainage system/run-off be used/constructed or else the products may not stay level and become damaged due to up-lift and/or shifting.

B.1.) Crushed Stone Base – Ensure materials, compaction, thickness, slope and settling times are clearly specified.

B.2.) Concrete Sub-base – Ensure that adhesive/glue will be used on the underside, outside edge, of each unit being installed.

B.3.) Asphalt Sub-base – Ensure that adhesive/glue will be used on the underside, outside edge, of each unit being installed.

3.3 Installations:

Rooftop installations, Crushed Stone sub-base and temporary installations often call for adhesive to be applied to the interlocks only. In these cases, do not apply

adhesive directly onto the roofing membrane or solid sub-base materials that are temporary without consulting an engineer, architect or end-user. Yield per tube will increase to 80 sq. ft. per tube.

D.) When using gallon pails for transitional ramps, yield is 50 sq. ft. per gallon.