Prepared by: Gale Associates Inc.
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Alternative Infills for Synthetic Turf - Properties as Infill Summary

Type of Alternative Infill	Material[1]	Color	Shape	Abrasiveness	UV Stability	Typical Turf Pile Height	Availability[4]	Resilient Shock Pad Recommended	Irrigation Recommended	Expected Life Span	Typical Mixture (By weight)	Approximate Cost[5]	Comments[1,2]
Crumb Rubber	Styrene butadien Rubber (SBR) Recycled tire rubber shreded	Black	Angular shaped granules	Low	Stable	2.25" - 2.50"	Readily Avaialble	No	No	Life of Carpet	50% Sand 50% Rubber	$50,000 per field	1. SBR Rubber and sand is the typical infill system used in the majority of synthetic turf fields installed since 1990's. 2. SBR rubber maintains its resiliency over a wide range of temperature and enviornmental conditions.
Silica Sand	Rounded Silica Sand	Tan/Brown	Rounded Particles	High	Stable	1.50" - 2.0"	Readily Avaialble	Required (See Comments)	No	Life of Carpet	100% Silica Sand	+$0 net for additional sand +$130,000 for resilient pad	1. Shock pad is required to provide shock attenuation (G-max) 2. Sand stays hard under cold/frozen conditions (regardless of shock pad) 3. Use turf stitch gage of 5/8"or less. 4. Consider turf thatch layer for fly up prevention.
Organic	Cork or Cocunut Husk or rice hulls	Natural appearance (tan/brown)	Angular shaped granules	Low	Low Stability	1.50" - 2.50"	Limited Availability	Yes (See Comments)	Yes[6]	Unknown[3] ability to decompose	10%-15% Organic 90% to 85% Sand	+$180,000 for materials +$130,000 for resilient pad +$15,000 for Irrigation +$325,000 total net add	1.Reports of early degredation and floating of partilces 2. Organics can stay hard under frozen conditions (regardless of shock pad) 3. Shock pad reccommended to provide shock attenuation over warranty period 4. Consider increased maintenance
Coated Crumb Rubber	SBR (Styrene butadien Rubber) Recycled tires shreded and coated with acrylic or EPDM	Custom colors available	Angular shaped granules	Low	Medium stability	2.25" - 2.50"	Readily Avaialble	No	No	Life of Carpet	50% Sand 50% Coated Rubber	+$220,000 materials	1. Still contains SBR Rubber 2. Manufacturers claim coating encapsulates outgasing of SBR rubber 3. Shock pad is not required, consider a combination of shock pad and other infill material to reduce quantity of needed material
EPDM (Ethylen Propylene Diene Monomer) Rubber	Virgin rubber produced for infill of ahtletic fields only	Custom colors available	Angular shaped Granules	Low	Medium stability	2.25"-2.50"	Limited Availability	No (See Comments)	No	Not proven long term	50% Sand 50% EPDM	+ $360,000 materials	1. Similar material to SBR rubber 2. Shock pad is not required, consider a combination of shock pad and other infill material to quantity of EPDM needed 3. EPDM is a generic term and quality can vary greatly. Proven source and propriety formulations are recommended.
TPE (Thermoplastic Elastomer)	Extruded plastic pellets	Custom colors avaialble	Typically Uniform pellets Shape depends on manufacturer	Low to Medium	Stable	1.5" -2.50"	Limited Availability	Recommended	No	Not proven long term	50% TPE 50% Sand	+$360,000 materials +130,000 resilient Pad +490,000 total net add	1. Turf thatch layer is suggeted to help reduce fly up/displacement of material 2. Shock pad is not required, some owners have used combination of shock pad and TPE to reduce quantity of infill needed. 3. TPE is generic term - Quality can vary greatly. Proven source and propriety formulations are recommended
Coated Sand	Polymer Coated Silica Sand	Green	Fairly Round Particles	Med	Stable	1.50" - 2.0"	Limited Availability	Required (See Comments)	No	16 Year Warrentee (See Comment)	100% Coated Silica Sand Particles	+$150,000 to $250,000 for materials +130,000 resilient pad +380,000 total net add	1. Coating has been reported to last shorter than warrantee period 2.Shock pad is required. Some manufacturers suggest a mix with TPE to obtain required resiliency (Gmax). 4. Turf stitch gage of 5/8" or less is recommended to prevent displacment. 5. Turf Thatch layers should be considered to
Nike Grind	Nike's Environmentally Perferred Rubber (Meets or exceeds restricted substance standards set for wearable consumer goods)	Mutiple Colors	Angular shaped granules	Low	Stable	2.25" - 2.50"	Very Limited Availability	No	No	Per Nike, Expected life 10 years of play at 40 hours per week	50% Sand 50%Nike grind	+$130,000 materials	1.Proprietary. 2. Reports that infill is not asthetically pleasing. 3. Has occasionally been used as a supplement to SBR rubber or in lieu of SBR to provide 'renewable' label since 1990's

Notes:

1. Information provided was compiled by available online data, manufacturers literature and conversations with turf and infill distributors. Gale has not conducted any independent testing of infill materials and does not guarantee the accuracy of information provided here in.
2. Installations of fields with alternative infill material (other than SBR Rubber and Sand) are somewhat limited and many have not been proven long term. Gale does not guarantee performance of any turf system.
3. Few older installations in U.S. More common in Europe. Only one supplier warranties for life of turf (geoturf) in U.S.
4. May become more or less available as demand and popularity fluxuates. Cost fluxuates with availability
5. Costs are generalized approximations. Costs are NET addition to cost of a typical sand/SBR turf infill system. Actual costs will vary based on depth of infill/turf depth, type of resilient pad used. Market costs can vary greatly due to materials demand and availabilty.
6. Organic Infill suppliers recommend keeping infill moist to aid with resiliency, improve longetivity, prevent compaction and material displacement

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Alternative Infills for Synthetic Turf - Pros and Cons

Type of Alternative Infill	Material	Brand/Trade Names	Pros	Cons
Crumb Rubber	Styrene butadien Rubber (SBR) Recycled tire rubber shreded	None SBR rubber Ambient or Cyrogenic	Low Cost / Recycled Material Highly Analyized and Tested for safety, environmental and health concerns when as turf infill. Good Drainage Does not float Low Maintenance, High UV Stability - Maintains Resiliency Manufacturers Warranties Warm fields in freezing climates Readily available	Poor Reputation / Perception as 'trash' Perception as Hazardous to Human Health 'Heat' of play, Hot Fields / Concern in Warm Climates Static Cling - gets in Uniforms and Equipment
Silica Sand	Rounded Silica Sand	Sand None	Low Cost Highly Analyized as Infill Low Maintenance Good Drainage Common Mineral Manufacturers Warranties Adds Wieght/Stability to Infill Systems	Relative 'hardness' Abrasive Cost (Requires Resilient Pad if used alone)
Organic	Cork or Cocunut Husk or Rice Hulls	ProGeo - Geoturf Purefill - Field Turf Geofill - Shaw Sports Natrafill	Natural Material / Renewable Perception as Natural Material Reported to reduce Heat Concerns as Infill Natural Color & appearance Good Resilency Reported Common Use in Europe	High Cost - High materials Costs Cost - Resilient Pad Recommended Cost - must be kept moist - Requires Irrigation System Cost - Higher Maintenance costs/Shorter Life Cycle* Potential to Plug/affect drainage Freezes-Hard fields in freezing climates Potential for weed and mold growth Limited availability Floats - Should not be used in Flood Prone Areas
Coated Crumb Rubber	SBR (Styrene butadien Rubber) Recycled tires shreded and coated with acrylic or EPDM	Polytan RPU - Polytan Cushionfall Sport Coolfill - SprintTurf	Low Maintenance Good Drainage High UV Stability - Maintains Resiliency Coating reported to encapsulate SBR rubber outgassing & improve heat concerns Manufacturers Warranties Does not Float Variety of Colors - Reported to reduce heat concerns Does not require Resilient pad or Irrigation	High Cost - High materials Costs Same chemical make-up & potentials as SBR Rubber Relatively little analysis as Turf Infill Limited availability
EPDM (Ethylen Propylene Diene Monomer) Rubber	Virgin rubber produced for infill of ahtletic fields only	EPDM Melos EPDM ST - APT Melos Bionic EPDM - APT Gezofill - Gezolan corp.	Low Maintenance Good Drainage High UV Stability - Maintains Resiliency Manufacturers Warranties Does not Float Variety of Colors - Reported to reduce heat concerns Does not require Resilient pad or Irrigation	High Cost - High materials Costs Very Similar chemical make-up & potentials as SBR Rubber Relatively little analysis as Turf Infill Generic Material - Must use Proven - Proprietary formulations for quality Limited availability in quantities needed for fields
TPE (Thermoplastic Elastomer)	Extruded plastic pellets	EcoGreen - Field Turf Eco Max - Field Turf BionPro - Polytan FutrFill - Target indust.	Low Maintenance Good Drainage High UV Stability Manufacturers Warranties Variety of Colors - Reported to reduce heat concerns Does not require Irrigation Common plastic used widely in medial, food and toy manufacture Some Older U.S. Installations	High Cost - High materials Costs Cost - Use of Resilent Pad Recommended Relative hardness - Needs Resilient Pad Generic Material - Must use Proven - Proprietary formulations for quality Limited availability in quantities needed for fields Limited analysis for use as Infill
Coated Sand	Polymer Coated Silica Sand	Flexsand Envirofill	Low Maintenance Very Good Drainage Manufacturers Warranties Variety of Colors - Reported to reduce heat concerns Does not require Irrigation Does not float Can add wieght/stability to infill systems	High Cost - High materials Costs Cost - Use of Resilent Pad Recommended Relative hardness - Needs Resilient Pad Generic Material - Must use Proven - Proprietary formulations for quality Limited availability in quantities needed for fields Limited analysis for use as infill Unproven - Limited use as infill
Nike Grind	Nike's Environmentally Perferred Rubber (ground sneakers) (Meets or exceeds restricted substance standards set for wearable consumer goods)	Nike Grind Eco-grind - Field Turf	Low Maintenance Very Good Drainage Good resiliency & Life cycle Recycled Material Does not require Irrigation or Resilient Pad Has been used for years with SBR or as stand alone infill additive	High Cost - High materials Costs Very Limited Availability No color choices - Poor aesthetics - can look 'trashy' Very Similar chemical make-up & potentials as SBR Rubber Static Charge - sticks to equipment and clothing

Notes:

This Summary is assembled from available information some of which was obtained from materials vendors literature

This summary is intended as a general reference, is not specific in nature, and is not intended as a stand alone docment.