SIGMA

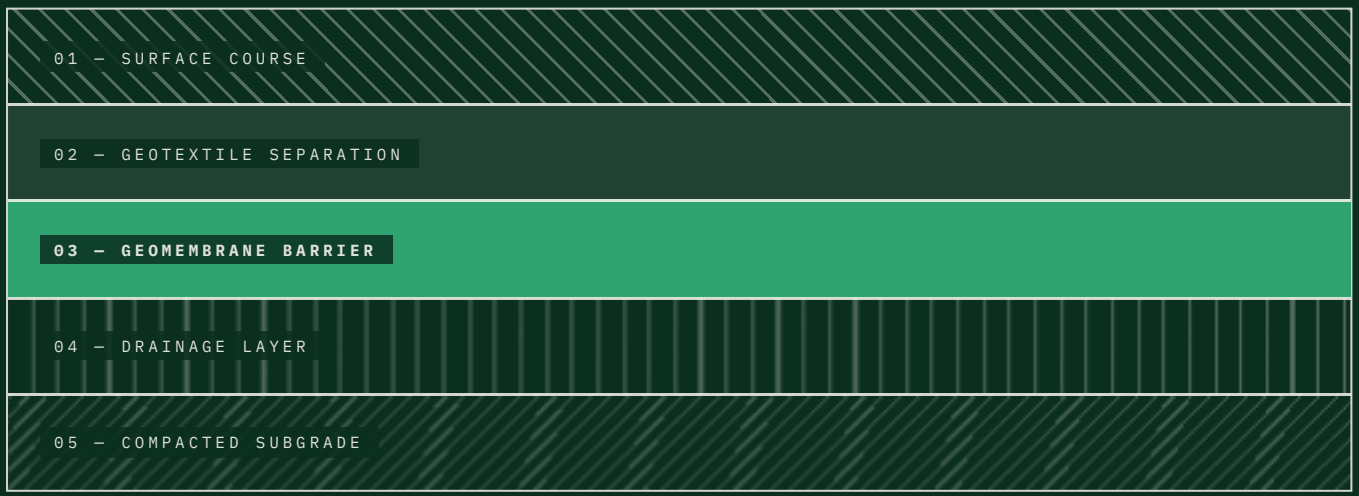
GEOSYNTHETICS · MANUFACTURER & EXPORTER

SIG-CAT-EN
EXPORT EDITION

GEO SYNTHETICS

PRODUCT CATALOG

GEOMEMBRANES · GEOTEXTILES · GEOCELLS · GEOGRIDS
GCL · DRAINAGE · EROSION CONTROL · EQUIPMENT



ISO 9001 CERTIFIED CE MARKED EXPORTED TO 60+ COUNTRIES sigmageosynthetics.com

COMPANY PROFILE

A MANUFACTURER BUILT FOR EXPORT.

SIGMA is a Chinese geosynthetics manufacturer and supplier specialised in the production of geomembranes, geotextiles, geocells and geogrids. Established in 1998, we have grown into one of the industry's leading geosynthetics factories, built on a commitment to high-quality products and efficient service for clients worldwide.

We focus on geosynthetics and do it well: geomembranes and geotextiles as our core products, alongside geocells, geogrids, GCL, drainage and erosion-control materials. Production runs across our own modern workshops with dedicated geomembrane, engineering-fibre, geocell and geotextile production lines — so quality is consistent and capacity is real.

Our customers are contractors, distributors, project owners and traders who need dependable lining, reinforcement and drainage materials — and a manufacturer that can supply them at container scale, on time, with the test documentation to back them up. We warmly welcome new business partners worldwide to join our distribution network.

SHANDONG SIGMA NEW MATERIAL CO., LTD — FACTORY

CAPABILITY DATA

1998
ESTABLISHED — PRODUCING GEOSYNTHETICS SINCE

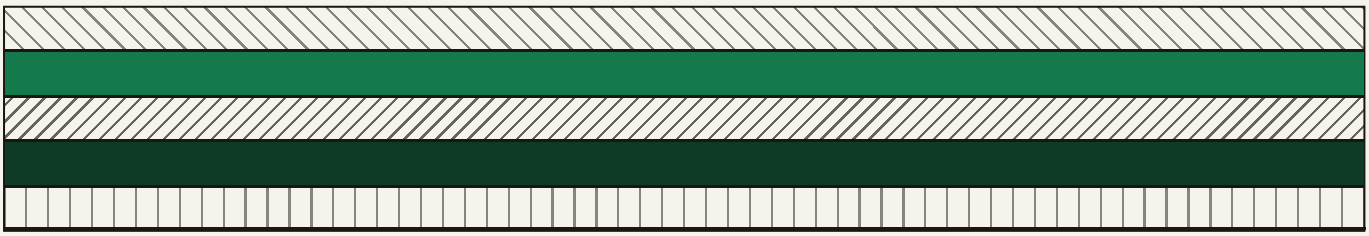
60+
COUNTRIES SERVED WORLDWIDE

40
PRODUCTS ACROSS 11 FAMILIES

ISO 9001
CERTIFIED · CE-MARKED · IN-HOUSE LAB

WHY SIGMA

- In-house production of the full geosynthetics range — one supplier, one set of paperwork.
- ISO 9001 certified management system and CE-marked products.
- National-standard laboratory controlling quality from raw material to finished roll.
- Exported to more than 60 countries, with the documentation overseas buyers need.
- FOB Qingdao / Ningbo / Shanghai or CIF, full-container and LCL shipping.
- OEM / ODM supply to your specification — grade, thickness, width, surface and packaging.



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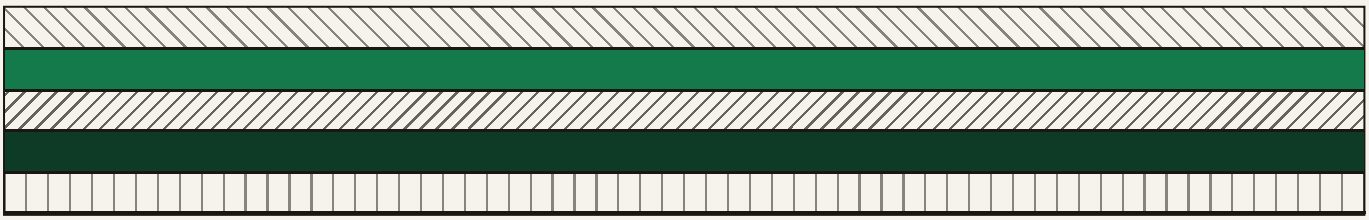

01 GEOMEMBRANES

6 PRODUCTS

Impermeable polyethylene and PVC barrier liners, extruded in-house to GRI-GM13 and welded on site into one continuous watertight membrane.

SG-GM-01

HDPE GEOMEMBRANE

GRI-GM13 · 0.75–3.0 mm (30–120 mil) · Smooth · Black

Smooth HDPE geomembrane liner to GRI-GM13 — an impermeable high density polyethylene pond liner for landfill, water and containment, 0.75–3.0 mm.

APPLICATIONS

- Solid waste landfill liner and capping
- HDPE pond liner — fish pond, farm pond and water reservoir
- Canal, ditch and channel lining
- Secondary containment and wastewater lagoons

KEY PROPERTIES

Material	Virgin high density polyethylene (HDPE) + carbon black
Thickness	0.75 / 1.0 / 1.25 / 1.5 / 2.0 / 2.5 / 3.0 mm (30–120 mil)
Surface	Smooth (textured on request)
Color	Black

SMOOTH HDPE GEOMEMBRANE — PROPERTIES BY NOMINAL THICKNESS, PER GRI-GM13 (REV. 16, MARCH 17, 2021).

Property	Test Method	Unit	0.75 mm (30 mil)	1.0 mm (40 mil)	1.5 mm (60 mil)	2.0 mm (80 mil)	2.5 mm (100 mil)	3.0 mm (120 mil)
Thickness (min. avg.), lowest of 10 readings	ASTM D5199	% of nominal	–10%	–10%	–10%	–10%	–10%	–10%
Density (min.)	ASTM D1505 / D792	g/cm³	0.940	0.940	0.940	0.940	0.940	0.940
Tensile — strength at yield	ASTM D6693 (Type IV)	kN/m (lb/in)	11 (63)	15 (84)	22 (126)	29 (168)	37 (210)	44 (252)
Tensile — strength at break	ASTM D6693 (Type IV)	kN/m (lb/in)	20 (114)	27 (152)	40 (228)	53 (304)	67 (380)	80 (456)
Tensile — elongation at yield	ASTM D6693 (Type IV)	%	12	12	12	12	12	12
Tensile — elongation at break	ASTM D6693 (Type IV)	%	700	700	700	700	700	700
Tear resistance (min.)	ASTM D1004	N (lb)	93 (21)	125 (28)	187 (42)	249 (56)	311 (70)	374 (84)
Puncture resistance (min.)	ASTM D4833	N (lb)	240 (54)	320 (72)	480 (108)	640 (144)	800 (180)	960 (216)

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SG-GM-02

PVC GEOMEMBRANE

ASTM D7176 / PGI-1104 · 10–60 mil (0.25–1.52 mm) · Gray or black · Smooth/embossed

Flexible PVC geomembrane and PVC pond liner to ASTM D7176 / PGI-1104 — a non-reinforced polyvinyl chloride liner, 10–60 mil, for ponds and containment.

APPLICATIONS

- PVC pond liner — fish ponds, garden ponds and ornamental pools
- Canal, ditch and irrigation channel lining
- Reservoir, lake and dam liner
- Landfill liners and covers
- Exposed roof and structure waterproofing
- Planted and green roofs — outstanding rooting resistance

KEY PROPERTIES

Material	Non-reinforced flexible polyvinyl chloride (PVC)
Standard	ASTM D7176-06 (cross-ref. PGI-1104)
Thickness grades	PVC10 / PVC20 / PVC30 / PVC40 / PVC50 / PVC60 (10–60 mil)
Specific gravity (min.)	1.2 (ASTM D792)
Surface	Smooth or embossed
Color	Gray or black (other colors by agreement)

NON-REINFORCED FLEXIBLE PVC GEOMEMBRANE — CERTIFIED, INDEX AND SEAM PROPERTIES BY GRADE, PER ASTM D7176-06 / PGI-1104.

Property	Test Method	Unit	PVC10 (0.25 mm / 10 mil)	PVC20 (0.51 mm / 20 mil)	PVC30 (0.76 mm / 30 mil)	PVC40 (1.02 mm / 40 mil)	PVC50 (1.27 mm / 50 mil)	PVC60 (1.52 mm / 60 mil)
Nominal thickness	ASTM D5199	mm (mil)	0.254 ±0.013 (10 ±0.5)	0.508 ±0.030 (20 ±1)	0.762 ±0.040 (30 ±1.5)	1.016 ±0.050 (40 ±2)	1.270 ±0.060 (50 ±2.5)	1.524 ±0.080 (60 ±3)
Tensile strength at break (min.)	ASTM D882	kN/m (lb/in)	4.2 (24)	8.4 (48)	12.8 (73)	17.0 (97)	20.3 (116)	24.0 (137)
Elongation at break (min.)	ASTM D882	%	250	360	380	430	430	450
Modulus at 100% (min.)	ASTM D882	kN/m (lb/in)	1.8 (10)	3.6 (20)	5.4 (30)	7.2 (40)	9.0 (50)	10.8 (60)
Tear strength (min.)	ASTM D1004	N (lb)	11 (2.5)	27 (6)	35 (8)	44 (10)	58 (13)	67 (15)
Dimensional stability (max. change)	ASTM D1204	%	4	4	3	3	3	3
Low-temperature impact	ASTM D1790	pass at	−23 °C (−10 °F)	−26 °C (−15 °F)	−29 °C (−20 °F)	−29 °C (−20 °F)	−29 °C (−20 °F)	−29 °C (−20 °F)
Specific gravity (min.)	ASTM D792	—	1.2	1.2	1.2	1.2	1.2	1.2
Water extraction (max. loss)	ASTM D1239	%	0.15	0.15	0.15	0.20	0.20	0.20
Volatile loss (max. loss)	ASTM D1203	%	1.5	0.90	0.70	0.50	0.50	0.50

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SG-GM-03

LLDPE GEOMEMBRANE

GRI-GM17 · 0.50–3.0 mm (20–120 mil) · Smooth · Flexible · Black

Smooth LLDPE geomembrane and flexible LLDPE liner to GRI-GM17 — a linear low density polyethylene liner, 0.50–3.0 mm, for landfill, pond and containment.

APPLICATIONS

- Solid waste landfill liner and capping (high-settlement zones)
- Pond and lagoon liner — aquaculture and water treatment
- Canal, ditch and channel lining over irregular subgrades
- Secondary containment and tailings facilities
- Tank, dam and detail lining requiring high conformance

KEY PROPERTIES

Material	Linear low density polyethylene (LLDPE) + carbon black
Standard	GRI-GM17 (Rev. 13, Sept 9, 2019)
Thickness	0.50 / 0.75 / 1.0 / 1.5 / 2.0 / 2.5 / 3.0 mm (20–120 mil)
Surface	Smooth (textured on request)
Color	Black
Formulated density (max.)	0.939 g/cm³ (ASTM D1505 / D792)

SMOOTH LLDPE GEOMEMBRANE — PROPERTIES BY NOMINAL THICKNESS, PER GRI-GM17 (REV. 13, SEPT 9, 2019), TABLE 1 (MIN. AVE.).

Property	Test Method	Unit	0.50 mm (20 mil)	0.75 mm (30 mil)	1.0 mm (40 mil)	1.5 mm (60 mil)	2.0 mm (80 mil)	2.5 mm (100 mil)	3.0 mm (120 mil)
Thickness (min. avg.), lowest of 10 readings	ASTM D5199	% of nominal	–10%	–10%	–10%	–10%	–10%	–10%	–10%
Formulated density (max.)	ASTM D1505 / D792	g/cm³	0.939	0.939	0.939	0.939	0.939	0.939	0.939
Tensile — strength at break	ASTM D6693 (Type IV)	kN/m (lb/in)	13 (76)	20 (114)	27 (152)	40 (228)	53 (304)	66 (380)	80 (456)
Tensile — elongation at break	ASTM D6693 (Type IV)	%	800	800	800	800	800	800	800
2% modulus (max.)	ASTM D5323	N/mm (lb/in)	210 (1200)	315 (1800)	420 (2400)	630 (3600)	840 (4800)	1050 (6000)	1260 (7200)
Tear resistance (min.)	ASTM D1004	N (lb)	50 (11)	70 (16)	100 (22)	150 (33)	200 (44)	250 (55)	300 (66)
Puncture resistance (min.)	ASTM D4833	N (lb)	120 (28)	190 (42)	250 (56)	370 (84)	500 (112)	620 (140)	750 (168)
Axi-symmetric break resistance strain (min.)	ASTM D5617	%	30	30	30	30	30	30	30
Carbon black content (range)	ASTM D4218	%	2.0–3.0	2.0–3.0	2.0–3.0	2.0–3.0	2.0–3.0	2.0–3.0	2.0–3.0

SG-GM-04

LDPE GEOMEMBRANE

Low density polyethylene · Flexible film liner · Smooth · Black

Flexible LDPE geomembrane and LDPE liner — a low density polyethylene film liner with PE resin, carbon black and UV stabilizers for landfill and pond.

APPLICATIONS

- Solid waste landfill liner and waste containment
- Pond and lagoon liner — aquaculture
- Water treatment and storage lining
- Canal, ditch and irrigation lining
- Agricultural and general anti-seepage lining

KEY PROPERTIES

Material	Low density polyethylene (LDPE) + carbon black
Surface	Smooth
Color	Black
Properties	Impermeable · UV-resistant · flexible
Thickness	On request — confirm grade per order
Standard	No single public statutory standard — manufacturer specification

LDPE GEOMEMBRANE — PROPERTIES BY NOMINAL THICKNESS. NO SINGLE PUBLIC STATUTORY STANDARD GOVERNS FINISHED LDPE GEOMEMBRANE (GRI-GM17 COVERS LLDPE; GRI-GM13 COVERS HDPE); VALUES AWAIT SIGMA DATASHEET. PLACEHOLDERS "ON REQUEST" ARE NOT ESTIMATES.

Property	Test Method	Unit	Value
Material	—	—	Low density polyethylene (LDPE) + carbon black
Surface	—	—	Smooth
Color	—	—	Black
Nominal thickness range	ASTM D5199	mm (mil)	On request
Density	ASTM D1505 / D792	g/cm³	On request
Tensile — strength at break	ASTM D6693	kN/m (lb/in)	On request
Tensile — elongation at break	ASTM D6693	%	On request
Tear resistance	ASTM D1004	N (lb)	On request
Puncture resistance	ASTM D4833	N (lb)	On request
Carbon black content	ASTM D4218	%	On request
Roll width / length	—	m	On request

SG-GM-05

TEXTURED GEOMEMBRANE

GRI-GM13 (textured) · 0.75–3.0 mm (30–120 mil) · Single/double textured · Black

Textured HDPE geomembrane to GRI-GM13 — a rough-surface polyethylene liner, single or double textured, 0.75–3.0 mm, for steep slopes, landfill and mining.

APPLICATIONS

- Steep-slope and vertical landfill liner and capping
- Mining — heap leach pads and process ponds
- Retaining and backfill structures requiring high friction
- Waste containment on inclined subgrades
- Reservoir and dam slopes where smooth liner would slide

KEY PROPERTIES

Material	Virgin high density polyethylene (HDPE) + carbon black
Standard	GRI-GM13 textured (Rev. 16, March 17, 2021)
Surface	Single or double sided textured (rough)
Asperity height (min.)	0.40 mm / 16 mil (ASTM D7466)
Thickness	0.75 / 1.0 / 1.5 / 2.0 / 2.5 / 3.0 mm (30–120 mil)
Color	Black

TEXTURED HDPE GEOMEMBRANE — PROPERTIES BY NOMINAL THICKNESS, PER GRI-GM13 (REV. 16, MARCH 17, 2021), TABLE 2 (MIN. AVE., SINGLE/DOUBLE TEXTURED).

Property	Test Method	Unit	0.75 mm (30 mil)	1.0 mm (40 mil)	1.5 mm (60 mil)	2.0 mm (80 mil)	2.5 mm (100 mil)	3.0 mm (120 mil)
Thickness (min. avg.); 8 of 10 ≥ −10%, any −15%	ASTM D5994	% of nominal	nom. −5%	nom. −5%	nom. −5%	nom. −5%	nom. −5%	nom. −5%
Asperity height (min.)	ASTM D7466	mm (mil)	0.40 (16)	0.40 (16)	0.40 (16)	0.40 (16)	0.40 (16)	0.40 (16)
Density (min.)	ASTM D1505 / D792	g/cm³	0.940	0.940	0.940	0.940	0.940	0.940
Tensile — strength at yield	ASTM D6693 (Type IV)	kN/m (lb/in)	11 (63)	15 (84)	22 (126)	29 (168)	37 (210)	44 (252)
Tensile — strength at break	ASTM D6693 (Type IV)	kN/m (lb/in)	8 (45)	10 (60)	16 (90)	21 (120)	26 (150)	32 (180)
Tensile — elongation at yield	ASTM D6693 (Type IV)	%	12	12	12	12	12	12
Tensile — elongation at break	ASTM D6693 (Type IV)	%	100	100	100	100	100	100
Tear resistance (min.)	ASTM D1004	N (lb)	93 (21)	125 (28)	187 (42)	249 (56)	311 (70)	374 (84)
Puncture resistance (min.)	ASTM D4833	N (lb)	200 (45)	267 (60)	400 (90)	534 (120)	667 (150)	800 (180)
Stress crack resistance (min.)	ASTM D5397 (App.)	hr	500	500	500	500	500	500

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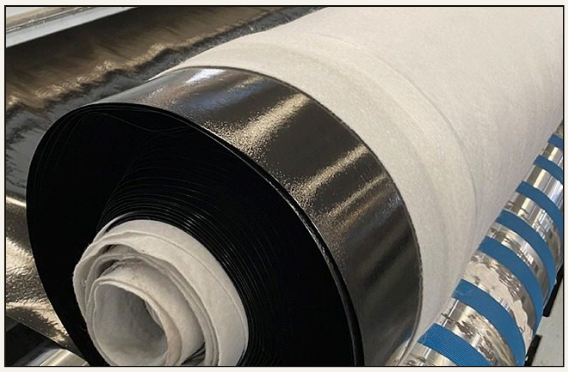
SG-GM-06

COMPOSITE GEOMEMBRANE

GM-GT composite liner · One/two-cloth-one-membrane · Geotextile + PE geomembrane



Composite geomembrane — HDPE/PE geomembrane laminated with one or two nonwoven geotextile layers (GM-GT composite liner) for dams, canals and landfill.

APPLICATIONS

- Reservoir, dam and embankment anti-seepage (seepage, plugging, slope protection)
- Canal, channel and vertical core-wall lining
- Landfill, sewage treatment and hazardous-waste containment
- Fish ponds, artificial lakes and golf-course pond lining
- Mining tailings ponds, heap leach and sedimentation tanks

KEY PROPERTIES

Construction	PE geomembrane + 1 or 2 layers nonwoven geotextile
Common types	One-cloth-one-membrane / two-cloth-one-membrane
Membrane	PE / HDPE geomembrane core
Geotextile	Nonwoven (staple or filament) geotextile
Geotextile mass / membrane thickness	On request — confirm grade per order
Standard	No single public statutory standard for finished composite — manufacturer / GB spec

COMPOSITE GEOMEMBRANE — CONSTRUCTION AND PROPERTIES. THE FINISHED CLOTH-AND-MEMBRANE LAMINATE HAS NO SINGLE PUBLIC STATUTORY STANDARD (EACH LAYER FOLLOWS ITS OWN METHOD; GB/T 17642 OR MANUFACTURER SPEC APPLIES); VALUES AWAIT SIGMA DATASHEET. PLACEHOLDERS "ON REQUEST" ARE NOT ESTIMATES.

Property	Test Method	Unit	Value
Construction	—	—	PE geomembrane + 1 or 2 layers nonwoven geotextile
Common types	—	—	One-cloth-one-membrane / two-cloth-one-membrane
Membrane material	—	—	PE / HDPE geomembrane
Geotextile type	—	—	Nonwoven geotextile
Membrane thickness	—	mm	On request
Geotextile mass per unit area	ASTM D5261 / GB/T 13762	g/m²	On request
Total mass per unit area	—	g/m²	On request
Tensile strength (composite)	—	kN/m	On request
Elongation at break	—	%	On request
CBR puncture strength	ASTM D6241	N	On request
Permeability coefficient	—	cm/s	On request
Roll width / length	—	m	On request

02 GEOTEXTILES

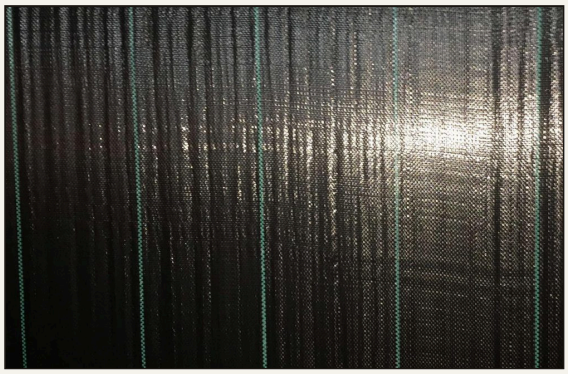
6 PRODUCTS

Nonwoven and woven fabrics for separation, filtration, reinforcement and protection — from lightweight filter cloth to high-strength woven grades.

SG-GT-07

WOVEN GEOTEXTILE

AASHTO M288 · Class 1 / 2 / 3 · PP / PET · Woven



High-strength woven geotextile fabric (PP / PET high-tenacity yarn) to AASHTO M288 — for separation, stabilization and reinforcement on roads.

APPLICATIONS

- Separation and stabilization under unpaved roads and haul roads
- Woven driveway fabric beneath gravel and aggregate driveways
- Subgrade reinforcement for car parks, yards and working platforms
- Embankment, railway subgrade and hardstanding base reinforcement

KEY PROPERTIES

Material	High-tenacity polypropylene (PP) / polyester (PET) woven yarn
Construction	Woven — monofilament, fibrillated or slit-film
Standard	AASHTO M288 (survivability Class 1 / 2 / 3)
Function	Separation · stabilization · reinforcement

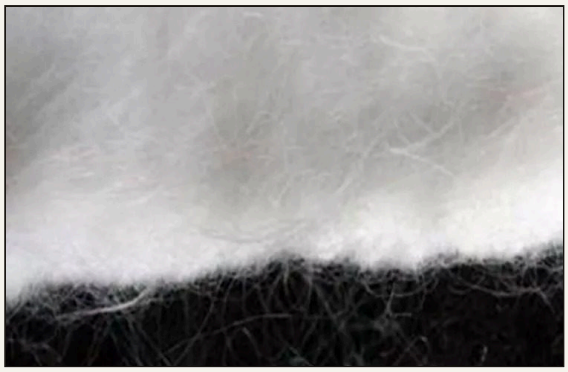
WOVEN GEOTEXTILE (PP / PET) — AASHTO M288 MINIMUM AVERAGE ROLL VALUES (MARV), ELONGATION <50%.

Property	Test Method	Unit	Class 1	Class 2 (default)	Class 3
Grab strength (min.)	ASTM D4632	N	1400	1100	800
Sewn seam strength (min.)	ASTM D4632	N	1260	990	720
Trapezoid tear strength (min.)	ASTM D4533	N	500	400	300
CBR puncture strength (min.)	ASTM D6241	N	2750	2200	1650
Permittivity — separation (min.)	ASTM D4491	sec^{-1}	0.02	0.02	0.02
Apparent Opening Size (AOS) — separation (max. avg.)	ASTM D4751	mm	0.60	0.60	0.60
UV stability — retained strength after 500 hr	ASTM D4355	%	50	50	50

SG-GT-08

NONWOVEN GEOTEXTILE

AASHTO M288 · Needle-punched · ≥50% elong. · Filtration · Drainage



Needle-punched nonwoven geotextile fabric (PET / PP staple fiber) to AASHTO M288 — for filtration, separation, drainage and protection in French drains.

APPLICATIONS

- Filter and wrap fabric for French drains and trench drains
- Subsurface drainage blankets and edge / fin drains
- Separation and filtration beneath pavers, paths and roads
- Non woven landscape fabric and weed-suppression underlayment
- Cushion / protection layer over and under geomembrane liners
- Bank protection and erosion control for reservoirs, canals and dams

KEY PROPERTIES

Material	Staple-fiber polyester (PET) / polypropylene (PP)
Construction	Needle-punched nonwoven
Standard	AASHTO M288 (survivability Class 1 / 2 / 3)
Function	Filtration · separation · drainage · protection
Elongation	≥ 50% (nonwoven)
Mass per unit area	100–800 g/m² (commercial range, ASTM D5261)

NEEDLE-PUNCHED NONWOVEN GEOTEXTILE (PET / PP) — AASHTO M288 MINIMUM AVERAGE ROLL VALUES (MARV), ELONGATION ≥50%.

Property	Test Method	Unit	Class 1	Class 2 (default)	Class 3
Grab strength (min.)	ASTM D4632	N	900	700	500
Sewn seam strength (min.)	ASTM D4632	N	810	630	450
Trapezoid tear strength (min.)	ASTM D4533	N	350	250	180
CBR puncture strength (min.)	ASTM D6241	N	1925	1375	990

SG-GT-09

PP GEOTEXTILE

AASHTO M288 · Class 1 / 2 / 3 · Polypropylene · Woven / Nonwoven

Polypropylene (PP) geotextile to AASHTO M288 — needle-punched PP nonwoven for filtration, separation, drainage and protection, plus woven PP grades.

APPLICATIONS

- Reinforcement of railway subgrade and highway pavement maintenance
- Separation and filtration beneath unpaved roads, paths and pavers
- Filter and wrap fabric for French drains and subsurface drainage
- Non woven polypropylene filter fabric for dyke and embankment protection
- Cushion / protection layer over and under geomembrane liners
- Polypropylene black woven stabilization underlayment for haul roads and yards

KEY PROPERTIES

Material	Polypropylene (PP) staple fiber (nonwoven) / PP yarn (woven)
Construction	Needle-punched nonwoven (woven PP on request)
Standard	AASHTO M288 (survivability Class 1 / 2 / 3)
Function	Filtration · separation · drainage · protection · reinforcement
Elongation	≥ 50% (nonwoven) / < 50% (woven)
UV stability	50% strength retained after 500 hr (ASTM D4355)

PP GEOTEXTILE (NEEDLE-PUNCHED NONWOVEN POLYPROPYLENE) — AASHTO M288 MINIMUM AVERAGE ROLL VALUES (MARV), ELONGATION ≥50%.

Property	Test Method	Unit	Class 1	Class 2 (default)	Class 3
Grab strength (min.)	ASTM D4632	N	900	700	500
Sewn seam strength (min.)	ASTM D4632	N	810	630	450
Trapezoid tear strength (min.)	ASTM D4533	N	350	250	180
CBR puncture strength (min.)	ASTM D6241	N	1925	1375	990

SG-GT-10

PET NEEDLE-PUNCHED NONWOVEN GEOTEXTILE

AASHTO M288 · Needle-punched · ≥50% elong. · Polyester (PET) · Nonwoven

PET needle-punched nonwoven geotextile to AASHTO M288 — staple-fiber polyester fabric for filtration, separation, drainage and protection on subgrades.

APPLICATIONS

- Reinforcement of railway subgrade and highway pavement maintenance
- Filter and wrap fabric for French drains and subsurface drainage
- Separation and filtration beneath roads, paths and pavers
- Protection of dykes, hydraulic-structure isolation and tunnels
- Cushion / protection layer over and under geomembrane liners
- Coastal beach, land reclamation and environmental-protection works

KEY PROPERTIES

Material	Staple-fiber polyester (PET)
Construction	Needle-punched nonwoven
Standard	AASHTO M288 (survivability Class 1 / 2 / 3)
Function	Filtration · separation · drainage · protection
Elongation	≥ 50% (nonwoven)
UV stability	50% strength retained after 500 hr (ASTM D4355)

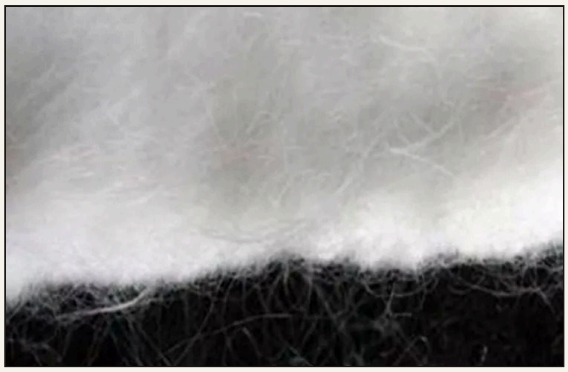
PET NEEDLE-PUNCHED NONWOVEN GEOTEXTILE (POLYESTER) — AASHTO M288 MINIMUM AVERAGE ROLL VALUES (MARV), ELONGATION ≥50%.

Property	Test Method	Unit	Class 1	Class 2 (default)	Class 3
Grab strength (min.)	ASTM D4632	N	900	700	500
Sewn seam strength (min.)	ASTM D4632	N	810	630	450
Trapezoid tear strength (min.)	ASTM D4533	N	350	250	180
CBR puncture strength (min.)	ASTM D6241	N	1925	1375	990

SG-GT-11

POLYESTER FILAMENT NONWOVEN GEOTEXTILE

AASHTO M288 · Continuous filament · Spunbond · Polyester (PET) · Nonwoven



Polyester continuous filament nonwoven geotextile to AASHTO M288 — spunbond PET filament fabric with high strength and good drainage for roads.

APPLICATIONS

- Roads, airfields and railroads — separation and reinforcement
- Embankments, retaining structures and reinforced soil
- Reservoirs, canals, dams and bank protection
- Coastal engineering, silt fences and geotube fabric
- Filtration, drainage and protection over geomembrane liners

KEY PROPERTIES

Material	Virgin polyester (PET) continuous filament
Construction	Spunbond continuous filament, needle-punched nonwoven
Standard	AASHTO M288 (survivability Class 1 / 2 / 3)
Function	Drainage · filtration · protection · separation · reinforcement
Elongation	≥ 50% (nonwoven)
UV stability	50% strength retained after 500 hr (ASTM D4355)

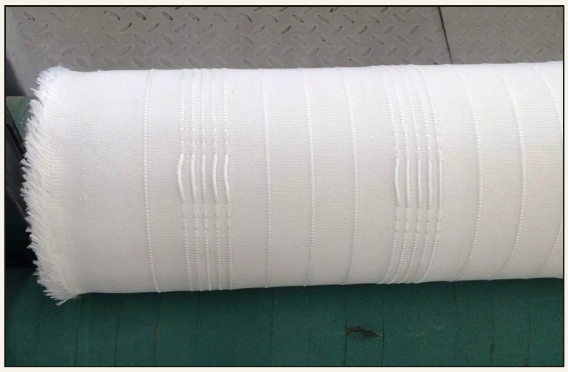
POLYESTER FILAMENT NONWOVEN GEOTEXTILE (CONTINUOUS FILAMENT) — AASHTO M288 MINIMUM AVERAGE ROLL VALUES (MARV), ELONGATION ≥50%.

Property	Test Method	Unit	Class 1	Class 2 (default)	Class 3
Grab strength (min.)	ASTM D4632	N	900	700	500
Sewn seam strength (min.)	ASTM D4632	N	810	630	450
Trapezoid tear strength (min.)	ASTM D4533	N	350	250	180
CBR puncture strength (min.)	ASTM D6241	N	1925	1375	990

SG-GT-12

POLYESTER-PP WOVEN GEOTEXTILE

AASHTO M288 · Class 1 / 2 / 3 · PET / PP · Woven · High tensile



Polyester / polypropylene woven geotextile to AASHTO M288 — high tensile, low-elongation PET/PP woven fabric for landfill reinforcement and road base.

APPLICATIONS

- Landfill liner reinforcement and basal reinforcement
- Embankment over soft soil and reinforced soil slopes
- Road and railway construction — subgrade reinforcement
- Foundations of marine structures, port facilities and reservoirs
- Waste and chemical management, peninsula shoal engineering

KEY PROPERTIES

Material	High-tenacity polyester (PET) / polypropylene (PP) yarn
Construction	Woven (high tensile, low elongation)
Standard	AASHTO M288 (survivability Class 1 / 2 / 3)
Function	Reinforcement · stabilization · separation
Elongation	< 50% (woven)
UV stability	50% strength retained after 500 hr (ASTM D4355)

POLYESTER-PP WOVEN GEOTEXTILE (PET / PP) — AASHTO M288 MINIMUM AVERAGE ROLL VALUES (MARV), ELONGATION <50%.

Property	Test Method	Unit	Class 1	Class 2 (default)	Class 3
Grab strength (min.)	ASTM D4632	N	1400	1100	800
Sewn seam strength (min.)	ASTM D4632	N	1260	990	720
Trapezoid tear strength (min.)	ASTM D4533	N	500	400	300
CBR puncture strength (min.)	ASTM D6241	N	2750	2200	1650
Permittivity — separation (min.)	ASTM D4491	sec^{-1}	0.02	0.02	0.02
Apparent Opening Size (AOS) — separation (max. avg.)	ASTM D4751	mm	0.60	0.60	0.60
UV stability — retained strength after 500 hr	ASTM D4355	%	50	50	50

03 GEOCELLS

2 PRODUCTS

Cellular confinement systems that lock aggregate and soil in place for load support, slope protection and channel armouring.

SG-GC-13

SMOOTH HDPE GEOCELL

Smooth HDPE · ultrasonic welded · 3D cellular confinement · Slope · driveway · load support

Smooth HDPE geocell — a 3D honeycomb ground grid for slope protection, gravel driveways and load support. Ultrasonically welded, panels custom-sized.

APPLICATIONS

- Geocell for slope protection and slope stabilization
- Gravel driveway stabilizer and ground grid for driveways and parking
- Roadbed and railway subgrade reinforcement
- Load support under dykes, retaining walls and pipelines

KEY PROPERTIES

Material	High density polyethylene (HDPE) strip
Surface	Smooth
Construction	3D honeycomb cells, ultrasonically welded seams
Cell depth	On request

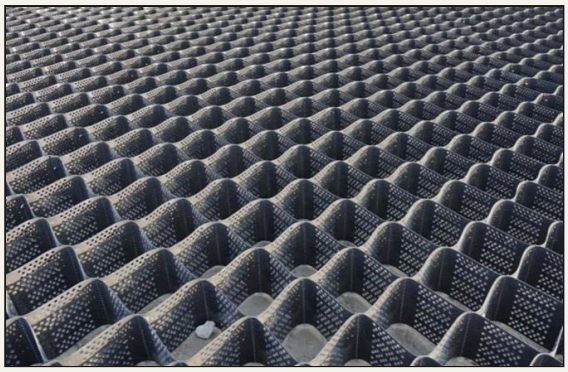
SMOOTH HDPE GEOCELL — GEOMETRY AND MATERIAL. NO SINGLE PUBLIC STANDARD GOVERNS HDPE GEOCELL; VALUES PENDING THE SIGMA DATA SHEET.

Property	Unit	Value
Material	—	High density polyethylene (HDPE) strip
Surface	—	Smooth
Cell depth	mm	On request
Strip (sheet) thickness	mm	On request
Weld (seam) spacing	mm	On request
Cell weld (seam peel) strength	N	On request
Expanded panel size (L × W)	m	On request

SG-GC-14

TEXTURED PERFORATED HDPE GEOCELL

Textured + perforated HDPE · 3D cellular confinement · Higher friction · drainage



Textured perforated HDPE geocell — a 3D honeycomb ground grid with textured, perforated cell walls for extra friction and drainage. Welded, custom-sized.

APPLICATIONS

- Slope protection and slope stabilization on steeper grades
- Gravel driveway, ground grid and parking stabilization
- Roadbed and railway subgrade reinforcement
- Load support under dykes, retaining walls and pipelines
- Channel, riverbank, beach and desert surface confinement

KEY PROPERTIES

Material	High density polyethylene (HDPE) strip
Surface	Textured (perforated cell walls)
Construction	3D honeycomb cells, ultrasonically welded seams
Cell depth	On request
Strip thickness	On request
Perforation	On request

TEXTURED PERFORATED HDPE GEOCELL — GEOMETRY AND MATERIAL. NO SINGLE PUBLIC STANDARD GOVERNS HDPE GEOCELL; VALUES PENDING THE SIGMA DATA SHEET.

Property	Unit	Value
Material	—	High density polyethylene (HDPE) strip
Surface	—	Textured
Cell wall	—	Perforated
Cell depth	mm	On request
Strip (sheet) thickness	mm	On request
Perforation (size / pattern)	—	On request
Weld (seam) spacing	mm	On request
Cell weld (seam peel) strength	N	On request
Expanded panel size (L × W)	m	On request

04 GEOGRIDS

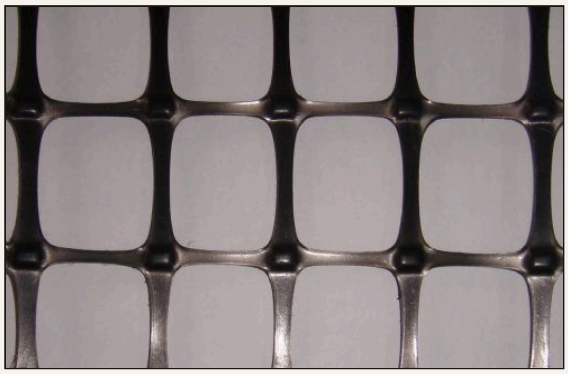
5 PRODUCTS

Uniaxial, biaxial, polyester, fiberglass and steel-plastic grids for base reinforcement, retaining walls and asphalt overlay.

SG-GG-15

PP BIAXIAL GEOGRID

15-15 → 50-50 kN/m · Polypropylene · Punched & drawn · Junction efficiency 93%



Punched and drawn PP biaxial geogrid for subgrade stabilization and base reinforcement — 15-15 to 50-50 kN/m grades, square apertures, 93% junction efficiency.

APPLICATIONS

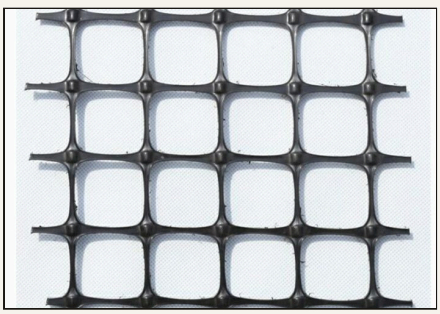
- Subgrade stabilization and base-course reinforcement under roads
- Soft-soil and weak-ground treatment before paving or filling
- Working platforms, haul roads and unpaved gravel roads
- Airport, port and railway formation layers

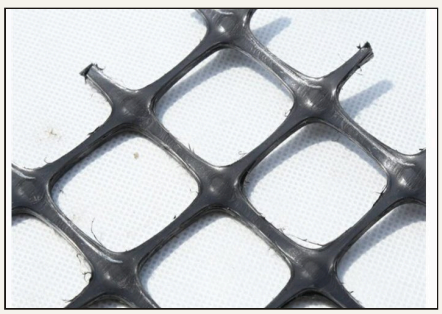
KEY PROPERTIES

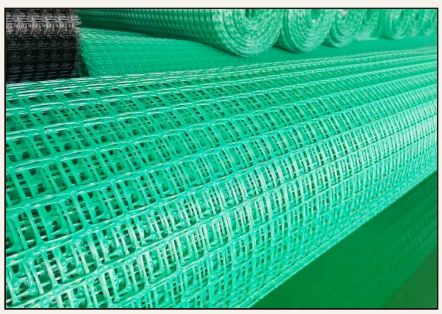
Material	Polypropylene (PP), punched and biaxially drawn
Structure	Square aperture, integral (monolithic) junctions
Standard grades	15-15 / 20-20 / 25-25 / 30-30 / 40-40 / 45-45 / 50-50 kN/m
Ultimate tensile (MD × CD)	15 × 15 to 50 × 50 kN/m (ASTM D6637)

PP BIAXIAL GEOGRID — MECHANICAL PROPERTIES BY STRENGTH GRADE. VALUES VERBATIM FROM THE SOURCE DATASHEET CROSS-CHECK.

Property	Unit	Test Method	15-15	20-20	25-25	30-30	40-40	45-45	50-50
Ultimate tensile strength (MD / CD)	kN/m	ASTM D6637	15 / 15	20 / 20	25 / 25	30 / 30	40 / 40	45 / 45	50 / 50
Tensile strength @ 2% strain (MD / CD)	kN/m	ASTM D6637	5 / 5	7 / 7	9 / 9	10.5 / 10.5	14 / 14	16 / 16	17.5 / 17.5
Tensile strength @ 5% strain (MD / CD)	kN/m	ASTM D6637	7 / 7	14 / 14	17 / 17	21 / 21	28 / 28	32 / 32	35 / 35
Yield elongation	% ≤	ASTM D6637	13	13	13	13	13	13	13
Junction efficiency	%	GRI GG2	93	93	93	93	93	93	93
Minimum carbon black	%	ASTM D4218	2	2	2	2	2	2	2



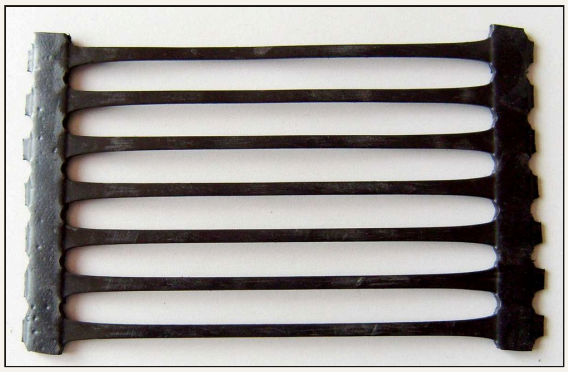




SG-GG-16

UNIAXIAL GEOGRID

60–300 kN/m · PP · HDPE uniaxial · ASTM D6637



PP and HDPE uniaxial geogrid for retaining walls, MSE walls and reinforced slopes — 60–300 kN/m machine-direction strength, long oval apertures, low creep.

APPLICATIONS

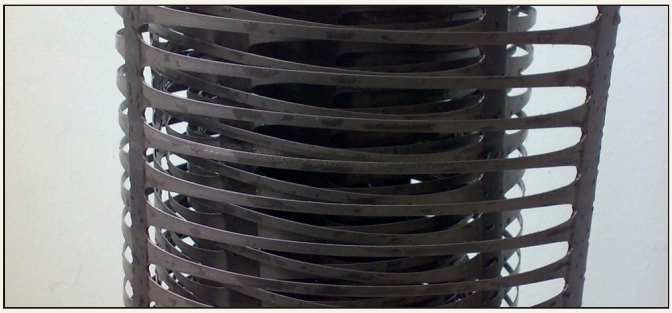
- Geogrid reinforced retaining wall and segmental (block) wall reinforcement
- MSE wall geogrid layers behind precast panel and modular block facings
- Geogrid slope stabilization and steep reinforced-soil slope construction
- Soft-subgrade and embankment reinforcement over weak or compressible ground
- Bridge abutment and approach-fill reinforced soil structures
- Landfill, dyke and levee slope reinforcement

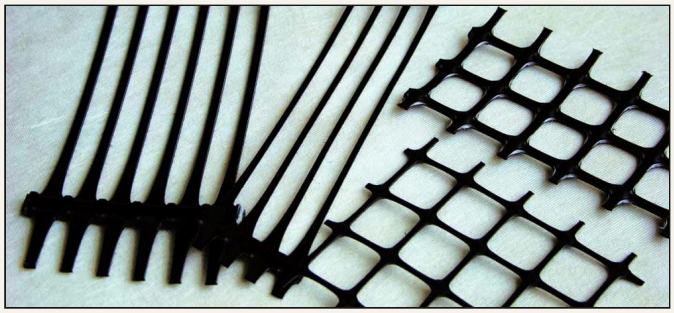
KEY PROPERTIES

Material	PP (60–300 kN/m) or HDPE (60–200 kN/m), UV and anti-ageing additives
Manufacture	Extruded / punched sheet, drawn in machine direction only
Tensile strength (MD)	60 / 80 / 110 / 150 / 200 / 260 / 300 kN/m (PP, ASTM D6637)
Yield elongation	≤ 10% (PP); 11.5% at ultimate (HDPE)
Aperture	530 × 14 mm (PP); 460 × 12 mm (HDPE)
Junction efficiency	90–93% (HDPE, GRI GG2-87)

PP UNIAXIAL GEOGRID — PRIMARY STRENGTH LADDER. TEST METHOD ASTM D6637 WHERE STATED BY THE SOURCE. VALUES VERBATIM FROM THE SOURCE DATASHEET.

Property	Unit	60	80	110	150	200	260	300
Tensile strength (MD)	kN/m	60	80	110	150	200	260	300
Tensile strength @ 2% strain	kN/m ≥	17	26	32	45	70	94	105
Tensile strength @ 5% strain	kN/m ≥	35	48	64	90	120	185	195
Yield elongation	% ≤	10	10	10	10	10	10	10
Roll length	m	100	100	50	50	50	50	50
Roll width	m	1–3	1–3	1–3	1–3	1–3	1–3	1–3

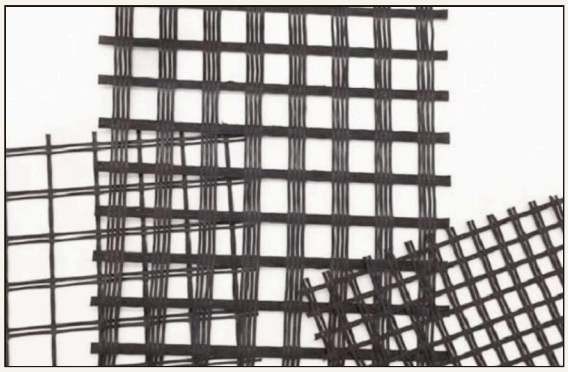




SG-GG-17

FIBERGLASS GEOGRID

25–120 kN/m · Elongation ≤ 4% · Standard & self-adhesive



Bitumen-coated fiberglass geogrid for asphalt overlays — warp-knitted alkali-free glass fibre, 25–120 kN/m, elongation ≤ 4%, standard and self-adhesive.

APPLICATIONS

- Asphalt overlays on cracked or aged pavement — reflective crack control
- Rehabilitation of concrete pavement before an asphalt surfacing
- Widening joints and lane-joint zones where differential movement concentrates
- Highway, airport apron and port pavement reinforcement
- Bridge approach slabs and culvert crossings with known settlement
- Urban resurfacing and car parks where overlay thickness is limited

KEY PROPERTIES

Material	Alkali-free glass fibre roving, warp-knitted
Coating	Modified bitumen
Breaking strength (warp × weft)	25 × 25 to 120 × 120 kN/m
Elongation at break	≤ 4%
Mesh size	12.7 × 12.7 / 25.4 × 25.4 / 50 × 50 mm
Roll width	1–6 m (2 / 4 / 6 m standard)

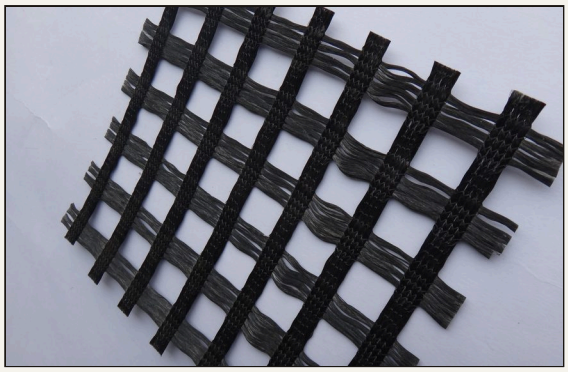
FIBERGLASS GEOGRID — STANDARD EGA RANGE AND SELF-ADHESIVE EGAA RANGE. VALUES VERBATIM FROM THE SOURCE DATASHEET; ROLL LENGTH AND MASS PER UNIT AREA ARE NOT PUBLISHED FOR THIS LINE.

Property	Unit	25-25	30-30	40-40	50-50	60-60	80-80	100-100	120-120
EGA — Breaking strength, warp	kN/m ≥	25	30	40	50	60	80	100	120
EGA — Breaking strength, weft	kN/m ≥	25	30	40	50	60	80	100	120
EGA — Elongation at break (warp / weft)	% ≤	4	4	4	4	4	4	4	4
EGA — Mesh size	mm	25.4 × 25.4	←	←	←	←	←	←	←
EGA — Roll width	m	1–6	←	←	←	←	←	←	←
EGAA (self-adhesive) — Breaking strength, warp / weft	kN/m ≥	25	30	40	50	—	80	100	120
EGAA (self-adhesive) — Elongation at break	% ≤	4	4	4	4	—	4	4	4
EGAA (self-adhesive) — Mesh size	mm	25.4 × 25.4	←	←	←	—	←	←	←
EGAA (self-adhesive) — Roll width	m	1–6	←	←	←	—	←	←	←

SG-GG-18

POLYESTER GEOGRID

LTDS 34–452 kN/m @ 120 yr · Warp-knitted PET · PVC / SBR / bitumen coated



Warp-knitted PET geogrid with published long-term design strength — 34 to 452 kN/m LTDS at a 120-year design life, PVC, SBR or bitumen coated.

APPLICATIONS

- Geogrid reinforced soil retaining walls and MSE walls
- Reinforced steep slopes and geogrid slope stabilization
- Bridge abutments and approach embankments over compressible ground
- Basal reinforcement of embankments on soft or piled foundations
- Working platforms, haul roads and subgrade stabilization
- Landfill capping, veneer slopes and closure berms

KEY PROPERTIES

Material	High-tenacity polyester industrial filament, warp-knitted
Coating	PVC, SBR or bitumen (specify per application)
Ultimate tensile strength (MD)	60 / 100 / 200 / 400 / 800 kN/m
Long-term design strength (LTDS, 120 years)	34 / 60 / 121 / 236 / 452 kN/m
Elongation at ultimate strength	10% (13% on the 800 grade)
Mesh size	25 × 25 mm (uniaxial LTDS range)

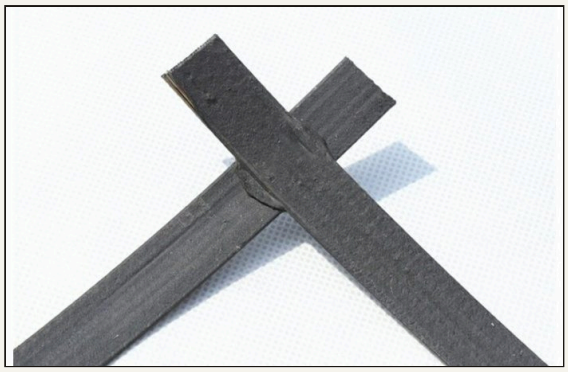
POLYESTER GEOGRID — UNIAXIAL RANGE, PVC COATED, HIGH-TENACITY POLYESTER YARN. LONG-TERM DESIGN STRENGTH (LTDS) IS QUOTED FOR A 120-YEAR DESIGN LIFE. VALUES VERBATIM FROM THE SOURCE DATASHEET.

Property	Unit	60	100	200	400	800
Ultimate tensile strength (MD / CD)	kN/m	60 / 30	100 / 30	200 / 30	400 / 50	800 / 100
Tensile strength @ 2% strain	kN/m	12	18	36	68	130
Tensile strength @ 5% strain	kN/m	30	50	100	160	270
Elongation at ultimate strength	%	10	10	10	10	13
Long-term design strength (LTDS, 120 years)	kN/m	34	60	121	236	452
Mesh size	mm	25 × 25	25 × 25	25 × 25	25 × 25	25 × 25
Roll width	m	5.2	5.2	5.2	5.2	5.0
Roll length	m	100	100	100	50	50
Container loading (40HC)	rolls / m²	100 / 52,000	90 / 46,800	50 / 26,000	60 / 15,600	28 / 7,000

SG-GG-19

STEEL-PLASTIC COMPOSITE GEOGRID

30-30 → 120-120 kN/m · Elongation at break ≤ 3% · Frost resistance −35 °C



Steel-cored composite geogrid welded at every crossing — 30-30 to 120-120 kN/m biaxial and 50-20 to 100-30 uniaxial, ≤ 3% elongation at break, full strength retained after 100 freeze-thaw cycles.

APPLICATIONS

- Soft-ground treatment under high embankment fills
- Bridge approach slabs and abutment backfill — differential settlement control
- Geogrid subgrade stabilization for highways, ramps and haul roads
- Cut-fill junctions and widening of existing carriageways
- Cold-region and permafrost-margin earthworks exposed to freeze-thaw
- Geogrid reinforced soil walls, steep slopes and load-transfer platforms

KEY PROPERTIES

Material	High-strength steel wire, high-density polyethylene sheath
Structure	Flat straps, bonded and welded at every crossing
Biaxial grades (GSZ)	30-30 / 40-40 / 50-50 / 60-60 / 70-70 / 80-80 / 100-100 / 120-120 kN/m
Uniaxial grades (GDZ)	50-20 / 50-30 / 60-30 / 80-30 / 100-30 kN/m
Elongation at break	≤ 3%
Mesh size	140 mm

STEEL-PLASTIC COMPOSITE GEOGRID, BIAXIAL RANGE (GSZ) — VALUES VERBATIM FROM PUBLISHED MANUFACTURER DATA. UNIAXIAL GDZ RANGE AND CONSTRUCTION DATA IN THE NOTES BELOW.

Property	Unit	30-30	40-40	50-50	60-60	70-70	80-80	100-100	120-120
Ultimate tensile strength, MD	kN/m ≥	30	40	50	60	70	80	100	120
Ultimate tensile strength, CD	kN/m ≥	30	40	50	60	70	80	100	120
Elongation at break	% ≤	3	3	3	3	3	3	3	3
Ultimate tensile strength after 100 freeze-thaw cycles (MD / CD)	kN/m ≥	30 / 30	40 / 40	50 / 50	60 / 60	70 / 70	80 / 80	100 / 100	120 / 120
Elongation at break after 100 freeze-thaw cycles	% ≤	3	3	3	3	3	3	3	3
Mesh size	mm	140	140	140	140	140	140	140	140
Frost resistance	°C	−35	−35	−35	−35	−35	−35	−35	−35

05 GEOSYNTHETIC CLAY LINERS

2 PRODUCTS

Bentonite composite liners that self-seal under hydration — a compacted-clay equivalent delivered in rolls.

SG-CL-20

GEOSYNTHETIC CLAY LINER (GCL)

GRI-GCL3 (Rev. 5) · Reinforced GT-GT · needle-punched · Sodium bentonite ≥ 3700 g/m²

Needle-punched reinforced sodium bentonite geosynthetic clay liner (GCL) to GRI-GCL3 — a self-sealing clay liner for ponds, landfills and containment.

APPLICATIONS

- Bentonite pond liner — ornamental ponds, lakes and golf-course water features
- Solid waste landfill base liner and capping
- Canal, river and reservoir seepage prevention
- Municipal, subway and underground building waterproofing

KEY PROPERTIES

Material	Granular sodium (natrium) bentonite between two geotextiles
Construction	Needle-punched reinforced GCL (GT-GT)
Standard	GRI-GCL3 (Rev. 5, Nov. 21, 2019)
Mass of GCL (min.)	4000 g/m² (ASTM D5993)

NEEDLE-PUNCHED REINFORCED SODIUM-BENTONITE GCL (GT-GT) — PROPERTIES PER GRI-GCL3 (REV. 5, NOV. 21, 2019).

Property	Test Method	Unit	Requirement
Clay (bentonite) — swell index (min.)	ASTM D5890	mL/2 g	24
Clay (bentonite) — fluid loss (max.)	ASTM D5891	mL	18
Cap fabric (nonwoven) — mass/unit area (min.)	ASTM D5261	g/m² (oz/yd²)	200 (5.9)
Cap fabric (woven) — mass/unit area (min.)	ASTM D5261	g/m² (oz/yd²)	100 (3.0)
Carrier fabric (nonwoven composite) — mass/unit area (min.)	ASTM D5261	g/m² (oz/yd²)	200 (5.9)
Carrier fabric (woven) — mass/unit area (min.)	ASTM D5261	g/m² (oz/yd²)	100 (3.0)
Mass of GCL (min.)	ASTM D5993	g/m² (lb/ft²)	4000 (0.81)
Mass of bentonite (min.)	ASTM D5993	g/m² (lb/ft²)	3700 (0.75)
Moisture content (max.)	ASTM D5993	%	35
Tensile strength, MD (min.)	ASTM D6768	kN/m (lb/in)	4.0 (23)

FULL DATASHEET AVAILABLE ON REQUEST · sigmageosynthetics.com

SG-CL-21

PE-LAMINATED GCL

PE film + needle-punched GCL · Bentonite base per GRI-GCL3 · Geofilm GCL · steep-slope

PE-laminated GCL (geofilm GCL) — a needle-punched sodium bentonite clay liner with a polyethylene film on one face for an extra impermeable barrier.

APPLICATIONS

- Landfill caps, closures and base seal
- Environmental protection under roads, railways and airports
- Dams, dikes, water containment and pond applications
- Structural waterproofing and secondary containment
- Mining applications and tunnels

KEY PROPERTIES

Material	Sodium bentonite between woven + nonwoven geotextiles, PE film laminated one side
Construction	Needle-punched reinforced GCL + laminated polyethylene membrane
Base standard	GRI-GCL3 (Rev. 5, Nov. 21, 2019) — bentonite/geotextile
Mass of bentonite (min.)	3700 g/m² (ASTM D5993)
Permeability of GCL (max.)	5×10^{-11} m/s (ASTM D5887)
Swell index (min.)	24 mL/2 g (ASTM D5890)

MANUFACTURER DATASHEET — PE-LAMINATED GCL SPECIFICATIONS.

Property	GCL-3	GCL-4	GCL-5	CUSTOMIZED	COMMENTS
Weight of bentonite granular	3000g-7000g/m2	3500g-7500g/m2	4000g-10000g/m2	4000g-10000g/m2	Can be customized as required
Water content	8-12%	8-12%	8-12%	8-12%	
thickness	5-7mm	5-8mm	6-10mm	5-8mm	
Thickness of HDPE liner	No liner	0.1-0.5mm	No liner	0.1-0.5mm	
Swell index of bentonite granular	≥24	≥24	≥24	≥24	24,25,26,27
nonwoven geotextile — Weight	180-300g/m2	180-300g/m2	180-300g/m2	180-300g/m2	
nonwoven geotextile — Polypropylene or polyester	PP and PET or customized	PP and PET or customized	PP and PET or customized	PP and PET or customized	Percentage of PP can be customized
Woven fabric — Material	Polypropylene	Polypropylene	Polypropylene	Polypropylene	
Woven fabric — Weight	110g, 130g, 150g, 200g	110g, 130g, 150g, 200g	110g, 130g, 150g, 200g	110g, 130g, 150g, 200g	Usual stock is 130g/m2 and other weight needs to be customized
Woven fabric — Woven method	Circular or plain	Circular or plain	Circular or plain	Circular or plain	
Tensile strength	≥600N/100mm	≥800N/100mm	≥800N/100mm	≥600N/100mm	
Peel strength	≥40N/10cm	≥50N/10cm	≥40N/10cm	≥40N/10cm	

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06 GRAVEL GRIDS

1 PRODUCT

Permeable HDPE paving grids that stabilise gravel and grass surfaces for driveways, parking and access roads.

SG-GR-22

GRAVEL GRID

HDPE cellular paver · Interlocking · Gravel / grass · permeable

HDPE gravel grid / grass paver — a snap-together cellular grid that confines gravel or grass for permeable, load-bearing driveways, paths and slopes.

APPLICATIONS

- Permeable gravel and grass driveways
- Car parks and overflow parking
- Fire lanes and access roads
- Garden paths and walkways

KEY PROPERTIES

Material	High-density polyethylene (HDPE), often high recycled content
Cell depth	25–50 mm (1"–2") — deeper cells for heavier loads
Open area / porosity	~90% (≈ 93% at cell top)
Connection	Interlocking tabs (no clips, staples or pins)

HDPE GRAVEL GRID / GRASS PAVER — MANUFACTURER SPECIFICATION (NO SINGLE PUBLIC STATUTORY STANDARD). VALUES TYPICAL OF HDPE PERMEABLE PAVERS; SIGMA PANEL DIMENSIONS AND LOAD RATINGS CONFIRMED AGAINST PRODUCTION DATA.

Property	Typical range	Notes
Material	High-Density Polyethylene (HDPE), often high recycled content	—
UV / color	Black (carbon-black UV stabilized); green available	—
Recyclable	Yes	—
Cell depth (height)	25 – 50 mm (1" – 2")	deeper cells for heavier loads
Cell size (inside dia. / width)	~55 – 80 mm (≈ 2.1" – 3.3")	hexagonal or cylindrical cells
Wall thickness	~3 mm (0.12") nominal, up to ~6 mm (0.24") at load-bearing points	—
Open area / porosity	~90% (≈ 93% at cell top)	high permeability
Connection	Interlocking tabs / male-female locking (no clips, staples or pins)	—
Weight	~3 – 6.5 kg/m² (≈ 0.6 – 1.3 lb/ft²)	varies with depth
Compressive strength (empty)	up to ~37 MPa (≈ 5,350 psi)	grid alone; design value depends on model

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07 GEOBAG & GEOTUBE

2 PRODUCTS

Woven containment bags and dewatering tubes for shoreline protection, sludge dewatering and marine works.

SG-GB-23

GEOTUBE

Woven geotextile · Dewatering · Custom-sized

Geotube (geotextile dewatering tube) — a large prefabricated woven-geotextile tube for sludge dewatering, dredge containment and shoreline structures.

APPLICATIONS

- Sludge and slurry dewatering
- Dredge-material containment and dewatering
- Shoreline restoration and marine construction structures
- Lagoon and wastewater solids dewatering

KEY PROPERTIES

Material	High-strength woven geotextile (sewn tube)
Function	Sludge dewatering · dredge containment · marine structures
Fabric tensile (MD/CD, ultimate)	450/625 to 1000/1000 lbs/in (ASTM D4595)
AOS	0.43–0.60 mm / US Sieve No. 40–30 (ASTM D4751)

GEOTUBE — WOVEN DEWATERING GEOTEXTILE FABRIC PROPERTIES (MARV) AND FABRICATED TUBE DIMENSIONS. VALUES VERBATIM FROM THE SOURCE DATASHEET; "ON REQUEST" KEPT WHERE THE SOURCE HAS NO VALUE.

Property	Test Method	Unit	Standard Grade	Heavy Grade
Wide-Width Tensile Strength (MD / CD, ultimate)	ASTM D4595	kN/m (lbs/in)	78.8 / 109.4 (450 / 625)	175 / 175 (1000 / 1000)
Wide-Width Tensile Elongation (MD / CD)	ASTM D4595	%	20 (max.)	20 (max.)
Factory Seam Strength	ASTM D4884	kN/m (lbs/in)	70 (400)	88 (500)
CBR Puncture Strength	ASTM D6241	N (lbs)	8,900 (2,000)	On request
Apparent Opening Size (AOS)	ASTM D4751	mm (US Sieve)	0.43 (No. 40)	0.60 (No. 30)
Water Flow Rate	ASTM D4491	l/min/m² (gal/min/ft²)	813 (20)	815 (20)
Pore Size O_{50} (typical)	ASTM D6767	micron	80	On request
Pore Size O_{95} (typical)	ASTM D6767	micron	195	On request
UV Resistance (% retained, 500 hr)	ASTM D4355	%	80	85
Mass per Unit Area (typical)	ASTM D5261	g/m² (oz/yd²)	585 (17.3)	1,119 (33)

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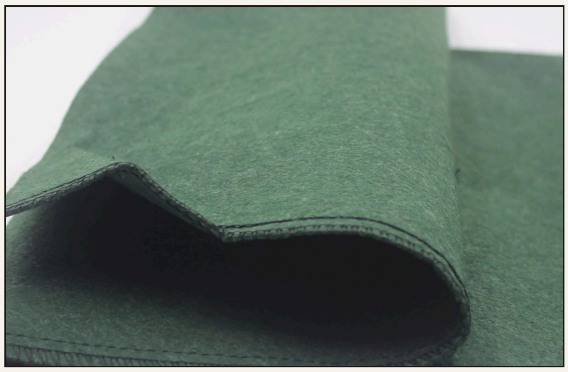
SG-GB-24

GEOBAG

Woven / nonwoven PP-PET fabric · Sand fill · custom sizes · Containment · dewatering



Geobag — a geotextile bag sewn from woven or needle-punched PP/PET fabric, filled with sand or soil for shoreline protection, dredging and dewatering.

APPLICATIONS

- Shoreline, riverbank and slope protection against erosion and scour
- Dredge-material and high-volume sediment containment
- Sludge and slurry dewatering and volume reduction
- Coastal and marine structures — groynes, breakwaters, revetments
- Temporary flood and embankment protection

KEY PROPERTIES

Material	Polypropylene or polyester (PP/PET) geotextile
Fabric type	Woven or needle-punched nonwoven
Fill	Sand, soil or fertilizer
Wide-width tensile (MD/CD)	78.8 / 109.4 kN/m (ASTM D4595) — woven grade
Apparent opening size (AOS)	0.43 mm / No. 40 (ASTM D4751) — woven grade
UV resistance	80 % retained, 500 hr (ASTM D4355)

GEOBAG — WOVEN GEOTEXTILE FABRIC PROPERTIES (MARV) FOLLOW ASTM METHODS, TRANSCRIBED FROM THE GEOTUBE WOVEN-FABRIC TABLE (SAME WOVEN SYSTEM). FINISHED BAG SIZE IS CUSTOM AND IS A PLACEHOLDER.

Property	Test Method	Unit	Value (woven grade)
Wide-width tensile strength (MD / CD, ultimate)	ASTM D4595	kN/m (lb/in)	78.8 / 109.4 (450 / 625)
Wide-width tensile elongation (MD / CD)	ASTM D4595	%	20 (max.)
Factory seam strength	ASTM D4884	kN/m (lb/in)	70 (400)
CBR puncture strength	ASTM D6241	N (lb)	8,900 (2,000)
Apparent opening size (AOS)	ASTM D4751	mm (US Sieve)	0.43 (No. 40)
Water flow rate	ASTM D4491	l/min/m² (gal/min/ft²)	813 (20)
UV resistance (% retained, 500 hr)	ASTM D4355	%	80
Mass per unit area (typical)	ASTM D5261	g/m² (oz/yd²)	585 (17.3)
Finished bag size (L × W / volume)	—	—	Made to order

08 DRAINAGE SYSTEMS

6 PRODUCTS

Sheet drains, geonets, drainage pipes and prefabricated verticals that intercept and carry water off the structure.

SG-DR-25

CORRUGATED DRAINAGE PIPE

AASHTO M294 · Type S dual-wall · 4"–60" · solid / perforated

HDPE double-wall corrugated drainage pipe (Type S) to AASHTO M294 — corrugated outside, smooth inside, solid or perforated, 4"–60" for culverts.

APPLICATIONS

- Storm sewers and stormwater conveyance
- Driveway, road and farm culvert pipe
- Subsurface (French) drains and field drains
- Land drainage and subsoil drainage systems

KEY PROPERTIES

Material	High-density polyethylene (HDPE), cell class 435400C (ASTM D3350)
Wall type	Type S dual-wall (corrugated exterior / smooth interior); Type C available
Diameter range	4"–60" (100–1500 mm)
Surface	Solid or perforated (Class 1 / Class 2 per AASHTO M294)

CORRUGATED HDPE DRAINAGE PIPE — TYPE S DUAL-WALL DIMENSIONS & PIPE STIFFNESS, PER AASHTO M294. MIN. STIFFNESS AT 5% DEFLECTION (ASTM D2412); MINIMUM AVERAGE PRODUCTION VALUES.

Nominal ID (in)	Nominal ID (mm)	Outside Dia. (in)	Min. Pipe Stiffness (psi)	Min. Wall Thickness (in)	Standard Length (ft)
4	100	4.7	34.0	0.002	20
6	150	6.9	34.0	0.002	20
8	200	9.4	50.0	0.025	20
10	250	11.8	50.0	0.025	20
12	300	14.5	50.0	0.035	20
15	375	17.5	42.0	0.040	20
18	450	21.5	40.0	0.050	20
24	600	27.9	34.0	0.060	20
30	750	35.7	29.0	0.060	20
36	900	42.1	22.5	0.070	20

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SG-DR-26

RIGID PERMEABLE DRAIN PIPE

Plastic blind ditch · PE permeable core · Geotextile-wrapped (optional)

Rigid permeable drain pipe (plastic blind ditch) — a PE filament-wound permeable core, optionally geotextile-wrapped, for rapid groundwater intake.

APPLICATIONS

- Subsurface (groundwater) drainage
- Retaining-wall back drainage
- Sports field and turf drainage
- Road-base and subgrade drainage
- Slope drainage to reduce soil erosion
- Railway, highway and airport-runway drainage

KEY PROPERTIES

Core material	Polyethylene (PE) filament-wound mesh / curved net
Filter wrap	Nonwoven geotextile (optional)
Open structure	Permeable upper ~2/3; closed lower ~1/3
Color	Black; other colors on request
Standard	No single public statutory standard — manufacturer specification
Key dimensions	On request — diameter / thickness / discharge from SIGMA datasheet

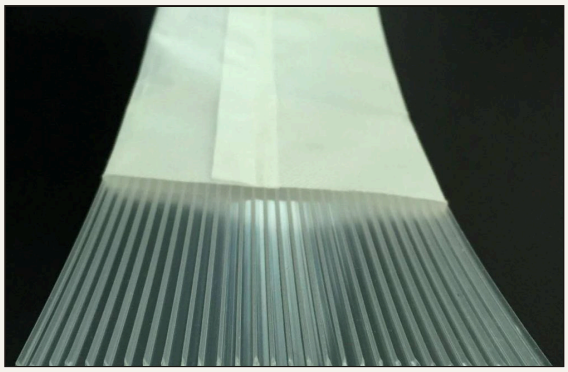
RIGID PERMEABLE DRAIN PIPE (PLASTIC BLIND DITCH) — MANUFACTURER SPECIFICATION. NO SINGLE PUBLIC STATUTORY STANDARD FOUND; NUMERIC DIMENSIONS TO BE SUPPLIED FROM SIGMA PRODUCTION DATA.

Property	Value	Notes
Core material	Polyethylene (PE) filament-wound mesh / curved net	—
Filter wrap	Nonwoven geotextile (optional)	—
Open structure	Permeable upper ~2/3; closed lower ~1/3	—
Color	Black; other colors on request	—
Nominal diameter	On request	typical market sizes exist but no public standard table found
Wall / mesh thickness	On request	—
Porosity / void ratio	On request	—
Compressive strength	On request	quote test method (e.g. ring/plate compression)
Discharge capacity	On request	—
Filter wrap mass per area	On request	g/m² if wrapped
Roll / length	On request	supplied in coils or cut lengths

SG-DR-27

WICK DRAIN (PVD)

ASTM D4716 · 100 mm band drain · PP core + geotextile filter



Prefabricated vertical drain (PVD / wick drain) — a PP drainage core in a nonwoven PP geotextile filter that accelerates consolidation of soft soils.

APPLICATIONS

- Accelerated consolidation of soft clay foundations
- Ground improvement beneath embankments and fills
- Preloading and surcharge programs
- Reclamation and soft-soil land development
- Increasing foundation shear strength before construction

KEY PROPERTIES

Type	Prefabricated vertical (band) drain — wick drain
Width	100 mm (4.0 in) typical
Core material	Polypropylene (PP) formed drainage core
Filter material	Nonwoven / spunbond PP geotextile
Discharge capacity	Per ASTM D4716 (at stated pressure and gradient)
Roll length	305 m (1,000 ft)

PREFABRICATED VERTICAL DRAIN (PVD / WICK DRAIN) — TYPICAL PROPERTIES; DISCHARGE CAPACITY PER ASTM D4716. FABRIC VALUES MARV, CORE/PRODUCT TYPICAL VALUES (ASTM D4439). REPRESENTATIVE OF A 100 MM-WIDE PVD.

Property	Unit	Value	Test Method
Product — Width	mm (in)	100 (4.0)	—
Product — Core material	—	Polypropylene (PP)	—
Product — Filter material	—	Nonwoven / spunbond PP geotextile	—
Product — Discharge capacity	gpm (L/min)	1.6 (6)	ASTM D4716
Product — Roll length	m (ft)	305 (1,000)	—
Core — Tensile strength	N (lb)	1,001 (225)	ASTM D4595
Filter — Water flow rate	L/min/m² (gpm/ft²)	2,444 (60)	ASTM D4491
Filter — Permittivity	sec^{-1}	0.8	ASTM D4491
Filter — Apparent opening size (AOS)	micron (US sieve)	210 (#70)	ASTM D4751
Filter — Grab tensile strength	N (lb)	578 (130)	ASTM D4632
Filter — Grab elongation	%	50	ASTM D4632
Filter — Trapezoidal tear	N (lb)	267 (60)	ASTM D4533

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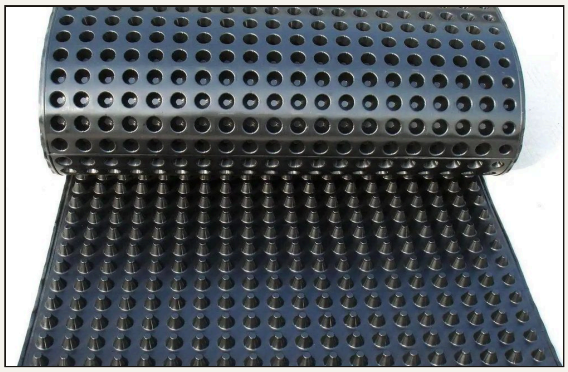
SG-DR-28

DIMPLED DRAINAGE SHEET

HDPE dimple board · Drainage + waterproofing · Geotextile-faced (optional)



HDPE dimpled drainage sheet (dimple board) — a studded polyethylene membrane that drains and waterproofs foundation walls, basements and green roofs.

APPLICATIONS

- Foundation waterproofing and basement wall drainage
- Roof garden, green roof and planter drainage
- Garage-roof greening and vertical greening
- Football pitches and golf courses
- Retaining-wall and tunnel back drainage
- Airport, subway and road-embankment drainage

KEY PROPERTIES

Material	High-density polyethylene (HDPE)
Dimple shape	Cylindrical or semi-cone studs
Facing	Optional nonwoven geotextile filter
Function	In-plane drainage + protection / waterproofing layer
Color	Black; other colors on request
Key dimensions	On request — dimple height / thickness / compressive load / discharge from SIGMA datasheet

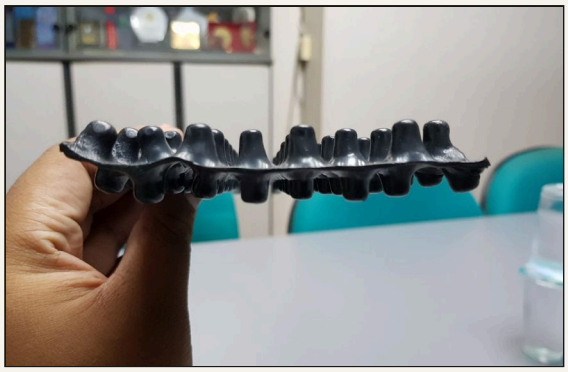
DIMPLED DRAINAGE SHEET (HDPE DIMPLE BOARD) — MANUFACTURER SPECIFICATION. NO SINGLE PUBLIC STATUTORY STANDARD GOVERNS DIMPLED DRAINAGE SHEETS; NUMERIC VALUES TO BE SUPPLIED FROM SIGMA PRODUCTION DATA.

Property	Value	Notes
Material	High-density polyethylene (HDPE)	—
Dimple shape	Cylindrical or semi-cone studs	—
Facing	Optional nonwoven geotextile filter	g/m² if faced
Color	Black; other colors on request	—
Dimple height	On request	sets the drainage gap depth
Sheet thickness	On request	—
Mass per unit area	On request	g/m² or kg/m²
Compressive load (at stated deflection)	On request	quote test method
Discharge / drainage capacity	On request	quote at design head/gradient
Roll size (width × length)	On request	supplied in rolls

SG-DR-29

PREFABRICATED HORIZONTAL DRAIN (PHD)

PHD drain · PP core + nonwoven filter · Soft-ground consolidation



Prefabricated horizontal drain (PHD) — a strong PP drainage core in a nonwoven filter jacket, laid horizontally to discharge pore water from drains.

APPLICATIONS

- Horizontal drainage blanket above PVD-treated soft ground
- Soft-foundation soil improvement and consolidation
- Preloading and surcharge programs
- Reclamation and soft-soil land development
- Replacement for sand drainage blankets

KEY PROPERTIES

Type	Prefabricated horizontal (band) drain — PHD
Core material	Mechanically strong polypropylene (PP) drainage core
Filter material	Nonwoven geotextile jacket
Function	Horizontal collection / discharge of pore water from vertical drains
Color	Black; other colors on request
Key dimensions	On request — width / thickness / discharge capacity from SIGMA datasheet

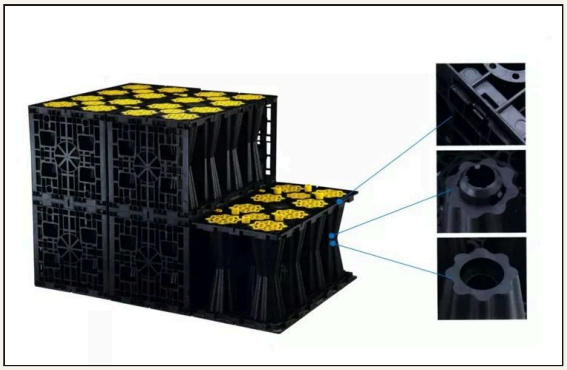
PREFABRICATED HORIZONTAL DRAIN (PHD) — MANUFACTURER SPECIFICATION. NO SINGLE PUBLIC STATUTORY STANDARD GOVERNS THE PHD BAND DRAIN; NUMERIC VALUES TO BE SUPPLIED FROM SIGMA PRODUCTION DATA.

Property	Value	Notes
Type	Prefabricated horizontal (band) drain	—
Core material	Mechanically strong polypropylene (PP)	—
Filter material	Nonwoven geotextile jacket	—
Color	Black; other colors on request	—
Width	On request	band width
Core thickness	On request	—
Core tensile strength	On request	quote test method
Discharge capacity	On request	quote at design confining pressure/gradient
Filter — water flow rate / permittivity	On request	ASTM D4491 if reported
Roll length	On request	supplied in rolls

SG-DR-30

RAINWATER STORAGE MODULE

PP storage crate · Modular · high void ratio · Detention / infiltration / reuse



Modular PP rainwater storage module (stormwater crate) — high-strength polypropylene cells that assemble into an underground tank for detention and reuse.

APPLICATIONS

- Underground stormwater detention and attenuation tanks
- Rainwater harvesting and storage for reuse
- Stormwater infiltration / soakaway systems
- Sponge-city urban runoff control
- Load-bearing tanks under greenery, plazas, parking and fire lanes

KEY PROPERTIES

Material	Polypropylene (PP), recyclable
Form	Modular cell / crate — splices into a tank of any shape
Function	Stormwater detention, infiltration and rainwater harvesting
Wrap	Geotextile (infiltration) or geomembrane (sealed detention) — project-specific
Color	Black; other colors on request
Key data	On request — module size / void ratio / compressive (vertical & lateral) load from SIGMA datasheet

RAINWATER STORAGE MODULE (PP STORMWATER CRATE) — MANUFACTURER SPECIFICATION. NO SINGLE PUBLIC STATUTORY STANDARD GOVERNS THESE MODULES; NUMERIC VALUES TO BE SUPPLIED FROM SIGMA PRODUCTION DATA.

Property	Value	Notes
Material	Polypropylene (PP), recyclable	—
Form	Modular cell / crate — splices into a tank of any shape	—
Wrap	Geotextile (infiltration) or geomembrane (sealed detention)	project-specific
Color	Black; other colors on request	—
Module dimensions (L × W × H)	On request	—
Void ratio / storage efficiency	On request	typically high for PP crates
Vertical compressive load	On request	quote test method & deflection
Lateral (side) load	On request	quote test method
Module weight	On request	—
Max. burial / cover depth	On request	depends on load rating

09 EROSION CONTROL

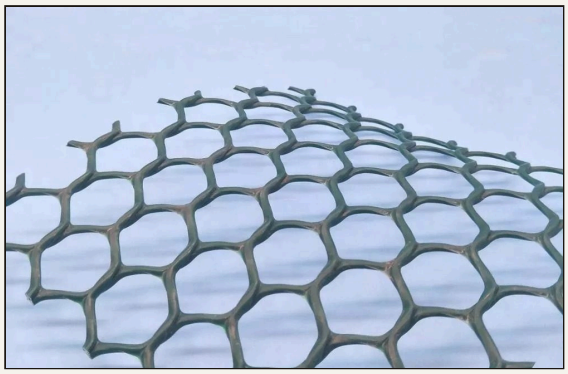
Mats, curtains, fences and revetment systems that hold soil, silt and slopes against water and wind.

6 PRODUCTS

SG-EC-31

HDPE PLASTIC FLAT MESH (GEONET)

7 models · CE121–HF10 · HDPE · 550–1240 g/m² · 2–2.5 m wide · multi-color



HDPE plastic flat mesh (geonet) — extruded polyethylene netting in 7 models, 550–1240 g/m², for slope protection, fencing and ground reinforcement.

APPLICATIONS

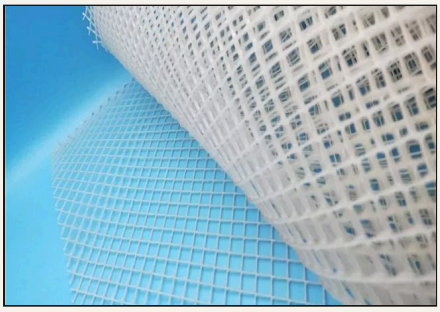
- Slope protection for roads, embankments and rock slopes
- Soil and water conservation and landslide prevention
- Ground reinforcement to improve load capacity and stability
- Garden, landscaping and lawn protection mesh

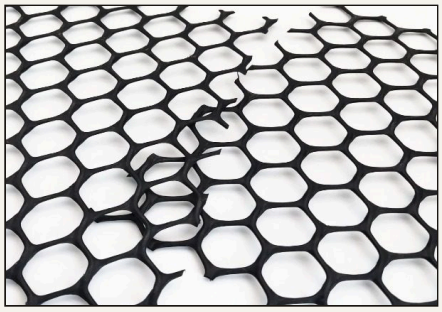
KEY PROPERTIES

Material	HDPE (high-density polyethylene) plastic
Models	CE121 / CE131 / CE151 / CE181 / CE191 / DN1 / HF10
Unit weight	550–1240 g/m² (by model)
Mesh size	(8±1)×(6±1) to (105±10)×(105±10) mm (by model)

MANUFACTURER DATASHEET — HDPE PLASTIC FLAT MESH SPECIFICATIONS BY MODEL (CE121–HF10).

Specification	CE121	CE131	CE151	CE181	CE191	DN1	HF10
Weight per sq.m (g/m²)	730±35	630±30	550±25	750±35	720±35	750±35	1240±60
Mesh size (mm)	(8±1)×(6±1)	(27±2)×(27±2)	(74±5)×(74±5)	(90±10)×(90±10)	(105±10)×(105±10)	(10±1)×(10±1)	(10±1)×(6±1)
Roll width (m)	2 or 2.5	2 or 2.5	2 or 2.5	2 or 2.5	2 or 2.5	2 or 2.5	2 or 2.5
Roll length (m)	40 or 50	40 or 50	40 or 50	40 or 50	40 or 50	40 or 50	40 or 50
Material	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE	HDPE
Tensile strength (kN/m)	6.2	5.8	5	5.77	6	6	18

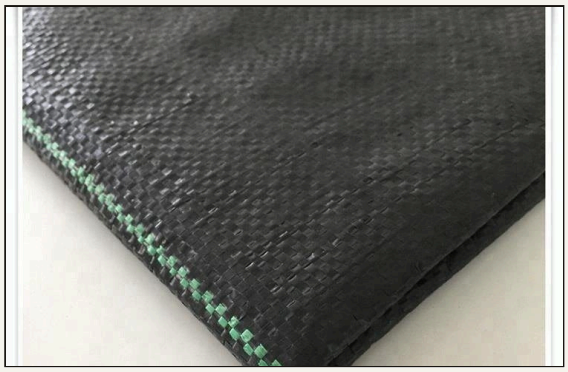




SG-EC-32

SILT FENCE

AASHTO M288 · 24 / 30 / 36 in · Woven PP · Black



Woven polypropylene silt fence for above-ground sediment control — AASHTO M288 silt fence fabric in 24/30/36 in heights, UV-stable and high-strength.

APPLICATIONS

- Construction site erosion control and sediment control fence
- Perimeter sediment control around stockpiles and disturbed soil
- SWPPP runoff and silt runoff control on slopes
- Temporary silt fence along ditches, channels and waterways
- Reinforced (wire-backed) silt fence for high-flow, heavy-duty sites
- Highway, subdivision and utility-trench sediment control

KEY PROPERTIES

Material	High-tenacity woven polypropylene
Standard	AASHTO M288 (Temporary Silt Fence)
Fabric height	24 / 30 / 36 in (610 / 760 / 915 mm)
Roll length	100 ft / 300 ft (30 m / 100 m)
Grab tensile (MD × CD)	200 × 200 lbs (ASTM D4632)
AOS	0.425 mm / US Std. Sieve 40 (ASTM D4751)

SILT FENCE GEOTEXTILE — WOVEN POLYPROPYLENE TO AASHTO M288 (TEMPORARY SILT FENCE). MARV EXCEPT AOS (MAXIMUM). VALUES VERBATIM FROM THE SOURCE DATASHEET.

Property	Test Method	Unit	AASHTO M288 — Unsupported	AASHTO M288 — Supported	SIGMA Standard Grade (MARV)
Grab Tensile Strength (MD × CD)	ASTM D4632	lbs	100 × 100	100 × 100	200 × 200
Grab Elongation	ASTM D4632	%	< 50	< 50	15
CBR Puncture Strength	ASTM D6241	lbs	—	—	700
Trapezoidal Tear Strength (MD × CD)	ASTM D4533	lbs	—	—	75 × 75
Permittivity	ASTM D4491	sec^{-1}	0.05 (min.)	0.05 (min.)	0.05
Water Flow Rate	ASTM D4491	$gal/min/ft^2$	10 (min.)	10 (min.)	4
Apparent Opening Size (AOS)	ASTM D4751	mm / US Std. Sieve	0.60 (max.)	0.60 (max.)	40 (0.425)
Ultraviolet Stability (500 hr)	ASTM D4355	% retained	70 (min.)	70 (min.)	70
Max. Post Spacing	—	ft (m)	4 (1.2)	6 (1.8)	6 (1.8) standard

SG-EC-33

TURBIDITY CURTAIN

DOT Type 1 / 2 / 3 · PVC-coated polyester · Floating · Hi-vis

Floating turbidity curtain (silt curtain) for in-water sediment control — DOT Type 1, 2 and 3 silt barriers with PVC fabric, flotation and ballast chain.

APPLICATIONS

- Dredging and reclamation sediment containment
- Marine and shoreline construction silt control
- Ponds, lakes and slow rivers (Type 1 / Type 2)
- Open, tidal and intercoastal water with current and waves (Type 3)
- Protecting sensitive water bodies from construction turbidity
- Bridge, outfall and pile-driving works over water

KEY PROPERTIES

Material	PVC-coated woven polyester
Types	DOT Type 1 (calm) / Type 2 (moving) / Type 3 (open / tidal)
Skirt depth (draft)	2–130 ft (0.6–40 m) by type
Flotation	Closed-cell foam, 4–24 in (100–600 mm) dia.
Freeboard	≥ 3 in (75 mm)
Panel length	50 ft / 100 ft (15 m / 30 m)

MANUFACTURER DATASHEET — TURBIDITY CURTAIN SPECIFICATIONS.

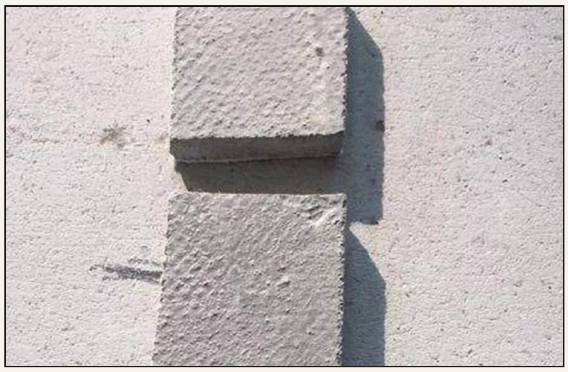
Component	Property	Type 1	Type 2	Type 3
Freeboard	Material	PVC	PVC	PVC
Freeboard	Spec.	height:160mm, grammage:600gsm	height:200mm, grammage:600gsm	height:300mm, grammage:800gsm
Freeboard	Tensile strength	crosswise-70KN/m, lengthway-60KN/M	crosswise-70KN/m, lengthway-80KN/M	crosswise-96KN/m, lengthway-80KN/M
Floating	Material	EPS	EPS	EPS
Floating	Spec.	dia.16cm*1.1m	dia.20cm*1.1m	dia.30cm*1.1m
Floating	Flotage	25kg/m	35kg/m	80kg/m
Draft	Material	PET needle-punched geotextile	PET needle-punched geotextile	PET needle-punched geotextile
Draft	Spec.	deep:0.5-10m, grammage:200gsm	deep:0.5-10m, grammage:300gsm	deep:0.5-10m, grammage:400gsm
Draft	Tensile strength	crosswise: 50KN/m, lengthway: 40KN/m	crosswise: 90KN/m, lengthway: 80KN/m	crosswise: 140KN/m, lengthway: 120KN/m
Chain	Material	hot galvanized chain	hot galvanized chain	hot galvanized chain
Chain	Spec.	dia.:4mm, 1.0kg/m	dia.:6mm, 1.5kg/m	dia.:10mm, 2.2kg/m
Chain	Strength	24KN/m	48KN/m	96KN/m

FULL DATASHEET AVAILABLE ON REQUEST · sigmageosynthetics.com

SG-EC-34

CONCRETE BLANKET (GCCM)

ASTM D8364 · 5 / 8 / 13 mm · GCCM · PVC-backed



Concrete blanket (GCCM) — a flexible cement-filled mat to ASTM D8364 that hydrates into a thin, durable concrete erosion-control layer.

APPLICATIONS

- Erosion control and concrete mats for slope protection
- Channel, ditch and culvert lining
- Abutments, berms and embankment protection
- Engineering repair of existing concrete structures
- Weed suppression and bund / containment lining

KEY PROPERTIES

Material	GCCM — fibre matrix + dry concrete, PVC-backed
Standard	ASTM D8364 (GCCM Materials)
Thickness grades	5 mm / 8 mm / 13 mm (Type I / II / III)
Compressive strength (28-day)	≥ 70 MPa (ASTM D8329)
Initial flexural strength (24 hr)	≥ 3.5 MPa (ASTM D8058)
Set / working time	1–2 hours

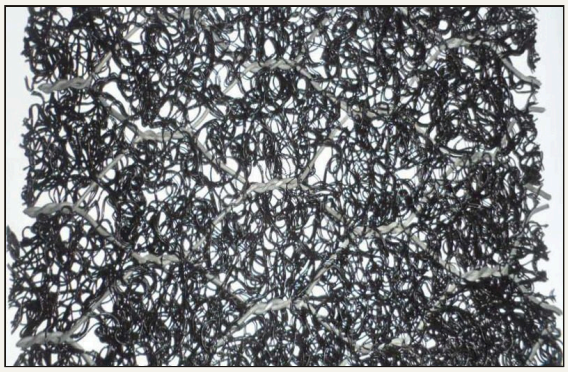
CONCRETE BLANKET (GCCM) — PROPERTIES BY THICKNESS GRADE, PER ASTM D8364. VALUES VERBATIM FROM THE SOURCE DATASHEET.

Property	Test Method	Unit	5 mm	8 mm	13 mm
Nominal thickness	ASTM D5199	mm	5	8	13
Mass per unit area (nominal)	ASTM D5993	kg/m²	7	12	19
GCCM Classification	ASTM D8364	Type	I	II	III
Compressive strength (28-day, cementitious mix)	ASTM D8329	MPa	≥ 70	≥ 70	≥ 70
Initial Flexural Strength (IFS, 24 hr)	ASTM D8058	MPa	≥ 3.5	≥ 3.5	≥ 3.5
Initial breaking load (flexural, 24 hr, MD)	ASTM D8058	N/m	750	1,750	5,000
Set / working time	—	hours	1–2	1–2	1–2

SG-EC-35

3D REINFORCED GEOMAT

3D PP mesh + steel wire · Erosion control geomat · Vegetated slope protection



3D reinforced geomat — a 3D PP mesh matrix composited with galvanized steel wire mesh that anchors topsoil and grass on slopes for erosion control.

APPLICATIONS

- Highway and railway roadbed slope protection
- River bank and embankment erosion control
- Sea-coast slope protection
- Channel and ditch lining protection
- General vegetated slope stabilization

KEY PROPERTIES

Matrix material	Polypropylene (PP) three-dimensional mesh mat
Reinforcement	Galvanized steel wire mesh composite
Structure	Open 3D matrix — holds soil, lets grass root through
Function	Erosion control + slope reinforcement (vegetated)
Color	Black / green
Key dimensions	On request — thickness / mass per area / tensile strength from SIGMA datasheet

3D REINFORCED GEOMAT — MANUFACTURER SPECIFICATION. NO SINGLE PUBLIC STATUTORY STANDARD GOVERNS 3D REINFORCED GEOMATS; NUMERIC VALUES TO BE SUPPLIED FROM SIGMA PRODUCTION DATA.

Property	Value	Notes
Matrix material	Polypropylene (PP) three-dimensional mesh	—
Reinforcement	Galvanized steel wire mesh composite	—
Structure	Open 3D matrix — holds soil, lets grass root through	—
Color	Black / green	—
Mat thickness	On request	—
Mass per unit area	On request	g/m²
Tensile strength (MD / CMD)	On request	quote test method
Wire mesh gauge / aperture	On request	galvanized steel
Roll size (width × length)	On request	supplied in rolls

SG-EC-36

CONCRETE REVETMENT MATTRESS

Fabric-formed concrete · Articulated concrete mattress · Scour-resistant slope lining

Concrete revetment mattress (articulated concrete mattress) — a woven geotextile form pumped full of concrete grout for a scour-resistant lining.

APPLICATIONS

- Channel and canal slope lining
- River-bank and embankment revetment
- Shoreline and coastal scour protection
- Bridge pier and culvert outlet scour protection
- Steep-slope erosion control where rock is impractical

KEY PROPERTIES

Fabric form	Two layers of woven geotextile, nylon spacer cords
Fill	High-strength flowable concrete grout (pumped on site)
Function	Channel / slope / shoreline revetment and scour protection
Thickness control	Set by spacer-cord length (controlled, uniform)
Color	Concrete grey (fabric per project)
Key data	On request — fabric mass/strength, panel size, fill thickness, grout strength from SIGMA datasheet

CONCRETE REVETMENT MATTRESS (FABRIC-FORMED / ARTICULATED CONCRETE MATTRESS) — ENGINEERED PER PROJECT. NO SINGLE PUBLIC PRODUCT STANDARD GOVERNS THE FABRIC-FORMED MATTRESS; NUMERIC VALUES TO BE SUPPLIED FROM SIGMA PRODUCTION DATA AND PROJECT DESIGN.

Property	Value	Notes
Fabric form	Two layers of woven geotextile, nylon spacer cords	—
Fill	High-strength flowable concrete grout (pumped on site)	—
Thickness control	Set by spacer-cord length	uniform regardless of slope
Color	Concrete grey (fabric per project)	—
Fabric mass per unit area	On request	g/m² (woven geotextile)
Fabric tensile strength	On request	quote test method (e.g. ASTM D4595)
Filled mattress thickness	On request	set by spacer cords
Concrete grout strength (28-day)	On request	project mix design
Panel / section size	On request	custom-fabricated
Grout consumption	On request	per m² at design thickness

10 PROTECTIVE MATERIALS

Root barriers, floating covers and liner accessories that shield the primary containment system.

2 PRODUCTS

SG-PR-37

ROOT BARRIER

HDPE · 40 / 60 / 80 / 100 mil · 18–60 in · Black

HDPE root barrier — a rigid polyethylene tree root barrier installed vertically in a trench to redirect roots and protect foundations. 40–100 mil.

APPLICATIONS

- Tree root barrier under the drip line of mature trees
- Root barrier for foundations, footings and driveways
- Protecting sidewalks, paving and hardscape from root damage
- Bamboo / rhizome barrier to contain running bamboo

KEY PROPERTIES

Material	Rigid high-density polyethylene (HDPE)
Thickness	40 / 60 / 80 / 100 mil (1.0 / 1.5 / 2.0 / 2.5 mm)
Panel / roll height	18 / 24 / 30 / 36 / 48 / 60 in (45–150 cm)
Roll length	100 ft (30 m); thicker grades also 80 ft (24 m)

ROOT BARRIER (HDPE) — DIMENSIONAL RANGES AND TYPICAL HDPE MATERIAL PROPERTIES. VALUES VERBATIM FROM THE SOURCE DATASHEET (MECHANICAL VALUES ARE VENDOR-STATED TYPICAL HDPE FIGURES, CONFIRM AGAINST PRODUCTION DATASHEET).

Property	Test Method	Unit	Value
Thickness	—	mil (mm)	40 (1.0) · 60 (1.5) · 80 (2.0) · 100 (2.5)
Panel / roll height	—	in (cm)	18 · 24 · 30 · 36 · 48 · 60 (45 / 60 / 75 / 90 / 120 / 150)
Standard roll length	—	ft (m)	100 (30); thicker grades also 80 (24)
Color	—	—	Black
Orientation	—	—	Installed vertically (or horizontally) in trench
Density	ASTM D1505	g/cm³	0.940 – 0.965
Carbon black content	ASTM D4218	%	2.0 – 3.0
Tensile strength	ASTM D6693	MPa	15 – 20
Puncture resistance	ASTM D4833	N	≥ 500 (varies strongly with thickness)
UV / weathering resistance	—	—	Carbon-black + UV-inhibitor stabilized

FULL DATASHEET AVAILABLE ON REQUEST · sigmageosynthetics.com

SG-PR-38

FLOATING COVER

HDPE / RPE membrane · Custom-fabricated to basin · Odor & evaporation control

Geomembrane floating cover for reservoirs, lagoons and digesters — a custom-fabricated HDPE / RPE floating cover for odor containment and biogas capture.

APPLICATIONS

- Odor containment over lagoons, ponds and process basins
- Low-rate anaerobic digester covers and biogas capture
- Evaporation control on water reservoirs
- Floating reservoir liner cover for potable and raw water storage
- Floating fish pond covers and aquaculture basins
- Floating covers for plants and vegetables in protected growing

KEY PROPERTIES

Material	HDPE or RPE geomembrane (per project)
Construction	Factory-fabricated panel, field-deployed
Cover type	Floating (defined-sump or tensioned)
Dimensions	Custom-sized to the basin / reservoir
Typical use	Odor containment, evaporation control, biogas capture

FLOATING COVER — FINISHED-PRODUCT PARAMETERS. THERE IS NO PUBLIC STATUTORY STANDARD FOR A FABRICATED FLOATING COVER; VALUES ARE PROJECT/MANUFACTURER-SPECIFIC AND TO BE SUPPLIED BY SIGMA.

Property	Unit	Value
Material	—	On request
Thickness	mil (mm)	On request
Cover type	—	On request
Dimensions	m² / shape	On request

11 INSTALLATION EQUIPMENT

2 PRODUCTS

Welding machines and field consumables that turn rolls of material into a finished, tested installation.

SG-EQ-39

GEOMEMBRANE GLUE

Hot-melt adhesive · Brush-applied · For geomembrane & geotextile

Geomembrane glue (hot-melt adhesive) for jointing geotextile, geomembrane and geosynthetics — a brush-applied HDPE liner glue with high bond strength.

APPLICATIONS

- Jointing and sealing HDPE geomembrane and pond liner seams
- Bonding geotextile and other geosynthetic materials
- Reservoir area and reservoir lining repairs and joints
- Dam body, cofferdam and channel anti-seepage joints

KEY PROPERTIES

Type	Hot-melt adhesive (geomembrane / geotextile glue)
Application	Brush-applied
Bonds	Geomembrane, geotextile and other geosynthetics
Key properties	High bond strength, sealing, water & ageing resistance

GEOMEMBRANE GLUE — PRODUCT PARAMETERS. NO PUBLIC STATUTORY STANDARD GOVERNS THE ADHESIVE; VALUES ARE MANUFACTURER-SPECIFIC AND TO BE SUPPLIED BY SIGMA.

Property	Unit	Value
Type	—	On request
Coverage	m²/L (or per unit)	On request
Cure time	hours	On request
Pack size	—	On request

SG-EQ-40

GEOMEMBRANE WELDING MACHINE

Hot wedge welder · High power · fast · For HDPE liner seams

Geomembrane welding machine (hot wedge welder) for HDPE liner installation — a high-power, fast, reliable welder for watertight liner seams.

APPLICATIONS

- HDPE geomembrane welding for landfill and containment liners
- Pond liner and dam liner field seaming
- Water conservancy, aquaculture and sewage-treatment lining
- Tunnels, subways and roofing waterproof anti-seepage projects
- Chemical mining and industrial anti-seepage installations

KEY PROPERTIES

Type	Hot-wedge geomembrane welder
Welds	HDPE geomembrane and pond liner seams
Operation	Self-propelled, dual-track wedge weld
Key attributes	High power, fast speed, stable & reliable

GEOMEMBRANE WELDING MACHINE — EQUIPMENT PARAMETERS. NO PUBLIC STATUTORY STANDARD GOVERNS THE MACHINE; RATINGS ARE MANUFACTURER-SPECIFIC AND TO BE SUPPLIED BY SIGMA.

Property	Unit	Value
Power	W	On request
Welding speed	m/min	On request
Temperature range	°C	On request
Voltage	V	On request
Weight	kg	On request

QUALITY & EXPORT

SPECIFIED, TESTED, CERTIFIED — THEN SHIPPED.

01

STANDARDS

Production to GRI-GM13, ASTM and ISO test methods. Factory QC on every batch: thickness, density, tensile, tear, puncture and OIT.

02

CERTIFICATION

ISO 9001 quality management. CE marking. Third-party inspection (SGS/BV) welcome before loading.

03

PACKING

Rolls wound on steel or paper cores, wrapped in woven sleeves and marked for sea freight. Container loading plans supplied with every order.

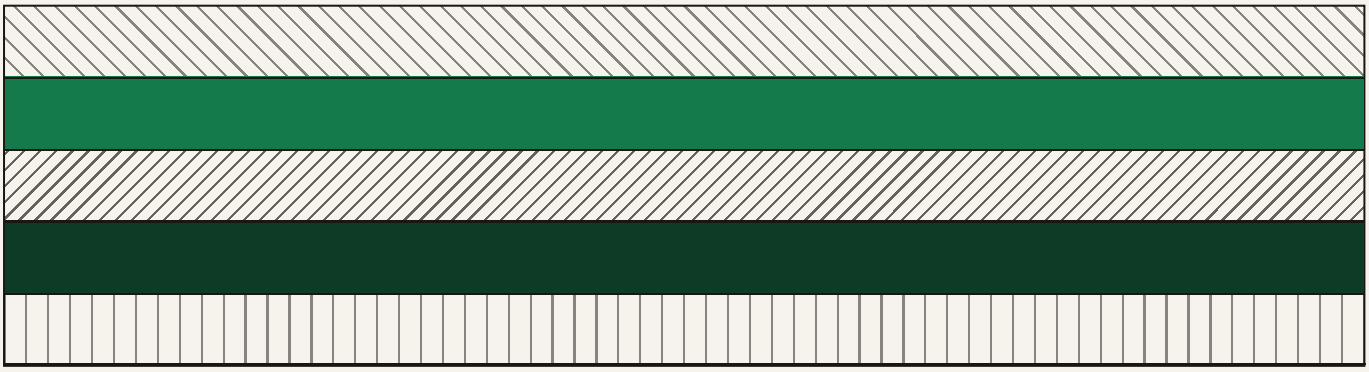
04

LOGISTICS

FOB Qingdao / Ningbo / Shanghai or CIF to your port. OEM / ODM supply to your specification — material grade, thickness, width, surface and packaging. Full-container and LCL orders, with the export documentation overseas buyers need.

7 × 24 · 365

Support is available 7 × 24, 365 days; we aim to respond to inquiries within one hour and to quote within one business day.



REQUEST A QUOTE

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Send product, thickness or grade, total quantity and destination port — we quote ex-works the same business day.