International Standard

ISO 10318-1

Geosynthetics —

Part 1: Vocabulary

Géosynthétiques —

Partie 1: Vocabulaire

Second edition
2026-01

Reference number
ISO 10318-1:2026(en)

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Published in Switzerland

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Foreword

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This document was prepared by Technical Committee ISO/TC 221, *Geosynthetics,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 189, *Geosynthetics,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 10318-1:2015), which has been technically revised. It also incorporates the Amendment ISO 10318-1:2015/Amd 1:2018.

The main changes are as follows:

— modification of definitions for reinforcement (3.1.4) and stress relief (3.1.8);

— addition of the following new terms defining products: geomat (3.2.6.2), geospacer (3.2.6), geocuspate (3.2.6.1), geomembrane (3.2.8.2), geosynthetic clay liner (3.2.8.3.1), bituminous geomembrane (3.2.8.4.1), geosynthetic cementitious composite (3.2.11), and geofoam (3.2.12);

— addition of the following new definitions for properties: energy absorption (3.3.4.4) and energy absorption index (3.3.4.5).

A list of all parts in the ISO 10318 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Geosynthetics —

Part 1:
Vocabulary

1 Scope

This document defines terms related to the functions, products, and properties in geosynthetics, and terms used in International Standards on geosynthetics.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terms related to functions

3.1.1
drainage
collection and transporting of either precipitation, ground water, or other fluids, or all three, in the plane of a geosynthetic material

3.1.2
filtration
restraining the uncontrolled passage of soil or other particles subjected to hydrodynamic forces, while allowing the passage of fluids into or across a geosynthetic material

3.1.3
protection
preventing or limiting local damage to a given element or material by the use of a geosynthetic material

3.1.4
reinforcement
use of the tensile stress-strain behaviour of a geosynthetic to improve the mechanical performance of a system or structure made of soil or other construction materials

3.1.5
separation
prevention from intermixing of adjacent dissimilar soils or fill materials by the use of a geosynthetic material

3.1.6
surface erosion control
use of geosynthetic materials to prevent or limit soil or other particle movements at the surface

Note 1 to entry: For example, a slope.

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3.1.7
barrier
ability of a geosynthetic to prevent or reduce flow, or mass transfer, or both

Note 1 to entry: The function is usually defined by single or multiple engineering or regulatory thresholds.

3.1.8
stress relief
<for asphalt overlay> function provided by an adequately bitumen-saturated interlayer which allows for slight differential movements between the two layers and thus relieves stress to delay or prevent reflective cracking

Note 1 to entry: An adequately bitumen-saturated interlayer can include, for example, a paving geotextile or a composite paving geogrid.

3.1.9
stabilization
improvement of the mechanical behaviour of an unbound granular material by including one or more geosynthetic layers such that deformation under applied loads is reduced by minimizing movements of the unbound granular material

3.2 Terms related to products

3.2.1
geosynthetic
GSY
product with, at least one, component(s) made from a synthetic or natural polymer, in the form of a sheet, a strip, or a three-dimensional structure, used in contact with soil or other materials in geotechnical and civil engineering applications

3.2.2
geotextile
GTX
planar, permeable, polymeric (synthetic or natural) textile material, which can be nonwoven, knitted, or woven

3.2.2.1
nonwoven geotextile
GTX-NW
geotextile made of directionally or randomly orientated fibres, filaments, or other elements, either mechanically, or thermally, or chemically bonded, or a combination of the three

3.2.2.2
knitted geotextile
GTX-K
geotextile produced by interlooping one or more yarns, filaments, or other elements

3.2.2.3
woven geotextile
GTX-W
geotextile produced by interlacing, usually at right angles, two or more sets of yarns, filaments, tapes, or other elements

3.2.2.4
geotextile-related product
GTP
planar, permeable, polymeric (synthetic or natural) material used in contact with soil or other materials in geotechnical and civil engineering applications, which does not conform to the definition of a geotextile

Note 1 to entry: See *geotextile* (3.2.2).

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3.2.3
geogrid
GGR
planar, polymeric structure consisting of a regular open network of integrally connected, tensile elements, which can be linked by extrusion, bonding, or interlooping or interlacing, and the openings of which are larger than the constituents

3.2.4
geocell
GCE
manufactured, three-dimensional, expandable, polymeric structure consisting of contiguous discrete cells which are subsequently filled

3.2.5
geostrip
GST
geosynthetic in the form of a long narrow continuous element, having its principal tensile properties in the longitudinal direction

3.2.6
geospacer
GSP
three-dimensional geosynthetic designed to create a void between two planes

Note 1 to entry: A geospacer can be in the form of a geocuspate, geomat or geonet.

3.2.6.1
geocuspate
GCP
geospacer consisting of an extruded, permeable or impermeable polymeric sheet formed into a regular network of protrusions on one or both sides to create a three-dimensional planar structure

3.2.6.2
geomat
GMA
three-dimensional, permeable structure, made of either polymeric monofilaments, or other elements (synthetic or natural), or both, and either mechanically, thermally, chemically, or otherwise bonded

Note 1 to entry: A geomat may also be used in surface erosion control.

3.2.6.3
geonet
GNT
geospacer consisting of parallel sets of ribs overlying and integrally connecting with similar sets at various angles

3.2.7
geoblanket
GBL
permeable structure of loose, natural or synthetic fibres and geosynthetic elements bonded together to form a continuous sheet

3.2.8
geosynthetic barrier
GBR
factory assembled geosynthetic in the form of a sheet with the purpose of providing the barrier function

3.2.8.1
polymeric geosynthetic barrier
GBR-P
geosynthetic barrier in which the barrier function is fulfilled by a polymer component

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3.2.8.2
geomembrane
GMB
geosynthetic barrier in which the barrier function is fulfilled by a polymer component

3.2.8.3
clay geosynthetic barrier
GBR-C
geosynthetic barrier in which the barrier function is fulfilled by a clay component

3.2.8.3.1
geosynthetic clay liner
GCL
geosynthetic barrier in which the barrier function is fulfilled by a clay component

3.2.8.4
bituminous geosynthetic barrier
GBR-B
geosynthetic barrier in which the barrier function is fulfilled by a bituminous component

3.2.8.4.1
bituminous geomembrane
BGM
geosynthetic barrier in which the barrier function is fulfilled by a bituminous component

3.2.9
geocomposite
GCO
manufactured, assembled material using at least one geosynthetic product among the components

3.2.10
geosynthetic container
GCT
assembly of one or more geosynthetics able to contain soil or other loose materials, closed by seaming, stitching, bonding, or other methods, for retaining the loose particles while allowing water or other fluids to escape

3.2.11
geosynthetic cementitious composite
GCC
factory produced geocomposite in the form of a sheet, consisting of cementitious material contained within one or more geosynthetics

3.2.12
geofoam
GFO
block or planar rigid cellular foamed polymeric material used in geotechnical engineering applications

3.3 Terms related to properties

3.3.1 General properties

3.3.1.1
nominal value
NV
value of a material property as declared, rather than measured, by the producer or supplier of the material

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3.3.2 Terms related to physical properties

3.3.2.1
thickness
d
distance between the upper and lower surfaces of a geosynthetic, measured normal to the surfaces and under a specified pressure

Note 1 to entry: Unit is expressed in mm.

3.3.2.2
mass per unit area
ρ_A
ratio of the mass of a specimen of specified dimensions to its area

Note 1 to entry: Unit is expressed in grams per square metre (g/m^2).

3.3.3 Terms related to hydraulic properties

3.3.3.1
characteristic opening size
O_{90}
size of opening which corresponds to the maximum particle size of 90 % by weight of the soil passing through the geotextile

Note 1 to entry: Unit is expressed in µm.

3.3.3.2
permeability
rate of fluid transmission through a geosynthetic

3.3.3.3
coefficient of permeability normal to the plane
k_n
ratio between flow velocity (v) and hydraulic gradient (i) normal to plane

Note 1 to entry: Unit is expressed in m/s.

3.3.3.4
flux
q_n
volumetric flow rate per unit area normal to the plane of the product at a defined head

Note 1 to entry: Unit is expressed in $l/(m^2 \cdot s)$ or $(m^3/(m^2 \cdot s))$.

3.3.3.5
velocity index
v-index
velocity corresponding to a head loss of 50 mm across a specimen, in a water permeability test

Note 1 to entry: Unit is expressed in mm/s.

3.3.3.6
permittivity
ψ
volumetric flow rate of water or other liquids per unit area per unit head loss, under laminar flow conditions, normal to the plane of a product

Note 1 to entry: Unit is expressed in s^{-1}.

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3.3.3.7
in-plane flow capacity
q_p
volumetric flow rate of water or other liquids per unit width of specimen, at defined gradients in the plane of a product

Note 1 to entry: Unit is expressed in l/(m·s).

3.3.3.8
transmissivity
θ
volumetric flow rate per unit width of specimen and per unit gradient in the plane of a product

Note 1 to entry: Unit is expressed in l/(m·s).

3.3.3.9
liquid tightness
ability of a geosynthetic to retain liquid

3.3.4 Terms related to mechanical properties

3.3.4.1
tensile stress
σ
tensile force per cross-sectional area of the specimen prior to loading, carried by a specimen at any given time in a short-term test

Note 1 to entry: Tensile stress expressed in MPa.

3.3.4.1.1
yield point
point on the stress-strain curve, other than the failure point, at which an increase in strain occurs without an increase in stress

3.3.4.1.2
tensile stress at yield point
σ_y
first stress at which an increase in strain occurs without an increase in stress

Note 1 to entry: It can be less than the maximum attainable stress.

3.3.4.1.3
tensile stress at failure
σ_f
tensile stress at which the test specimen ruptures

3.3.4.1.4
maximum tensile stress
σ_{max}
maximum tensile stress sustained by the test specimen during a tensile test

3.3.4.1.5
maximum tensile strain
ε_{max}
tensile strain at maximum tensile strength (T_{max})

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3.3.4.2
tensile strength
T
<related to specimen width> tensile force per unit width carried by a specimen at any given time in a short-term test

Note 1 to entry: Unit is expressed in kN/m.

3.3.4.2.1
tensile strength at failure
T_f
<related to specimen width> tensile strength at which the test specimen ruptures

3.3.4.2.2
maximum tensile strength
T_{max}
<related to specimen width> maximum tensile strength sustained by the test specimen during a tensile test

3.3.4.2.3
tensile modulus
J
ratio of the change in tensile stress or strength of a geosynthetic to the corresponding change in elongation

Note 1 to entry: Tensile modulus (stiffness) is expressed in MPa or kN/m.

3.3.4.3
preload
initial load enabling initial gauge length and strain zero to be determined under reproducible conditions

3.3.4.4
energy absorption
energy used in elongating a specimen to a given tensile stress or strain in a tensile test or impact test

Note 1 to entry: Energy absorption is relevant for products with tensile strength that is not calculated based on thickness. It is given by the integral of (the area under) the stress/strain curve to the chosen point, and expressed in kJ/m^2.

3.3.4.5
energy absorption index
E-index
approximate calculation of energy absorption at maximum load

Note 1 to entry: Calculated as follows:

$$\text{E-index} = 0{,}5 \times T_{max} \times \varepsilon_{max}$$

3.3.5 Terms related to the seaming or attaching of geotextile (GTX) or geotextile-related product (GTP)

3.3.5.1
connection
local or linear attachment of dissimilar geosynthetics or of a geosynthetic and another material

3.3.5.2
joint
local or linear attachment of similar geosynthetics

3.3.5.3
bond
areal attachment of the elements of a geosynthetic to each other

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3.3.5.4
maximum joint
seam strength
T_{Jmax}
maximum tensile strength of the seam formed by joining two or more sheets

Note 1 to entry: Unit is expressed in kN/m.

3.3.5.5
joint efficiency
seam efficiency
J_e
ratio of the joint or seam strength to the tensile strength of the material measured in the same direction

Note 1 to entry: Unit is expressed in %.

3.3.6 Terms related to interface properties

3.3.6.1
friction angle
ϕ
angle whose tangent is equal to the ratio of the frictional force per unit area to the normal stress at the interface between two parts of the same material or at the interface between two different materials

Note 1 to entry: Soil and GSY are examples of two materials.

3.3.6.2
friction interaction coefficient
$f_{s,GSY}$
ratio between the tangent of the friction angle between soil and GSY, and the tangent of the friction angle of the soil

3.4 Other terms

3.4.1
machine direction
MD
direction of manufacture of a geosynthetic product (the warp direction for woven geotextiles)

3.4.2
cross-machine direction
CMD
direction perpendicular to the direction of manufacture of a geosynthetic product (the weft direction for woven geotextiles)

3.4.3
design life
period of time from the start of installation to the point where the material no longer fulfils its required design properties in order to perform its function within defined limits

3.4.4
peel test
tensile test of a bond, joint, or connection in which two components are separately clamped and one component is peeled away from the other in order to determine peel strength

3.4.5
tensile shear test
tensile test of a bond, joint, or connection in which two components are separately clamped and load is applied in the plane of the product in order to determine tensile shear strength

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