Bundesministerium für Verkehr [Federal Ministry of Transport]
Department of Waterways and Shipping

Technical terms of delivery for geotextiles and geotextile-related products on waterways (TLG)*

- 2026 edition -

EU notification No XXX of

1 General

(1) These technical terms of delivery (TLG) and the specifications contained herein for the construction of revetments in accordance with MAR (Technical Note on the Application of Standard Construction Methods for Slope and Riverbed Stabilisation on Waterways) apply to geotextiles and geotextile-related products (hereinafter referred to as 'geotextiles'), which are used as filter, separation or protective layers in construction works for the stabilisation of embankments and riverbeds of waterways or in associated structures such as groynes, guide structures, side embankments or side ditches.

(2) These technical terms of delivery specify values for the essential characteristics and the intended use 'filtering and separation' as set out in DIN EN 13253:2016-12 – Geotextiles and geotextile-related products; Required properties for use in erosion control structures (coastal protection and revetment construction).

(3) Products from other European Union Member States or from Turkey, as well as goods originating from an EFTA member state which is a party to the Agreement on the European Economic Area that do not conform to these additional technical terms of delivery shall be deemed compliant, including the tests, inspections and certifications conducted in the country of manufacture, if the required level of protection (in terms of health, safety and fitness for purpose) is achieved in a similarly permanent manner.

2 Fibre-based materials

(4) The fibre materials used must be specified in the tender documentation.

3 Requirements

3.1 General

(5) The properties that are relevant for all applications according to DIN EN 13253:2016-12 (A) as well as the general properties according to section 3.2 always apply for all uses.

(6) In addition to the characteristics referred to in paragraph Error: Reference source not found, the contract document may also require additional characteristics which are only relevant in the case of special conditions of use referred to in Section 3.4 (S).

(7) All requirements also apply to the joints in geotextile sheets.

(8) The services declared in the declaration of performance and conformity under the Construction Products Regulation 2024 or the declaration of performance under the Construction Products Regulation 2011 must comply with the requirements of the contract document. In the case of the services required in the contract document for the type-related basic test, these services shall not fall below the mean value minus standard deviation of the basic test. Accordingly, a required maximum value must not be exceeded.

3.2 General characteristics and requirements

(9) Geotextiles, geotextile-related products and their connecting materials must be rot-resistant, oil-resistant, seawater-resistant, frost-resistant and environmentally compatible.

* Notified in accordance with Directive (EU) 2015/1535 of the European Parliament and of the Council, of 9 September 2015, laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services (OJ L 241, 17/9/2015, p. 1).

(10) The minimum period of use, unless it is a temporary measure, must be at least 100 years. This must be demonstrated for geotextiles and geotextile-related products in accordance with DIN EN 13253:2016-12, Annex B, and for yarns in accordance with DIN EN 12447:2021-11.

(11) For the environmental assessment of geosynthetics, the document “Assessment of the release of environmentally relevant substances from geosynthetics in water transport engineering” (VkBl 2025) (Issue 15/2025, EU Notification No 2024/0671/DE) shall apply. The test shall be carried out by the respective manufacturer or supplier and the results shall be attached to the application for the basic test in accordance with the BAW Directive “Testing of Geoplastics in Transport Hydraulic Engineering” (RPG) 2026.

(12) Geotextiles and geotextile-related products used as filters or separators shall be so flexible or elastic that they fully adjust to the unavoidable soil unevenness of the planum under the intended load without affecting their function. A geotextile is considered to be sufficiently flexible or stretchable if it can follow deformations of the substrate with an inclination of at least 1:10 = 5.7" against the design plane.

(13) The individual layers of composite materials must be clearly distinguishable from one another by visual inspection and must be bonded together across their entire surface. Point-like connections are only permitted for the connection of filter layers on additional layers, not for filter layers with each other. The spacing between the connection points must not exceed 5 cm. The joints between the individual layers must be capable of withstanding the usual installation stresses without damage.

(14) In the case of seam connections, fibre raw material, thread type and maximum tensile force of the yarn according to DIN EN ISO 2062:2010-04 shall be specified in the tender specifications. The distance between the seam and the edge of the geotextile must be at least 3 cm. Seam connections must meet all the minimum requirements for the geotextile.

3.3 Essential characteristics and requirements for the uses Filtering and separation according to DIN EN 13253

(15) The characteristics mentioned in DIN EN 13253:2016-12, which are relevant for the intended uses of filtering and separating in traffic water engineering, and the associated test methods are shown in Error: Reference source not found. The statement of performance must provide a full explanation of the characteristics listed at Error: Reference source not found. The performance characteristics of the geotextile or geotextile-related product must meet the requirements set out in the contract documents.

Table 1: Essential characteristics and requirements for all conditions of use (A)

Essential characteristics	Test methods	Requirement level
[1] Stepping (transverse and longitudinal)	DIN EN ISO 10319: 2025-02	As per contract document
[2] — Characteristic opening size (O_{90})	DIN EN ISO 12956: 2020-05	no requirement
[3] Water permeability perpendicular to the horizontal plane (V_{H50})	DIN EN ISO 11058: 2019-09	As per contract document
[4] Durability	DIN EN 13253: 2016-12	As per contract document

3.4 Performance characteristics and properties for special conditions of use

(16) The properties relevant to the special conditions of use of the revetment structure according to MAR and the associated test procedures are shown in Error: Reference source not found. The performance characteristics for special conditions of use of the geotextile or geotextile-related product must meet the requirements of the contract document.

Table 2: Features, characteristics and requirements for special conditions of use (S)

Features and characteristics for special conditions of use	Test methods	Requirement level
[1] hydrodynamic filter efficiency	Turbulence test according to DIN EN ISO 10772:2012-12 or RPG flow method	As per contract document
[2] Resistance to dynamic perforation for armourstones	Penetration test according to RPG	
[3] Resistance to surface abrasion	RPG abrasion test	
[4] Coefficient of friction against the underlying ground	Based on DIN EN ISO 12957-1:2019-04 or DIN EN ISO 12957-2:2025-03	
[5] Thickness of the filter layer:	DIN EN ISO 9863-1:2020-04	

3.5 Supply of geotextiles and geotextile-related products

(17) The client (AG) will only accept geotextiles and geotextile-related products from manufacturers that provide a declaration of performance and conformity, as well as a certificate of conformity for factory production control in accordance with BauPVO 2024, or a certificate of factory production control in accordance with BauPVO 2011 and DIN EN 13253: 2016-12. The supplied geotextiles must be subject to System 2+ for the evaluation of the factory production control system in accordance with Annex A of DIN EN 13253:2016-12.

(18) All deliveries must be accompanied by a declaration of performance and conformity in accordance with DIN EN 13253:2016-12.

(19) All geotextiles must be delivered protected from light and moisture. Deliveries damaged during transport must be taken back by the Contractor (AN) at its expense.

(20) Each delivery must have a numbered delivery note, which must contain the following details:

(a) Supplier (name, address)
(b) Consignee of delivery (name, address)
(c) Geotextile manufacturer (name, location)
(d) Geotextile product name
(e) Serial numbers of the geotextile rolls supplied

(21) According to DIN EN 13253:2016-12, all geotextile membranes must be marked with the identification features specified in DIN EN ISO 10320:2019-07.

(22) If a specific installation position of the geotextile has significance for its function, the installation top side shall be clearly marked as such (text ‘top side’, letter height at least 20 cm, readable after installation).

4 Testing

4.1 Type-related basic testing

(23) A type-specific basic test on a geotextile type must be carried out if, in the contract documents for the construction project, proof of its fundamental suitability as a filter or separation layer in hydrodynamically loaded slope and riverbed stabilisation works in accordance with MAR is required by the provisions of Error: Reference source not found. The type-specific basic test must be carried out in accordance with by means of a valid test report issued by the Federal Institute of Hydraulic Engineering (BAW) or by a body recognised for this purpose by the highest building control authority of the federal states. The test report shall not be older than 5 years unless its validity has been extended. A basic design test shall always include the determination of all the properties referred to in paragraph Error: Reference source not found. Changes in the starting materials or the manufacturing process during later production require a new type-related basic test with a changed product designation.

4.2 Checks carried out by the client

(24) The client reserves the right to carry out spot checks on the geotextiles delivered. Control tests are usually carried out on each class of stone at the following frequency:

- before installation starts: 1 control test

additionally:

- up to 5000 m² total area: 1 control test
- up to 10,000 m² total area: 2 control tests
- each additional 10,000 m²: 1 control test

(25) If the deliveries are made in connection with a construction contract and the total area is up to 5,000 m², the entire quantity of geotextile must arrive on site at least 10 working days before installation begins, so that the required inspection can be carried out in good time before installation begins. For a larger total area, a delivery quantity of at least 5,000 m² for the first control test is required.

(26) If the supply forms part of a construction contract, the Contractor shall, in the presence of the Client, take a sample in accordance with DIN EN ISO 9862:2024-02 from a roll specified by the Client, covering the full width of the roll and measuring at least 2 m in length. If the sheets are sewn together during installation, the sample shall contain a seam area with a minimum length of 1.5 m. The sample's installation side must be clearly marked if it is relevant for geotextile installation.

(27) A joint sampling report must be drawn up for each sampling exercise, to which the accompanying documents for the goods, the CE label and the declaration of performance and conformity in accordance with the Construction Products Regulation 2024 or the declaration of performance in accordance with the Construction Products Regulation 2011 must be attached. The sampling report must contain the following information:

- Name of the construction project / place of delivery
- Date of the construction contract / date of delivery
- Samples no.
- Installation area for which the sample is representative
- Geotextile function
- Product description
- Roll number
- Sample Date
- Name and signature of the authorised representatives of the contractor and the customer

(28) If pre-assembled geotextile sheets are supplied, the sample must include the seam area. The seam must be at least 1.5 m long and each section must be at least 0.75 m wide. The seams resulting from the sampling shall be re-sewn by the contractor.

(29) The client must send the samples, together with the sampling report, to the testing laboratory. A control test usually consists of the following individual tests:

- Identification of fibres (Kofler bench)
- Mass per unit area according to DIN EN ISO 9864:2005-05
- Layer thickness according to DIN EN ISO 9863-1:2020-04
- Tensile strength in the longitudinal and transverse directions in accordance with DIN EN ISO 10319:2025-09
- Seam strength in accordance with DIN EN ISO 10321:2008-08
- Water permeability perpendicular to the horizontal plane (V_{H50}) according to DIN EN ISO 11058:2019-09

(30) If identification of the fibres during the control test reveals deviations from the manufacturer's declaration or from the test report of the basic test, the consignment shall be rejected.

(31) For coating thickness and tensile strength, the mean value of a test series minus standard deviation shall not be less than the requirements of the contract document unless each individual test value meets the requirement.

(32) For the area-based mass, the following deviations shall be permitted during control tests:

GTX in accordance with DIN EN ISO 10318-1:2018-10 (including single-layer geotextiles):

- 10 percent of the average of the design-related basic

test

GCO in accordance with DIN EN ISO 10318-1:2018-10 including composites of geotextiles with mineral materials and multilayered nonwovens (GTX in accordance with DIN EN ISO 10318-1:2018-10):

- Characteristic area-related mass – 15 percent of the average of the design-related basic test
- weight of packaging: – 20 percent of the average of the design-related basic test

(33) With normal water permeability to the level (V_{H50}) according to DIN EN ISO 11058:2019-09, deviation of ± 50 per cent from the mean value of the type-related basic test is permitted in control tests.

(34) The costs of control tests shall be borne by the client, provided that they do not reveal a defect.

5 Measures in case of deficiencies

(35) A deficiency exists if one of the contractual requirements is not met by a control test in accordance with Section 4.

(36) If a defect is found, the roll in question will be rejected. In order to identify the missing items from the delivery, the client shall inspect the rolls with the immediately preceding and following production numbers in accordance with Section 4. The factory production control documents must be made available to the Client on request for this purpose.

(37) Supplies complained of shall be taken back by the contractor at its own expense.

(38) The contractor shall bear the costs of control tests showing a deficiency.

6 Other applicable provisions

DIN EN 13253:2016-12:	Geotextiles and geotextile-related products – Characteristics required for use in erosion control works (coastal protection and bank revetments).
DIN EN 13383-1:2002-08:	Armour stones – Part 1: Requirements.
DIN EN ISO 2062: 2010-04:	Textiles — Yarns from packaging units — Determination of the maximum tensile strength and maximum elongation at break of yarn sections using a constant rate of elongation (CRE) tester (ISO 2062:2009).
DIN EN ISO 9862: 2024-02:	Geoplastics – Sampling and preparation of measurement samples (ISO 9862:2005); German version EN ISO 9862:2005.
DIN EN ISO 9863-1:2020-04:	Geosynthetics - Determination of thickness at specified pressures – Part 1: Single layers (ISO 9863-1:2016 + Amd.1:2019).
DIN EN ISO 9864:2005-05:	Geoplastics – Test methods for determining the area-related mass of geotextiles and geotextile related products (ISO 9864:2005).
DIN EN ISO 10318-1:2018-10:	Geosynthetics – Part 1: Terms and definitions (ISO 10318-1:2015 + Amd 1:2018).
DIN EN ISO 10319:2015-09:	Geosynthetics – Wide-width tensile test (ISO 10319:20215).
DIN EN ISO 10320:2019-07:	Geoplastics - Identification on the construction site (ISO 10320:2019).
DIN EN ISO 10321:2008-08:	Geosynthetics – Tensile test for joints/seams by wide-width strip method (ISO 10321:2008).
DIN EN ISO 10772:2012-12:	Geotextiles – Test methods for determining the filter resistance of geotextiles in turbulent flow conditions (ISO 10772:2012).
DIN EN ISO 11058:2019-09:	Geotextiles and geotextile-related products – Determination of water permeability characteristics normal to the plane, without load (ISO 11058:2019).
DIN EN ISO 12956:2020-05:	Geotextiles and geotextile-related products – Determination of the characteristic opening size (ISO 12956:2019).
BauPVO (2011)	Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC. Avail-

able online at https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=celex%3A32011R0305, last checked on 12/03/2026.

BauPVO (2024) Regulation (EU) 2024/3110 of the European Parliament and of the Council of 27 November 2024 laying down harmonised rules for the marketing of construction products and repealing Regulation (EU) No 305/2011. Available online at https://eur-lex.europa.eu/legal-content/DE/TXT/HTML/?uri=OJ:L_202403110 last checked on 19/01/2026.

MAR (2008) Bundesanstalt für Wasserbau [Federal Waterways Engineering and Research Institute] (ed.) (2008): BAWMerkblatt Application of standard constructions for embankments and sole protections on inland waterways (MAR). Karlsruhe: Federal Institute for Hydraulic Engineering (BAW leaflets, recommendations and guidelines).

RPG (2026) Bundesanstalt für Wasserbau [Federal Waterways Engineering and Research Institute] (ed.) (2026): BAW Guideline Geoplastics Testing in Transport Hydraulic Engineering. Karlsruhe: Federal Institute for Hydraulic Engineering (BAW leaflets, recommendations and guidelines).

VkBl (2025) Federal Ministry of Transport: Introduction of a framework for assessing the release of environmentally relevant substances from geosynthetics in transport infrastructure projects. In: Official Gazette of the Federal Ministry of Transport of the Federal Republic of Germany (VkBl.) 79 (15), pp. 395–407.

Annex (informative)

Annex 1: Design-related requirements for geotextiles or geotextile-related products used in hydrodynamically loaded slope and riverbed stabilisation works in accordance with MAR

Annex 2: Area of validity of soil types A, B and C

Note:
Error: Reference source not found is only part of the contract if reference is made to it in the contract document. Error: Reference source not found serves to explain Error: Reference source not found.

Design-related requirements for geotextiles or geotextile-related products used in hydrodynamically loaded slope and riverbed stabilisation works in accordance with MAR

1. Filter effectiveness according to RPG

under a permeable top layer						
1	2	3	4	5	6	7
Item No	Function [1]	Agronomic category of the soil subsoil (compensation layer)	Thickness the filter layer (D) according to DIN EN ISO 9863-1:2020-04	permissible soil passage (mechanical filter effectiveness)		K_{10}-value of ground-occupied geotextile Geotextile [5] (hydraulic filtration performance)
				Total mass of soil passage (M_g)	Soil passage in final test phase ($M_{,L}$)	
			(mm)	(g/184 cm²) [2]	(g/184 cm²) [2]	(m/s)
1	F	Soil type A	D ≥ 4.5	M_G < 300 [3]	M_L < 30	$k_{10} \geq 1.0 \cdot 10^{-3}$
3	F	Soil type B	D ≥ 4.5			$k_{10} \geq 1.0 \cdot 10^{-4}$
4	F	Soil type C	D ≥ 6.0			$k_{10} \geq 1{,}0 \cdot 10^{-7}$
5	T	Cohesive soils with: $c_u \geq 10$ kN/m² and $I_P \geq 0.15$ [4] (e.g. sound seal)	no requirement	the requirements apply for soil type A, B or C (free choice)		the requirements apply for soil type C
6	T	Cohesive soils with: $c_u < 10$ kN/m² or $I_P < 0.15$ [4]	no requirement	the requirements apply for soil type C		
under impermeable cover (sealing)						
			(mm)			
7	T	regardless of soil type subsoil	D < 6.0	the requirements apply for soil type B		

[1] Use as filter layer (F) (function filtering and separating) or as separation layer (T) (function separating)

[2] Grams, relative to the size of the test area

[3] 300 g / 184 cm² = 16.3 kg/m²

[4] if $c_{,u}$ and I_P are unknown, all requirements for soil type C apply

[5] Permeability at 10°C at h = 50 mm calculated according to RPG from the water permeability normal to plane V_{H50} [m/s] according to DIN EN ISO 11058:2019-09 and layer thickness D [m] according to DIN EN ISO 9863-1:2020-04:

$$k_{10} = \frac{V_{H50} \cdot D}{R_{T10} \cdot h}$$

with temperature correction factor R_{T10} = 1.30 [-]

RPG: BAW Guidelines for the examination of geosynthetics in water transport engineering

2. Material requirements

Item No	Material property			Top layer construction				
				loose Armourstone	poured Armourstone	permeable and impermeable surfacing		
						G < 3 kN/m²	G > 3 kN/m²	
1	Tensile strength according to DIN EN ISO 10319:2025-02 longitudinal and transverse		kN/m	≥ 12.0	≥ 12.0	≥ 9.0[1)]	≥ 12.0	
2	Abrasion resistance to RPG	Characteristic opening width (O_{90}) according to DIN EN ISO 12956:2020-05 after abrasion stress	µm	< 140 per cent of the value obtained in the basic test without abrasion stress)	—	— [2)]		
		Tensile strength according to DIN EN 10319:2025-02 after abrasion stress (residual tensile strength)	kN/m	≥ 9.0	—	— [2)]		
				loose or partially encapsulated armourstone of class [3)]			Fully encapsulated armourstones	
				CP 90/250 30 kg [4)]	LMB 5/40 60 kg [4)]	LMB 10/60 90kg [4)]	all stone classes [5)]	
3	Penetration resistance (drop energy) according to RPG		Nm	≥ 600	≥ 1200	≥ 1800	≥ 600	—

[1)] for underwater installation ≥ 12.0 kN/m

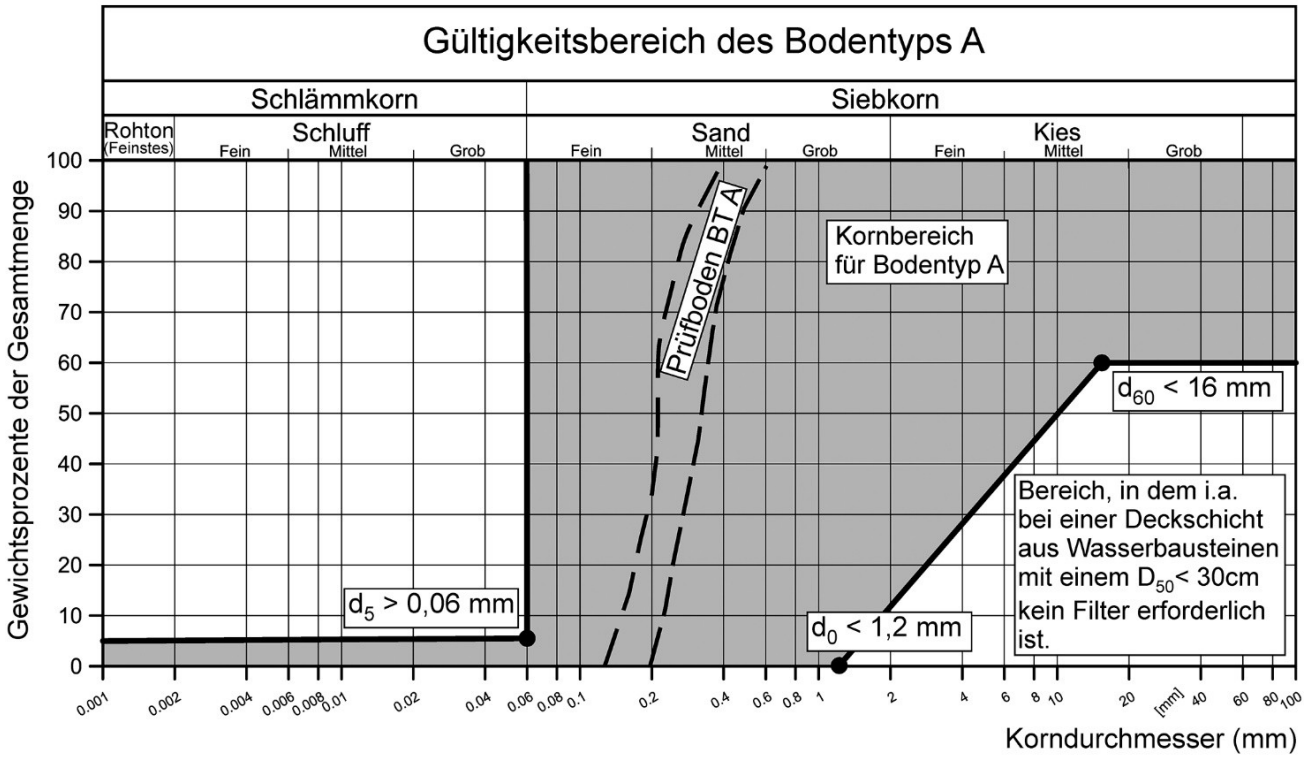
[2)] for concrete composite blocks as for loose armourstones

[3)] Stone classes according to DIN EN 13383-1:2002-08, for size classes up to a raw density $\rho_s = 3.00$ Mg/m³.

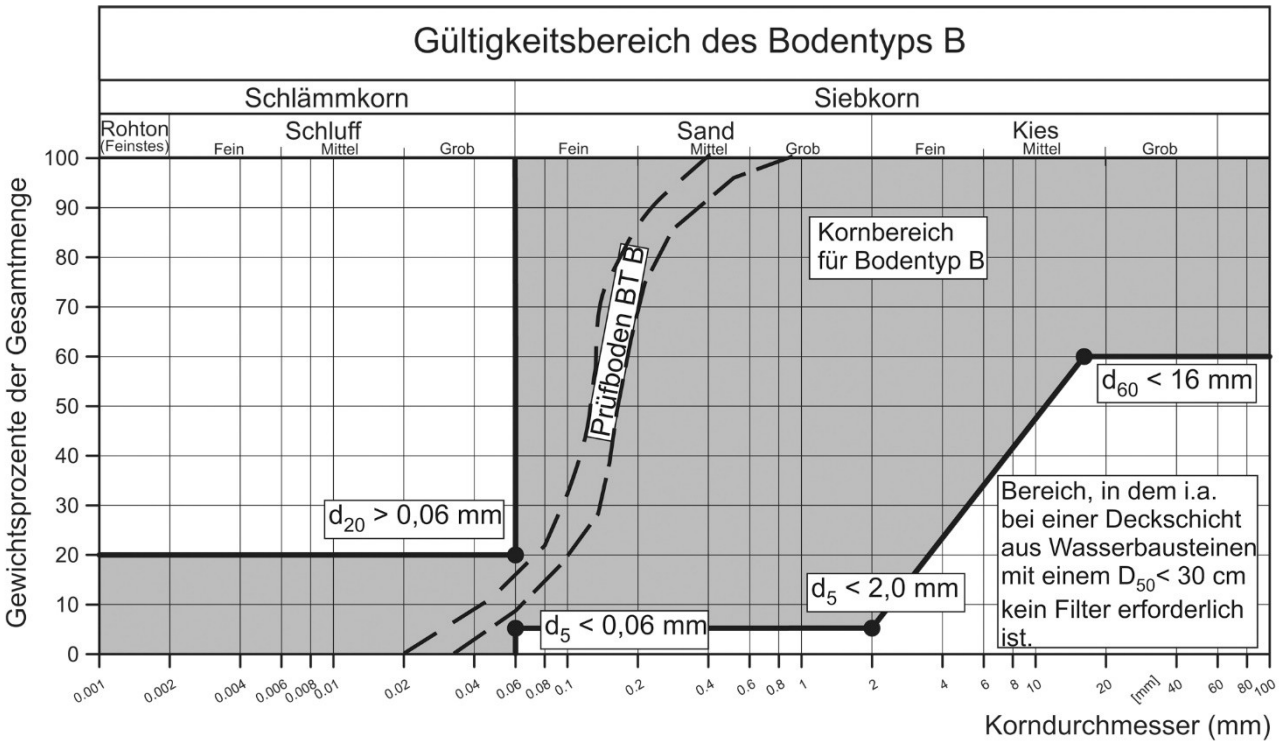
[4)] mass of a stone of the respective stone class, which is decisive for the penetration test, taking into account the permissible overgrain proportions (there is a high probability that 90 % of the stones by mass will not be exceeded). The potential energy is equivalent to that of a stone of this mass falling from a height of 2 metres.

[5)] for fully cast armourstones, the drop energy corresponds to the impact of a brick of class LMB 10/60 (90 kg) when installed under water.

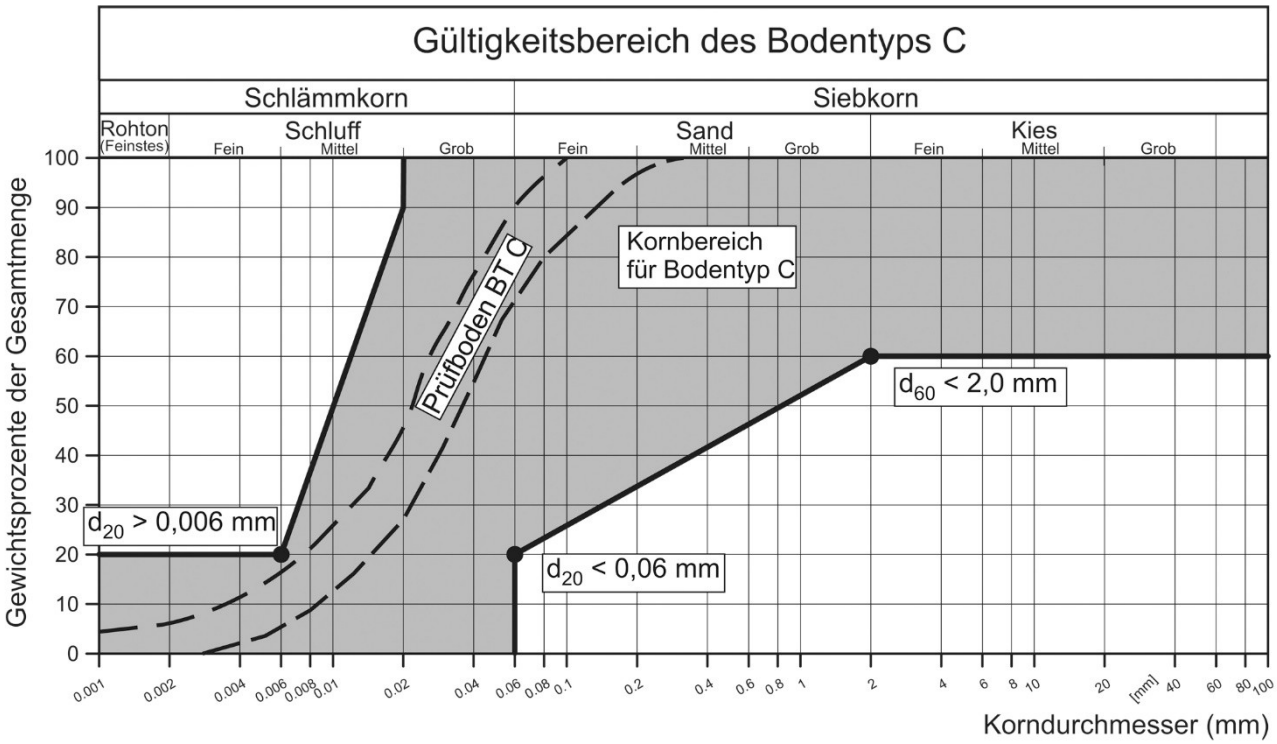
RPG: BAW Guideline for the Testing of Geotextiles in Transport and Water Engineering
DIN EN ISO 10319:2025-02: Geotextiles; Tensile test on a wide strip
DIN EN 13383-1:2002-08: Armour stones – Part 1: Requirements



Gewichtsprozente der Gesamtmenge	Weight percentage of the total quantity
Gültigkeitsbereich des Bodentyps A, Schlämmkorn, Siebkorn	Area of validity of soil type A, slurry grain, sieve grain
Rohton (Feinstes), Schluff, Fein, Mittel, Grob, Sand, Kies	Raw clay (very fine), silt, fine, medium, coarse, sand, gravel
Prüfboden BT A, Kornbereich für Bodentyp A	Test soil BT A, particle size range for soil type A
Bereich, in dem i.a. bei einer Deckschicht aus Wasserbausteinen mit einem D 50<-30 cm kein Filter erforderlich ist.	Area in which a filter is not required i.a. in the case of a surface layer of armourstones with a D 50 & L; -30 cm.
Korndurchmesser (mm)	Grain diameter (mm)



Gewichtsprozente der Gesamtmenge	Weight percentage of the total quantity
Gültigkeitsbereich des Bodentyps B, Schlämmkorn, Siebkorn	Area of validity of soil type B, slurry grain, sieve grain
Rohton (Feinstes), Schluff, Fein, Mittel, Grob, Sand, Kies	Raw clay (very fine), silt, fine, medium, coarse, sand, gravel
Prüfboden BT B, Kornbereich für Bodentyp B	Test soil BT B, particle size range for soil type B
Bereich, in dem i.a. bei einer Deckschicht aus Wasserbausteinen mit einem D 50<-30 cm kein Filter erforderlich ist.	Area in which a filter is not required i.a. in the case of a surface layer of armourstones with a D 50 & L; -30 cm.
Korndurchmesser (mm)	Grain diameter (mm)



Gewichtsprozente der Gesamtmenge	Weight percentage of the total quantity
Gültigkeitsbereich des Bodentyps C, Schlämmkorn, Siebkorn	Scope of soil type C, slurry grain, sieve grain
Rohton (Feinstes), Schluff, Fein, Mittel, Grob, Sand, Kies	Raw clay (very fine), silt, fine, medium, coarse, sand, gravel
Prüfboden BT C, Kornbereich für Bodentyp C	Test soil BT C, particle size range for soil type C
Bereich, in dem i.a. bei einer Deckschicht aus Wasserbausteinen mit einem D 50<-30 cm kein Filter erforderlich ist.	Area in which a filter is not required i.a. in the case of a surface layer of armourstones with a D 50 & L; -30 cm.
Korndurchmesser (mm)	Grain diameter (mm)