

# RECOMMENDATION

VS 7, 14.10.2020

for the implementation of the supervision and  
certification of geotextiles, geotextile-related products  
and geosynthetic barriers,  
approved according to the European  
methods of verification of conformity  
System 2+

IVG Industrieverband Geokunststoffe e.V.

**IVG.**

## Foreword

The European identification standards for geosynthetics provide for a different system of factory production control (FPC) and external monitoring from that which has to date been usual in Germany. The recommendation presented here for a voluntary quality surveillance of geosynthetics aims to present a transparent process that meets the requirements of third parties on the manufacturers of geosynthetics in order to achieve an increase in mutual trust.

### 1. Scope

This recommendation applies to the implementation of monitoring and certification, by means of an ivg Product Certificate, of geotextiles, geotextile-related products and geomembranes (henceforth collectively "geosynthetics") for which System 2+ is stipulated for proof-of-compliance procedures. It regulates the handling of sampling, testing of material samples and certification. In this context, part of the testing to be carried out by the manufacturer's FPC (factory production control) is performed by independent test laboratories in accordance with Section 8.

For the area covered by the ZTV E-StB 17 (Additional technical Conditions of Contract and Guidelines for Earthworks in Road Construction issue 2017), a certification to the contracting authority in accordance with this recommendation as proof a voluntary monitoring by the manufacturer or supplier of the material equivalent to an acceptance test on incoming materials in accordance with section 3.3.4.3 of the ZTV E-StB 17 can be presented.

### 2. Principles

The European standards define the proof-of-conformity procedure in Annex ZA. System 2+ consists of the elements indicated in the following table.

| Proof-of-conformity procedures |                                          | Responsibility (tasks) of the manufacturer                     | Role of the notified body                                                                                                                                       |
|--------------------------------|------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2+                             | Manufacturer's declaration of conformity | - initial testing of the product (Type test)<br>Continuous FPC | Certification of the FPC on the basis of<br><br>- initial inspection of the factory and the FPC<br><br>- ongoing monitoring, assessment and approval of the FPC |

In this system, regular sampling and material testing are solely carried out under the responsibility of the manufacturer. In the 2+ system, there are no fixed requirements concerning the qualification and competence of the material-testing bodies. A procedure is set out in this recommendation, in which for certain properties a regular sampling is carried out by the approved inspection bodies. The material testing for these samples must be done in laboratories in accordance with Section 8.

The test results are attributed to the FPC.

### 3. Terminology

Inspection body (I-body), is the approved body appointed by the manufacturer in accordance with these recommendations for the monitoring of the product range and according to the requirements of the Construction Products Regulations (see Annex A).

Certification body (C-body), is the approved body appointed by the manufacturer for the certification of the product range according to the requirements of the Construction Products Regulations (see Annex A).

It is possible for both inspection and certification to be undertaken by a single body.

Factory production control (FPC) is the continuous monitoring and control of production to be carried out by the manufacturer for each production site, by which it ensures that the geosynthetic products it produces comply with the provisions of the relevant European standards.

Test laboratory is a body that meets the requirements of Section 8.

Certificate describes the confirmation by the certification body of the certification of the FPC system according to the relevant European standard (Annex ZA). ("Certificate of conformity of the FPC" or "Certificate of Conformity of the Factory Production Control".)

Product certificate describes the confirmation by the certification body of the application of this recommendation; a product certificate is valid only in conjunction with a valid certificate (conformity certificate of the FPC).

Standard products are products which are regularly produced.

A product group is a group of products from a manufacturer that are made from the same raw materials and using the same technology. The product types typically differ by their mass per unit area and their tensile strength. Special products are individual product types from a manufacturer's product group that are made specifically for individual deliveries. (for example, project-related products)

Combination products are products that are manufactured from at least two components (standard and/or special products).

A product group of combination products is a group of a manufacturer's combination products. The previously specified terminology applies to the individual components of a combination product.

### 4. Sampling procedure

As a rule, the inspection body collects at the factory without prior notice and based on statistical principles (DIN EN ISO 9862) samples of production material intended for delivery. The sampling is generally done as part of the initial inspection of the factory and thereafter as part of the ongoing monitoring.

At least 5 rolls of each material to be sampled must be available from products produced after the last sampling procedure.

The samples must be unmistakably marked. The person sampling must produce and sign off a sampling protocol, and this must be countersigned by the manufacturer or its representative. The protocol must contain at least the following information:

- a) manufacturer and factory
- b) location of sample extraction
- c) where necessary, the amount of stock (from which the samples were taken)
- d) number or quantity of samples
- e) designation of the construction product according to the relevant technical specifications
- f) manufacturer's labelling of construction products
- g) sampler's labelling of samples
- h) where necessary, the properties to be tested
- i) Place and date
- j) Signatures

The above provisions apply analogously in the case of a product sold on the market by a dealer under its own name.

In specific cases, samples can be taken at a construction site in the presence of the manufacturer, dealer or the project supervisor or their representatives. It must be ensured that the samples originate from the delivery of the manufacturer or dealer being monitored. The manufacturer or dealer must be given an opportunity to be represented at the sampling.

## **5. Scope of testing**

Sampling and testing take place at the beginning of a regular monitoring once every six months (if the product has been produced in that half-year). If in four consecutive monitoring checks no negative result (negative result = B Sample failed) is recorded, the number of monitoring checks for the product is reduced to one per calendar year. This applies until a negative result for the product is recorded. In this case, the frequency is reset to its initial value.

Products declared defective by the manufacturer or exempt by the inspectors are only excluded from sampling if they are segregated and clearly marked as such.

The scope of testing and the properties to be tested under this recommendation are set out in Tables 1 and 2 of Annex B.

## **6. Sample testing**

The product tests must be carried out in a laboratory according to Section 8. A test certificate giving the results of the tests must be prepared and forwarded to the manufacturer and the inspection body.

## **7. Evaluation of test results**

The inspection body assesses whether the results comply with the requirements of the relevant European standard. In addition, the inspection body must investigate whether the results are in plausible agreement with the manufacturer's results obtained within the framework of the FPC. If a test result does not meet the requirements, the inspection body may immediately arrange for new sampling and testing of the affected products before the results are finally evaluated.

Tests performed on a product type that represents a product group can be applied to the test results for each of the individual products. This applies only to tests marked with "EP" in Annex B, Tables 1 and 2.

If the requirements are not fulfilled or are not in plausible agreement with the manufacturer's own results, the inspection body requests the manufacturer to remedy the offending defect within a reasonably short period given the scope and nature of the inspected construction product. After this period, a special inspection is carried out with new sampling.

The inspection body must inform the certification body of the test results and the performance of special inspections.

The evaluation of the test results is based on the following rules:

#### A-sample

- if the results of the A-sample are *within the tolerances declared by the manufacturer*, the product will be classed as *compliant*.
- if at least one result of the A-sample is *outside the 1.0 x tolerance* of the manufacturer, but *within the 1.5 x tolerance*, the B-sample must be tested, whereby all the tests required by the ivg recommendation in the bi-annual tests are repeated.
- if at least one test result is *outside the 1.5 x tolerance*, two additional rolls of the product (C, D) are selected by an external body for the purpose of a *special inspection*. Prior to this selection, the manufacturer may change the values in the declarations of performance of its products.

#### B-Sample:

- if the results of the B-sample are *within the tolerances declared by the manufacturer*, the product is classed as *compliant*.
- if at least one result of the B-sample is *outside the 1.0 x tolerance*, two additional rolls of the product (C, D) are selected by an external body for the purpose of a *special inspection*.

Prior to this selection, the manufacturer may change the values in the declarations of performance of its products. Special inspection, C-sample:

- if the results of the C-sample are *within the tolerances declared by the manufacturer*, the product is classed as *compliant*.
- if at least one result of the C-sample is *outside the 1.0 x tolerance* of the manufacturer, but *within the 1.5 x tolerance*, the D-sample must be tested, whereby all the tests required by the ivg recommendation in the bi-annual tests are repeated.
- if at least one result of the C-sample is *outside the 1.5 x tolerance*, the product is rated as *non-compliant* and an existing ivg-certificate must be withdrawn by the certification body.

#### Special inspection, D-sample:

- if the results of the D-sample are *within the tolerances declared by the manufacturer*, the product is classed as *compliant*.
- if at least one result of the D-sample is *outside the 1.0 x tolerance*, the product is rated as *non-compliant* and an existing ivg-certificate must be withdrawn by the certification body.
-

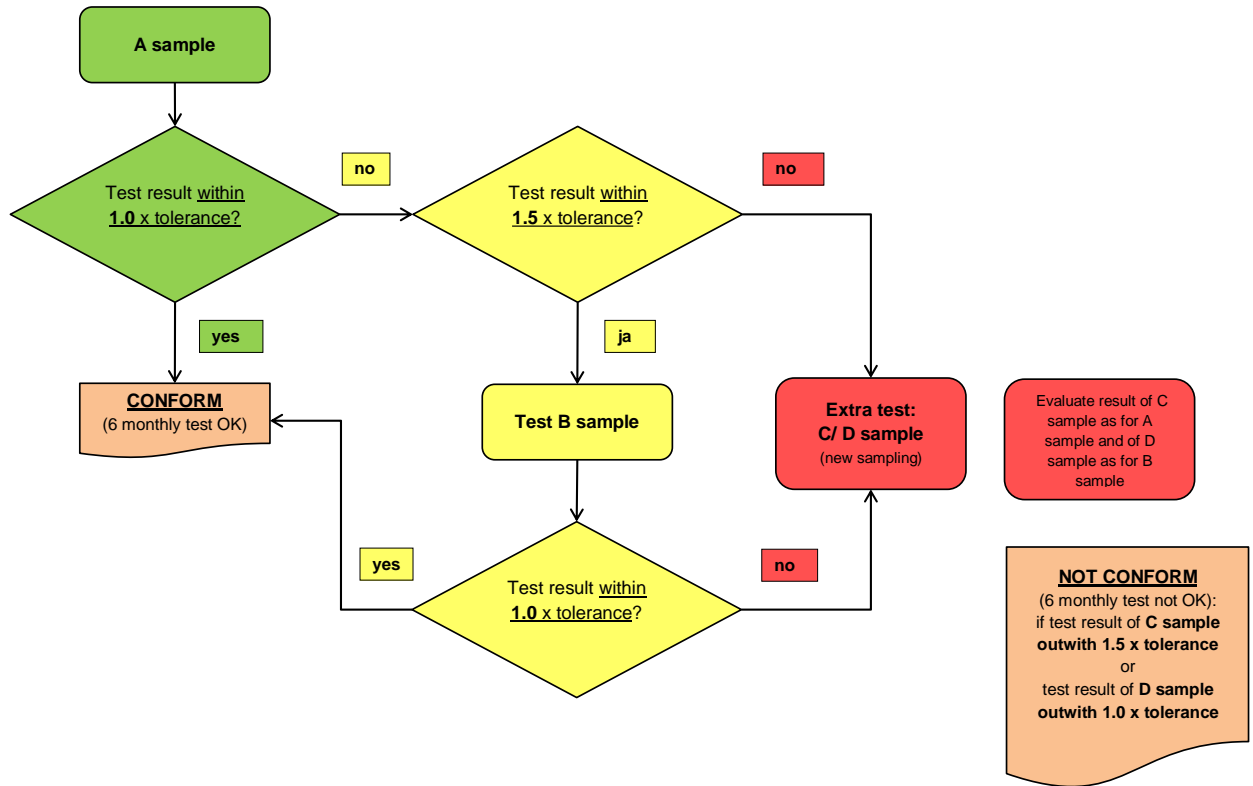


Figure 1: Flow chart for the evaluation of the test results

NOTE: *In the case of serious non-conformities which could represent a threat to public safety and order, an approved certification body (see Section 3) is obliged to notify the competent authorities without delay.*

## **8. Test Laboratory**

Product testing within the meaning of this recommendation is to be performed by testing laboratories that are impartial and have the necessary personnel, the necessary equipment and the necessary professional and technical competence. These conditions shall be deemed to be met if an accreditation according to DIN EN ISO/IEC 17025 for the testing of the properties listed in Annex B (Tables 1 and 2) marked with "+, x, E, EP" properties is granted.

Where a laboratory has no accreditation for specific test methods, these tests may be subcontracted to other laboratories, provided that these have the appropriate accreditations.

## **9 ivg.Product Certificate**

On the basis of the reports submitted by the inspection body, the certification body decides conclusively on the granting or maintenance of an ivg.Product Certificate. Here, it takes into account test certificates on the results of material tests conducted at the behest of an inspection body. The ivg.Product Certificate confirms that this recommendation has been applied in the handling of inspection and certification. The ivg.Product Certificate is valid only in conjunction with a valid CE certificate of conformity of the FPC.

The ivg.Product Certificate remains valid for a maximum of one year from the date of issue, or until it is declared invalid by the certification body. It expires immediately if decisive technical specifications and/or the conditions of manufacture of the construction product are modified. The ivg.Product Certificate is a verification of compliance according to DIN 18200:2000-05

In case of disputes between manufacturers/dealers and the certification body, a technical commission can be convened. The commission consists of an equal number of representatives of certification bodies and IVG members. It shall be chaired by a representative of the Federal Highway Highway Institute (BASt). Decisions are made on the basis of simple majority.

## 10. Labelling

On the basis of the ivg.Product Certificate, the manufacturer is entitled to label the construction product and all related documents with a reference to the application of this recommendation using the product quality mark of the ivg Industrieverband Geokunststoffe e. V. (Geosynthetics Industry Association), see Fig. 1.



Figure 1: Product quality mark of the IVG Industrieverband Geokunststoffe e. V.



## **Annex A**

### **Bibliography**

- [1] 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 (OJ L 88, 4.4.2011, p. 5).
- [2] List of notified bodies designated by Member States and the EFTA Countries (EEA Members) under Regulation (EU) No. 305/2011 of the European Parliament and of the Council of 9 March 2011. In: [http://ec.europa.eu/growth/tools-databases/nando/index.cfm?fuseaction=directive.notifiedbody&dir\\_id=33](http://ec.europa.eu/growth/tools-databases/nando/index.cfm?fuseaction=directive.notifiedbody&dir_id=33).
- [3] DIN 18200 Verification of compliance and conformity certificate for construction products – factory production control, external monitoring and certification
- [4] Merkblatt über die Anwendung von Geokunststoffen im Erdbau des Straßenbaus (Guideline on the Application of Geosynthetics in Road-Construction Earthworks): M Geok E: R2 – Issue 2016.
- [5] ZTVE: Additional Technical Regulations and Guidelines for Earthworks in Road Construction (FGSV)

## **Annex B**

### **Scope of testing, and properties of geosynthetics to be checked in the framework of this recommendation**

#### Initial inspection

An initial inspection is required for certification according to this recommendation. For standard products, this first inspection shall include the verification of the FPC and the sampling procedure. The scope of testing and the properties to be tested under this recommendation are set out in Tables 1 and 2 of Annex B

At the request of the manufacturer, special products are evaluated separately by the inspection body.

#### Ongoing monitoring

Ongoing monitoring is conducted every six months. Sampling and testing take place at the beginning of a regular monitoring once every six months. If in four consecutive monitoring checks no negative result is recorded, the number of monitoring checks for the product is reduced to one per calendar year. This applies until a negative result for the product is recorded. In this case, the frequency is reset to its initial value.

The scope of testing and the properties to be tested under this recommendation are set out in Tables 1 and 2 of Annex B

#### Validity

If the product group, which may include special products, is monitored annually or biannually, the certification body can issue the ivg.Product Certificate after review of the results of the FPC. This ivg.Product Certificate is re-issued annually.

An ivg.Product Certificate for a special product has a limited validity of six months.

*NOTE: The requirements and the nature, extent and frequency of the FPC are specified in the respective European standard.*

In accordance with this recommendation, samples must be taken at each factory inspection. The samples taken are tested in accordance with the following tables.

*NOTE: The test result obtained in the testing of a product type representing a product group can be applied to the respective individual products. This applies only to tests marked with "EP" in Annex B, Tables 1 and 2.*

**Scope of testing and properties of geosynthetics to be checked in the framework of this recommendation**

**Table 1: Geotextiles and geotextile-related products**

| Property                                                                    | Test procedure                  | Function         |                  |                  |                  |                  |
|-----------------------------------------------------------------------------|---------------------------------|------------------|------------------|------------------|------------------|------------------|
|                                                                             |                                 | Separation       | Filtration       | Drainage         | Reinforcement    | Protection       |
| Mass per unit area                                                          | DIN EN ISO 9864                 | +                | +                | +                | +                | +                |
| Thickness                                                                   | DIN EN ISO 9863-1               | ---              | +                | +                | ---              | +                |
| Max. tensile strength <sup>1)</sup> and elongation at max. tensile strength | DIN EN ISO 10319                | +                | +                | +                | +                | +                |
| Tensile strength of seams and joints                                        | DIN EN ISO 10321                | ---              | ---              | ---              | X                | ---              |
| Static puncture (CBR) <sup>1), 2)</sup>                                     | DIN EN ISO 12236                | +                | +                | ---              | ---              | +                |
| Tensile creep behaviour                                                     | DIN EN ISO 13431                | ---              | ---              | ---              | IP <sup>5)</sup> | ---              |
| Compressive creep behaviour                                                 | DIN EN ISO 25619-1              | ---              | ---              | I                | ---              | ---              |
| Protection efficiency of geotextiles                                        | DIN EN 13719                    | ---              | ---              | ---              | ---              | I <sup>(7)</sup> |
| Characteristic opening size                                                 | DIN EN ISO 12956                | +                | +                | ---              | ---              | ---              |
| Permeability normal to plane                                                | DIN 60500-4 or DIN EN ISO 11058 | +                | +                | ---              | I <sup>(4)</sup> | I <sup>(4)</sup> |
| Water-flow capacity in the plane                                            | DIN EN ISO 12958                | ---              | ---              | +                | ---              | ---              |
| Durability                                                                  | DIN EN 13249 et seq. Annex B    | IP <sup>6)</sup> | IP <sup>6)</sup> | IP <sup>6)</sup> | IP <sup>6)</sup> | IP <sup>6)</sup> |
|                                                                             |                                 |                  |                  |                  |                  |                  |
| Environmental loading                                                       | M Geok E Sections 6.29 and 7.7  | IP <sup>6)</sup> | IP <sup>6)</sup> | IP <sup>6)</sup> | IP <sup>6)</sup> | IP <sup>6)</sup> |

"Filtration" or "Reinforcement" is always connected with "Separation." In this case testing must be done for both.

**+** : Testing required every 6 months (/ annually in accordance with M Geok E, Annex 1.2)    **---**: Testing not required

**x:** required if joints in the direction of main load are foreseen

**I:** Report of the initial inspection required. If a product is altered in any way, the manufacturer must initiate a new product test and inform the certification authority.

**IP:** Report of the initial inspection required for a product group. If a product is altered in any way, the manufacturer must initiate a new product group test and inform the certification authority.

<sup>1)</sup> If tensile strength and puncture resistance are indicated by +, depending on the application a specific strength test is sufficient for the determination of the geotextile robustness class (tensile-strength testing for woven fabrics and composites, static puncture test for nonwovens)

<sup>2)</sup> This test cannot be used on all products, for example, not on composite materials.

<sup>3)</sup> Test can be performed on types representative of the product group

<sup>4)</sup> Not for geogrids

<sup>5)</sup> Test duration 10,000 h. With a test report after a 1,000 h test and a note that the test will continue until 10,000 h, an avg. Certificate can be issued.

<sup>6)</sup> The initial test must be carried out by an independent testing laboratory accredited according to DIN EN ISO IEC 17025. Repeat tests are required after 5 years and must follow the actual rules of CE certification. The test report shall be made available to the certification body without this having to be requested at the latest 3 months after the expiry of the 5-year period.

<sup>7)</sup> Thickness >= 2,5mm, GRK 5. According to M Geok E, Tabelle 5

**Table 2: Geosynthetic Barriers**

| Property                                                    | Types |       | Test standards                             |                                                      |
|-------------------------------------------------------------|-------|-------|--------------------------------------------|------------------------------------------------------|
|                                                             | GBR-P | GBR-C | GBR-P                                      | GBR-C                                                |
| Thickness                                                   | +     | ---   | DIN EN ISO 9863-1                          | ---                                                  |
| Mass per unit area                                          | ---   | +     | DIN EN 1849-2                              | DIN EN 14196                                         |
| Melt Flow Rate (MFR)                                        | +     | ---   | DIN EN ISO 1133-1                          | ---                                                  |
| Density                                                     | +     | ---   | DIN EN ISO 1183-1                          | ---                                                  |
| Permeability (liquid tightness)                             | I     | +     | DIN EN 14150                               | DIN EN 16416                                         |
| Swelling behaviour <sup>3)</sup>                            | ---   | +     | ---                                        | ASTM D 5890                                          |
| Tensile strength and Extension at tensile strength          | +     | +     | DIN EN ISO 527-1, -3<br>Type 5, 100 mm/min | DIN EN ISO 10319                                     |
| Push-through force                                          | +     | +     | DIN EN ISO 12236                           | DIN EN ISO 12236                                     |
| Burst strength                                              | I     | ---   | DIN EN 14151                               | ---                                                  |
| Tear-propagation strength                                   | +     | ---   | DIN ISO 34-1,<br>Method B, without notch   | ---                                                  |
| Foldability at low temperature                              | I     | ---   | DIN EN 495-5                               | ---                                                  |
| Dimensional stability                                       | +     |       | DIN 53377                                  | ---                                                  |
| Resistance to weathering                                    | IP    | ---   | DIN EN 13361 et seq.<br>DIN EN 12224       | 1)                                                   |
| Microbiological resistance                                  | IP    | IP    | DIN EN 13361 et seq.<br>DIN EN 12225       | DIN EN 13361 et seq.                                 |
| Resistance to oxidation                                     | IP    | IP    | DIN EN 13361 et seq.<br>DIN EN 14575       | DIN EN 13361 et seq.<br>DIN EN 13249 et seq. Annex B |
| Resistance to stress cracking                               | +     | +     | DIN EN 13361 et seq.<br>DIN EN 14576       | DIN EN 13361 et seq. <sup>2)</sup> DIN EN            |
| Resistance to leaching                                      | IP    | IP    | DIN EN 13361 et seq.<br>DIN EN 14415       | DIN EN 13361 et seq. DIN EN                          |
| Montmorillonite content (methylene blue test) <sup>3)</sup> | ---   | +     | ---                                        | VDG P 69                                             |
| Resistance to wetting-drying cycles                         | ---   | IP    | ---                                        | DIN CEN/TS 14417                                     |
| Resistance to freeze-thaw cycles                            | ---   | IP    | ---                                        | DIN CEN/TS 14418                                     |
| Resistance to root penetration                              | IP    | IP    | DIN EN 14416                               | DIN CEN/TS 14416                                     |
| Environmental loading                                       | IP    | IP    | M Geok E Sections 3.1, 6.29 and 7.7        | M Geok E Sections 3.1, 6.29 and 7.7                  |

GBR-P Polymeric geosynthetic barrier, GBR-C: Clay geosynthetic barrier

+ : Six-monthly testing required    ---: Testing not required

**I:** Report of the initial inspection required. If a product is altered in any way, the manufacturer must initiate a new product test and inform the certification authority.

**IP:** Report of the initial inspection required for a product group. If a product is altered in any way, the manufacturer must initiate a new product group test and inform the certification authority.

- 1) Since geosynthetic clay liners must always be covered immediately, this condition can be waived.
- 2) Valid for a GBR-C only in combination with a GBR-P.
- 3) Only the clay filling of a GBR-C is tested

The undersigned associations and companies hereby commit to recommending the application of this agreement.

Signed in the original and archived at the IVG.

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| <b>Issue date:</b> | <b>Issue number:</b> | <b>Alterations:</b>                                                                                                                                                                       |
|--------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>24-06-2009</b>  | Original             | Identified and signed                                                                                                                                                                     |
| <b>09-11-2009</b>  | vs. 1                | Adaptation of Table 2 GMB: Mass: +; Inner shear strength: --;                                                                                                                             |
| <b>15-01-2010</b>  | vs. 2                | Table 2, Note 1: Test specimen type 5A<br>Product quality mark new image, postal code and company name Colbond and Synteen adapted, postal code IVG modified.                             |
| <b>21-09-2010</b>  | vs. 3                | Text under Table 2 altered: „+“ :six-monthly testing required.                                                                                                                            |
| <b>01-01-2016</b>  | vs. 4                | Frequency of testing, tables and texts modified to reflect the changes in M geok E (2016), company name Colbond changed to Bonar                                                          |
| <b>01-09-2016</b>  | vs. 5                | Text adaptations to the amended European Construction Products Regulation; signed by Frank GmbH, Maccaferri Deutschland GmbH and St. Gobain Adfors                                        |
| <b>20-03-2018</b>  | vs. 6                | Revision of tables 1 and 2 after the introduction of the new product standards. Members updated to current status Additions under 5. Scope of the tests and 7. Evaluation of test results |

|                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>23-10-2018</b> | vs. 6a | Revision of amendments in table 1. Change under 4. Sampling procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>03-11-2019</b> | vs. 6b | Revision in table 1. In row „Protection efficiency of geotextiles“ amendment 7: Thickness $\geq 2,5$ mm, GRK 5. According to M Geok E, Tabelle 5<br><br>Revision in table 2: addition to explanation to „I“: „If a product is altered in any way, the manufacturer must initiate a new product test and inform the certification authority.<br><br>Revision in table 2: addition to explanation to „IP“: „If a product is altered in any way, the manufacturer must initiate a new product-group test and inform the certification authority |
| <b>20-07-2020</b> | vs 6c  | Revision in table 1, ammendment 6: Repeat tests ... must follow the actual rules of CE certification                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>14-10-2020</b> | vs 7   | BontexGeo as new member added; change of addresses from Maccaferri, TenCate, SG Adfors                                                                                                                                                                                                                                                                                                                                                                                                                                                       |