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TECHNICAL REQUIREMENTS

PTV 881

BENOR

TECHNICAL REQUIREMENTS

FOR

DROP ON MATERIALS FOR ROAD MARKING

COPRO - A not-for-profit impartial product control body for the construction industry

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FOREWORD

This document contains the technical requirements for drop on materials. The requirements included in these PTV respond to needs established by the various interested parties according to local customs.

The customer and/or user can require conformity of drop on material to the requirements of the PTV 881 to be demonstrated by way of a lot control.

The conformity of drop on materials can also be certified under the voluntary BENOR mark. With the BENOR mark, the supplier has to declare the performance of drop on materials for all the characteristics relevant to guaranteeing the application and limit values imposed by this PTV 881.

BENOR certification is based on full product certification in accordance with NBN EN ISO/IEC 17067.

The CE mark applies to drop on materials coming under the area of application of EN 1423. Pursuant to European Regulation (EU) no. 305/2011 (Construction Product Regulation – CPR) dated 2011-03-09, the CE mark relates to the essential characteristics of drop on material specified in EN 1423, Annex ZA, Table ZA.1.1 – ZA.1.4.

The CE mark is the only mark to declare that drop on material complies with the declared performance of the essential characteristics covered by EN 1423.

1 INTRODUCTION

1.1 TERMINOLOGY

1.1.1 Definitions

Drop on materials	Glass beads, anti-skid aggregates and mixtures of the two, which are applied as drop on materials on road marking products.
Drying time accelerator	Solid material accelerating the drying time of the water born paint.
Mixture of drop on materials and a drying time accelerator	Drop on material mixed with drying time accelerator in a given proportion.
Producer	The party responsible for producing drop on materials.
Product	The result of an industrial activity or process. Meant by this in the context of these technical requirements is a drop on material. It is the collective term for all product articles to which this PTV apply.
Product article	Set of units of a product with the same characteristics and performance that are produced in a specific manner and comply with one technical data sheet.
Product family	Group of product articles that are manufactured by a producer, for which the results on a random product article of the family apply to all other product articles of the family. The producer can propose a list of product articles that will be part of one family for one or more different properties. The classification in families can be different for different properties.
Product type	Group of manufactured goods with similar characteristics. One product may be divided into different product types on the basis of the applicable reference document, property categories, application, et cetera. The product types for drop on materials are: - Drop on glass beads; - Transparent antiskid aggregates; - Non-transparent antiskid aggregates; - Mixtures of glass beads and antiskid aggregates; - Mixtures of glass beads with different refractive indices; - Mixtures of drop on materials and drying accelerator.
Production unit	Technical facility/facilities tied to a geographical location used by a producer and in which one or more products are made.
Reference document	Document specifying the technical characteristics with which the materials, equipment, raw materials, production process and/or the product must comply (a standard, specification or any other technical specification).

Supplier	The party having to ensure that drop on material complies with the technical requirements. This definition can apply to the producer, the dealer, the importer or the distributor.
Surface treatment	Coating applied to the surface of the glass beads to enhance their properties.
Test	Technical action comprising the determination of one or more properties of a raw material or product according to a specified process.
Type testing	A series of checks for initially establishing (initial type testing) or, possibly, periodically confirming (repeat type testing) the characteristics of a product article and its conformity.

1.1.2 Abbreviations

PTV	Technical Requirements

1.1.3 References

EN 1423	Road marking materials - Drop on material - Glass beads, antiskid aggregates and mixtures of the two
EN ISO 787-9	General methods of test for pigments and extenders - Part 9 : Determination of pH value of an aqueous suspension (ISO 787-9:2019)
ISO 2591-1	Test sieving - Part 1 Methods using test sieves of woven wire cloth and perforated metal plate
ISO 7724-2	Paints and varnishes - Colorimetry - Part 2 : Colour measurement
PTV 883	Technical requirements for paints for road marking
PTV 884	Technical requirement for thermoplastics for road marking
PTV 885	Technical requirement for cold plastics for road marking
PTV 888	Technical requirement for preformed road markings

This PTV may contain dated and undated references. Only the cited version applies to dated references. The latest version always applies to undated references, including any errata, addenda and amendments.

Of all the EN standards referred to in these requirements, the corresponding Belgian publication NBN EN applies in each case. COPRO can allow the use of a publication other than the Belgian one provided its content is identical to that of the Belgian publication.

1.2 AVAILABILITY OF THIS PTV

The current version of this PTV is available free of charge on the COPRO website.

A paper version of this PTV can be ordered from COPRO. COPRO has the right to charge for this.

No changes may be made to the original PTV approved by the sectoral commission and/or confirmed by the Management body of COPRO.

1.3 STATUS OF THIS PTV

1.3.1 Version of this PTV

This PTV concerns version 6.0, which replaces version 5.0.

1.3.2 Approval of this PTV

This PTV was approved by the Sectoral Commission on the 30th of September 2024.

1.3.3 Confirmation of this PTV

This PTV was ratified by the Management Body of COPRO on the 3rd of December 2024.

1.3.4 Registration of this PTV

This PTV was submitted to BENOR non-profit organisation on the 9th of December 2024.

1.4 HIERARCHY OF RULES AND REFERENCE DOCUMENTS

1.4.1 Legislation

If certain rules contained in this PTV are inconsistent with applicable law, the rules arising from the legislation shall prevail. It is the responsibility of the supplier to monitor this and report any contradictions to COPRO in advance.

1.4.2 Directives concerning health and safety

If certain technical requirements are inconsistent with the directives concerning health and safety, such directives shall prevail. It is the responsibility of the supplier to monitor this and report any contradictions to COPRO in advance.

1.4.3 Tender documents

If certain rules from the applicable tender document are inconsistent with these technical requirements, the supplier can report this to COPRO.

1.5 QUESTIONS AND COMMENTS

Questions or comments concerning these technical requirements are directed to COPRO.

2 CONTEXT OF TECHNICAL REQUIREMENTS

2.1 PTV REDACTION

2.1.1 Redaction of this PTV

These technical requirements for the drop on materials are drawn up by the Sectoral Commission road marking materials of COPRO.

2.2 OBJECTIVES

2.2.1 Purpose of this PTV

2.2.1.1 The aim of this PTV is to specify requirements for the drop on materials used for road marking.

2.2.1.2 The requirements included in this PTV are in accordance with the harmonised standard EN 1423 and the rules for the CE mark applicable on the basis of this harmonised standard. The requirements arising from this PTV contain, where necessary, supplements for the correct and sustainable use of drop on material.

2.3 SCOPE

2.3.1 Subject of these technical requirements

2.3.1.1 The subject of these technical requirements are the drop on materials: glass beads, anti-skid aggregates, and the mixture of the two, which are applied as drop-on materials on road markings products (i.e. paints, drop on materials and thermoplastics) and the mixtures of above mentioned drop on materials with drying accelerators.

The different product types of drop on materials are:

- Drop on glass beads;
- Transparent antiskid aggregates;
- Non-transparent antiskid aggregates;
- Mixtures of glass beads and antiskid aggregates;
- Mixtures of glass beads with different refractive indices;
- Mixtures of drop on materials with drying accelerators.

2.3.1.2 The area of application of this PTV is entirely or partially covered by the intended use included in the harmonised standard EN 1423. This PTV imposes additional application requirements and/or provisions for an area of application that is more specifically defined or delineated.

The requirements included in this PTV for the drop on materials for the road marking respond to needs determined by the various interested parties according to local construction technologies and customs.

The effective performance of a drop on material in a road marking assembly can be evaluated on Road trials according to G0025. The performance test on a road marking assembly is a requirement for the base materials (see PTV 883, PTV 884, PTV 885 or PTV 888), The ATG attestations of fitness for use of these assemblies mention the used drop on material, surface treatments and dosage.

2.3.2 Circulars

COPRO can supplement this PTV with one or more circulars forming an integral part of this PTV.

2.4 REFERENCE DOCUMENTS

2.4.1 Product standards

The applicable product standard is EN 1423.

2.4.2 Tender documents

The tender document(s) can refer to this PTV 881.

2.4.3 Test methods

The applicable test method(s) are mentioned in chapter 3.

2.4.4 Other

Other applicable reference documents are mentioned in clause 1.1.3.

3 REQUIREMENTS

3.1 PRODUCTION UNIT AND EQUIPMENT

3.1.1 Production unit

3.1.1.1 The production unit meets the requirements of the applicable reference documents.

The production unit (in its entirety and all its parts) is presumed to comply with all the applicable laws concerning the environments, operation, economic, et cetera.

3.1.2 Production equipment

The supplier has equipment suitable for production according to the reference documents.

3.2 RAW MATERIALS

The supplied glass beads and antiskid aggregates used for the production of glass beads, mixtures of glass beads and antiskid aggregates, mixtures of glass beads with different refractive indices or mixtures of drop on materials with drying time accelator, comply to clauses 3.3, 3.4 or 3.5.

3.3 DROP ON GLASS BEADS

3.3.1 General

3.3.1.1 Drop on glass beads meet the requirements set out in clauses 3.3.2 to 3.3.7.

3.3.1.2 The supplier shall in each case declare the performance for the characteristics set out in clauses 3.3.2 to 3.3.7 for the glass beads for the use as drop on materials for road marking. If it concerns an essential characteristic, the supplier shall declare this on his Declaration of Performance.

3.3.1.3 Drop on materials can be coated to enhance their properties (examples given: floatation, the improvement of the adherence, coating by the polymerization initiators or any other surface treatments). As the effectiveness of the applied coatings are related to the nature and the formulation of each base material, this effectiveness can only be valorised by an “assembly” approval that covers both the base material as the glass beads. However, the producer of the glass beads may propose certain generic treatments, adapted to certain categories of marking products, determined at the same time by product type (water borne paint, solvent paint, cold plastics, thermoplastics, pre-formed road markings) and the class of binders and / or solvents. The tests that are carried out on glass beads that are distinguished from each other by the surface

treatment, can refer tothe presence of a surface treatment: no guarantee is given in terms of effectiveness (see article 3.3.2).

3.3.2 Presence of a surface treatment

The presence of a surface treatment of the drop on glass beads shall be declared.

When surface treatment is demonstrated the coated beads shall have a different behaviour than not coated beads.

The presence of a surface treatment is determined by the supplier according to:

- EN 1423 clause 5.3.1 ;
- a method proposed by the supplier, by which he demonstrates that the coated beads behave in a different way than the uncoated beads.

3.3.3 Refractive index

The refractive index is according to EN 1423, clause 4.1.2.1. The minimum class is class A.

The refractive index is determined in accordance with EN 1423 Annex A.

3.3.4 Weighted percentage of defective glass beads

The maximum weighted percentage of defective glass beads is according to EN 1423, clause 4.1.2.2.

The weighted percentage of defective glass beads is determined in accordance with EN 1423 Annex D.

3.3.5 Granulometry

The granulometry of the glass beads is according to EN 1423, clause 4.1.3.

The granulometry of glass beads is determined in accordance with ISO 2591-1.

3.3.6 Content of dangerous substances

The content of dangerous substances is according to EN 1423, clause 4.1.4.

Each element (As, Pb, Sb) shall be separately classified and shall comply to class 1: ≤ 200 ppm (mg/kg).

The content of dangerous substances is determined in accordance with EN 1423 Annex I.

3.3.7 Resistance to chemicals

The resistance to chemicals is according to EN 1423, clause 4.1.5.

The resistance to water, hydrochloric acid, calcium chloride and sodium sulphide the resistance to chemicals of glass beads shall be “Pass”.

The resistance to water, hydrochloric acid, calcium chloride and sodium sulphide is determined in accordance with EN 1423 Annex B.

3.4 TRANSPARENT ANTISKID AGGREGATES

3.4.1 General

3.4.1.1 Transparent antiskid aggregates meet the requirements set out in clauses 3.4.2 to 3.4.5.

3.4.1.2 The supplier shall in each case declare the performance for the characteristics set out in clauses 3.4.2 to 3.4.5 for the transparent antiskid aggregates for the use as drop on materials for road marking. If it concerns an essential characteristic, the supplier shall declare this on his Declaration of Performance.

3.4.2 pH value

The pH of the antiskid aggregates shall be not less than 5 and not greater than 11.

The pH is determined according to EN ISO 787-9.

3.4.3 Granulometry

The granulometry is according to EN 1423, clause 4.2.2.

The granulometry of transparent antiskid aggregates is determined in accordance with ISO 2591-1.

3.4.4 Content of dangerous substances

The content of dangerous substances is according to EN 1423, clause 4.2.3.

For transparent antiskid aggregates in glass, each element (As, Pb, Sb) shall be separately classified and shall comply to class 1: ≤ 200 ppm (mg/kg).

The content of dangerous substances is determined in accordance with EN 1423 Annex I.

3.4.5 Resistance to fragmentation (friability)

The friability index is according to EN 1423, clause 4.2.4.

The maximum value of the friability index shall be declared.

The friability index is determined in accordance with EN 1423 Annex G.

3.5 NON-TRANSPARENT ANTISKID AGGREGATES

3.5.1 General

3.5.1.1 Non-transparent antiskid aggregates meet the requirements set out in clauses 3.5.2 to 3.5.5.

3.5.1.2 The supplier shall in each case declare the performance for the characteristics set out in clauses 3.5.2 to 3.5.5 for the non-transparent antiskid aggregates for the use as drop on materials for road marking. If it concerns an essential characteristic, the supplier shall declare this on his Declaration of Performance.

3.5.2 pH value

The pH of the antiskid aggregates shall be not less than 5 and not greater than 11.

The pH is determined according to EN ISO 787-9.

3.5.3 Chromaticity coordinates

The chromaticity coordinates are according to EN 1423, clause 4.3.2.1.

The chromaticity coordinates are determined in accordance with ISO 7724-2.

3.5.4 Luminance factor

The luminance factor ß is according to EN 1423, clause 4.3.2.2.

The luminance factor shall be greater than 0,70.

The luminance factor is determined in accordance with ISO 7724-2.

3.5.5 Granulometry

The granulometry is according to EN 1423, clause 4.3.3.

The granulometry is determined in accordance with ISO 2591-1.

3.5.6 Resistance to fragmentation (friability)

The friability index is according to EN 1423, clause 4.3.4.

The maximum value of the friability index shall be declared.

The friability index is determined in accordance with EN 1423 Annex G.

3.6 MIXTURES OF GLASS BEADS WITH DIFFERENT REFRACTIVE INDICES

3.6.1 General

3.6.1.1 The characteristics of the individual glass beads shall comply with the requirements of clause 3.3.

The components are glass beads with a different refractive index according to clause 3.3.3. The proportions of the components of the mixtures shall be declared.

3.6.2 Granulometry

The granulometry of the mixture of glass beads with different refractive indices shall be declared and described giving the minimum and the maximum percentages, by mass, of the cumulative retained particles on metal wire cloth test sieves selected from sizes R 40/3 of ISO 3310-1:2016.

Granulometry of the mixture of glass beads with different refractive indices shall be described by selecting sieves in accordance with the following rules:

- the upper safety sieve shall retain 0 % to 2 % of the total mass of the mixture;
- the upper nominal sieve shall retain 0 % to 10 % of the mixture;
- if necessary, intermediate sieves shall be added to limit the ratio between the nominal sizes of openings of two successive sieves to a maximum of 1,7 : 1;
- for each of the intermediate sieves, the range by mass between the minimum N1 % and the maximum N2 % of the cumulative retained percentages shall be not more than 40 % (N2 - N1 ≤ 40);
- the lower nominal sieve shall retain 95 % to 100 % of the mixture;

The granulometry of the mixture of glass beads with different refractive indices is determined in accordance with ISO 2591-1.

3.7 MIXTURES OF GLASS BEADS AND ANTISKID AGGREGATES

3.7.1 General

3.7.1.1 The characteristics of the glass beads shall comply with the requirements of clause 3.3 and the characteristics of the antiskid aggregates shall comply with the requirements of clauses 3.4 and/or 3.5.

The proportions of the components of the mixtures shall be declared.

3.7.2 Granulometry

The granulometry of the mixture of glass beads and antiskid aggregates shall be declared and described giving the minimum and the maximum percentages, by mass, of the cumulative retained particles on metal wire cloth test sieves selected from sizes R 40/3 of ISO 3310-1:2016.

Granulometry of the mixture of glass beads and antiskid aggregates shall be described by selecting sieves in accordance with the following rules:

- the upper safety sieve shall retain 0 % to 2 % of the total mass of the mixture;
- the upper nominal sieve shall retain 0 % to 10 % of the mixture;
- if necessary, intermediate sieves shall be added to limit the ratio between the nominal sizes of openings of two successive sieves to a maximum of 1,7 : 1;
- for each of the intermediate sieves, the range by mass between the minimum N1 % and the maximum N2 % of the cumulative retained percentages shall be not more than 40 % (N2 - N1 ≤ 40);
- the lower nominal sieve shall retain 95 % to 100 % of the mixture;
- the lower safety sieve shall retain 99 % to 100 % of the mixture; the sieve size of this sieve shall not be lower than 90µm.

The granulometry of the mixture of glass beads and antiskid aggregates is determined in accordance with ISO 2591-1.

3.8 MIXTURES OF DROP ON MATERIALS AND DRYING TIME ACCELERATOR

3.8.1 General

3.8.1.1 The characteristics of the drop on materials shall comply with the requirements of 3.3, 3.4, 3.5, 3.6 or 3.7. The drying accelerator has the particularity that it absorbs water from water borne paint films without binding to the paint.

The proportions of the components of the mixtures shall be declared.

The maximum deviation from the declared ratio is +/- 2 %.

3.9 TYPE TESTING

3.9.1 General

The type test is conducted under the responsibility of the supplier.

3.9.2 Scope

The type test is conducted on each product article.

3.9.3 Requirements

3.9.3.1 The characteristics according to 3.6.2 and 3.7.2 shall always be determined during the typetest.

In case the producer, when producing the glass beads or antiskid aggregate or any of the mixtures, uses a glass bead that he manufactures himself, he shall determine all the properties described in clause 3.3.

In case the producer, when producing the glass beads or antiskid aggregate or any of the mixtures, uses an antiskid aggregate that he either

- manufactures himself;
- or does not manufacture himself and is supplied without a CE certification, he shall determine all the properties described in clause 3.4 or 3.5.

In case the producer, when producing the glass beads or antiskid aggregate or any of the mixtures, uses a glass bead or antiskid aggregate that he does not manufacture himself, but which is supplied with a CE attestation, the properties of the CE-certified product may be adopted. It is the producer's responsibility to verify that

- the attestation of conformity level of the supplied glass beads or antiskid aggregate is that given in the harmonized standard NBN EN 1423 (AVCP 1);
- the characteristics of the glass beads or antiskid aggregates comply with the requirements of this PTV.

If the producer of the product article produces himself the glass bead or antiskid aggregate and the product article can be assigned to an existing product family, the following characteristics are not to be reassessed:

- Glass beads: surface treatment; refractive index, resistance to chemicals, dangerous substances;
- Transparent antiskid aggregates: pH value, dangerous substances, friability index;
- Non transparent antiskid aggregates: pH value, chromaticity coordinates and luminance factor friability index.

3.9.4 Type test report

The details and results of the type test are recorded in a type test report.

In either way, the type test report shall include:

- for glass beads, the origin of the glass beads and the characteristics according to clause 3.3 of this PTV;
- for antiskid aggregates, the origin of the antiskid aggregate and the characteristics according to clause 3.3 or 3.4 of this PTV;
- for mixtures, the origin and characteristics of the components of the mixture and the granulometry of the mixture.

3.9.5 Validity

The type test is valid as long as the raw materials are equivalent.

3.9.6 Modifications

If for the production of glass beads, antiskid aggregates, mixtures of glass beads and antiskid aggregates, mixtures of glass beads with different refractive indices or mixtures of drop on materials with drying time accelerator, a raw material, the composition, the production process or another relevant parameter is modified, the producer shall assess the influence of this modification on the characteristics of the product article or product type.

If the raw material used for manufacturing the surface treatment is modified, the producer shall assess the influence of this modification on the characteristics of the product article.

If the producer for the production of glass beads, antiskid aggregates, mixtures of glass beads and antiskid aggregates, mixtures of glass beads with different refractive indices or mixtures of drop on materials with drying time accelerator

- uses, in comparison with the initial type test, a different origin of the glass, the producer shall assess the influence of this modification on the characteristics of the product article;
- uses, in comparison with the initial type test, a different origin of glass beads and/or antiskid aggregate, the producer shall demonstrate that the characteristics of the new component (glass bead and/or antiskid aggregate) comply with the declared characteristics of the original component. For mixtures, it must be demonstrated that the initial granulometry of the mixture is still lived up to.

Another origin means that the glass beads and/or anti-skid aggregate

- derives from a supplier while either one of them or both were self-manufactured at the time of the initial type test,

- is self-manufactured while either one of them or both derived from a supplier at the time of the initial type test,
- derives from a supplier other than that supplier at the time of the initial type test.

For mixtures of glass beads and antiskid aggregates, mixtures of glass beads with different refractive indices or mixtures of drop on materials with drying time accelerator, deviations from the original proportions should not exceed 2 %.

3.9.7 Repeat type testing

Not applicable.

4 TEST METHODS

4.1 SAMPLING

4.1.1 Sampling method for lot control

For lot control according to clause 6.2 the sampling is according to EN 1423, clause 5.2.

4.1.2 Sampling method for production control

For factory production control the producer can deviate from the method described in EN 1423. The correlation between his method and the method according to EN 1423 shall be demonstrated.

4.2 SAMPLE PREPARATION

4.2.1 Sample preparation

Sample preparation is according to EN 1423, clause 5.2.

5 PRODUCT IDENTIFICATION

5.1 PRODUCT NAME

5.1.1 Official name

The official name of the drop on material consists of “Drop on materials:” followed by the name of the product type (clause 2.3.1.1).

Examples given:
- *“Drop on materials : glass beads”*
- *“Drop on materials : antiskid aggregates “*
- *“Drop on materials : mixture of glass beads and antiskid aggregates”*
- *“Drop on materials : “mixture of glass beads of different refractive indexes”*
- *“Mixture of drop on materials and drying accelerators”*

5.1.2 Commercial name

The commercial name is freely chosen by the supplier insofar as it does not lead to confusion or clash with the official name.

5.2 IDENTIFICATION

5.2.1 Delivery modes

5.2.1.1 Drop on materials can be delivered in bulk or in a package.

5.2.1.2 If drop on materials are delivered in a package, it is identified on each packaging unit (e.g. per bucket or per bag) and per group of packages (e.g. per pallet).

5.2.2 Individual packages

The following information must be given on each packaging unit:

- name and address of the supplier and/or producer,
- name(s) of the drop on materials,
- the quantity of the content,
- the batch or production number,
- production date.

5.2.3 Group of packages

There are no requirements for identification of the group of packages.

5.3 DELIVERY NOTE

5.3.1 Information

Each delivery of drop on materials is additionally accompanied of the delivery documents.

The following information is given on each delivery note:

- name and address of the supplier and/or producer,
- name of the customer,
- name(s) of the drop on materials,
- date of loading,
- quantity of drop on materials.

6 ASSESSMENT OF DELIVERIES

6.1 PRODUCT CHECK BY THE CUSTOMER ON DELIVERY

6.1.1 Check by the customer

On receipt of the drop on materials, the customer checks:

- compliance of the delivery note with the ordered goods;
- in case of individual packages, compliance of the identification of the product with the delivery note.

If the drop on materials are delivered under the voluntary BENOR mark, the conformity of the product is demonstrated and clause 6.2 does not apply.

6.2 LOT CONTROL BEFORE DELIVERY

6.2.1 General

The aim of a lot control is to check whether there is sufficient confidence that the characteristics of the drop on materials of a supplied lot comply with this PTV.

6.2.2 Sampling

6.2.2.1 Sampling is carried out in principle by an impartial body or by the recipient (generally a road authority) on the supplier's premises.

6.2.2.2 Sampling is carried out according to clause 4.1.1 and is representative of the entire lot.

6.2.2.3 For mixtures of glass beads and antiskid aggregates, glass beads of different refractive index and for mixtures of drop on materials and drying time accelerator the samples of the constituents are taken before mixing, and the mixing is performed in the presence of the impartial body or the recipient.

6.2.3 Lot size and number of samples

6.2.3.1 Number of samples is according to EN 13549.

6.2.4 Checking

All the characteristics of the relevant clause(s) 3.3, 3.4 and/or 3.5 are checked.

6.2.6 Processing of the drop on materials

The products of a lot may only be processed after all the results of the test are known and satisfactory.

7 PROCESSING OF THE DROP ON MATERIALS

7.1 PROCESSING OF THE PRODUCT

7.1.1 Storage conditions

The drop on materials should be stored in the closed original packages, protected from moisture. Producers can add additional recommendations on the technical data sheet.