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TECHNICAL REQUIREMENTSBE

PTV 885

BENOR

TECHNICAL REQUIREMENTS

FOR

COLD PLASTICS FOR ROAD MARKING

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

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CONTENTS

FOREWORD

This document contains the technical requirements for cold plastics for road marking. 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 cold plastics for road markings to the requirements of the PTV 885 to be demonstrated by way of a lot control.

The conformity of cold plastics for road marking can also be certified under the voluntary BENOR mark. With the BENOR mark, the supplier has to declare the performance of cold plastics for all the characteristics relevant to guaranteeing the application and limit values imposed by this PTV 885.

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

1 INTRODUCTION

1.1 TERMINOLOGY

1.1.1 Definitions

Coefficient of retroreflected luminance, R_L	Quotient of the luminance L of a field of the road marking in a direction of observation by the illuminance E⊥ at the field perpendicular to the direction of the incident light (definition of EN 1436, unit: mcd m^{-2} lx^{-1}).
Cold plastic	Products supplied as multi-component systems (at least one main component and a hardener system), where the cohesive film is being formed after mixing all components, with the cold plastic curing because of a chemical reaction.
Drop on materials	The antiskid aggregates, the drop-on glass-beads and the mixtures of glass beads and antiskid aggregates have to meet the requirements of the standard NBN EN 1423 and PTV 881.
Luminance coefficient under diffuse illumination, Qd	Quotient of the luminance of a field of the road marking in a given direction by the illuminance on the field (unit: mcd·m^{-2}·lx^{-1}), definition of EN 1436.
Producer	The party responsible for producing the cold plastics for road marking.
Product article	Set of units of a product with the same characteristics and performance that are produced in a specific manner and comply with the technical file.
Product	The result of an industrial activity or process. Meant by this in the context of these technical requirements is cold plastics for road marking. It is the collective term for all product articles to which these PTV apply.
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).
Removability	The state of being removable entirely without damage to the road surface and without leaving evident residual traces.
Road marking assembly	Road markings, possibly combined with retro reflective road studs, can provide for horizontal road signing. Road markings can be realized by the application of an assembly consisting of a cold plastic (compliant with this PTV) and drop-on glass beads or a mixture of glass beads and anti-skid aggregate.

Roll-over class	Number of wheels passages over a point of a road surface within a specified period of time.
Supplier	The party having to ensure that cold plastics for road marking complies with the technical requirements. This definition can apply to the producer, the dealer, the importer or the distributor.
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) the characteristics of a product article and its conformity.

1.1.2 Abbreviations

PTV	Technical Requirements
Qd	Luminance coefficient under diffuse illumination
R_L	Coefficient of retroreflected luminance

1.1.3 References

G0025	Guide for the obtainment of an attestation of fitness for use G0025 Test sites on the road of Road marking assemblies
NBN EN 1824	Road marking materials - Road trials
NBN EN 1871	Road marking materials - Physical properties
ISO 2811-1	Paints and varnishes - Determination of density - Part 1: Pycnometer method (ISO 2811-1:2016)
ISO 2811-2	Paints and varnishes - Determination of density - Part 2: Immersed body (plummet) method (ISO 2811-2:2011)
ISO 4892-3	Plastics - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (ISO 4892-3:2016)
NBN EN 12802	Road marking materials - Laboratory methods for identification
NBN EN ISO/IEC 17067	Conformity assessment - Fundamentals of product certification and guidelines for product certification schemes (ISO/IEC 17067:2013)

This PTV contains 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 4.0 which will replace version 3.0.

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 confirmed 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 cold plastics for road marking are drawn up by the Sectoral Commission Road marking materials of COPRO.

2.2 OBJECTIVES

2.2.1 Purpose of this PTV

The aim of this PTV is to specify requirements for the cold plastics used for road markings.

2.3 SCOPE

2.3.1 Subject of these technical requirements

The subject of these technical requirements are white and yellow structured or non-structured - both non-preformed - cold plastics for road markings. White cold plastics are to be used for permanent road markings, yellow thermoplastics for temporary road markings, both in circulation areas . Other products and colours intended for road markings are not covered by this PTV.

Note: Preformed cold plastics are not covered by this PTV but by the PTV 888.

The cold plastics that are the subject of the PTV are intended to be dropped on with glass beads or with mixtures of glass beads and antiskid aggregates during the application, in order to form a road marking assembly.

This PTV does not cover the compatibility of cold plastics with old marking materials. If necessary, the compatibility of two products will have to be evaluated on a case-by-case basis.

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

There is no applicable product standard(s) for cold plastics for road marking.

2.4.2 Tender documents

The tender document(s) can refer to this PTV 885.

2.4.3 Test methods

The applicable test method(s) are mentioned in chapter 4.

2.4.4 Other

Other applicable reference documents are mentioned in article 1.1.3.

3 REQUIREMENTS

3.1 PRODUCTION UNIT AND EQUIPMENT

No requirements are set for the production unit and equipment.

3.2 RAW MATERIALS

Premix glass beads comply to PTV 881 or PTV 882.

3.3 PRODUCTION PROCESS

The packaging shall provide that the average of the effective content of 10 packages is not less than the nominal content. No package at all may have a content lower than 95 % of the declared content.

3.3.1 Viscosity

The viscosity of the cold plastic at the end of the production process shall be determined.

The manufacturer shall state tolerances for the viscosity.

The viscosity of the cold plastic is tested in accordance with EN ISO 2555 with a Type A viscometer or another appropriate viscometer.

3.4 COLD PLASTIC FOR ROAD MARKING

3.4.1 General

3.4.1.1 The cold plastic for road marking meets the requirements set out in articles 3.4.2 to 3.4.5. For cold plastic which is to be applied directly to hydraulic concrete surfaces the alkali resistance of article 3.4.4 is applicable. This test is not applicable if the cold plastic is not intended to be applied directly to hydraulic concrete surfaces but after application of a primer, recommended by the manufacturer. This primer is not covered by the PTV.

3.4.1.2 The supplier shall in each case declare the performance for the characteristics set out in articles 3.4.2 to 3.4.4 for the cold plastic for road marking. The storage stability (article 3.4.3) is only tested if the lab tests are performed earlier than the recommended shelf life (see article 5.2.4) after sampling, otherwise this characteristic is considered as complying without further testing, as the cold plastic could be homogenized for the tests.

3.4.1.3 Article 3.4.6 to 3.4.12 are identification tests. These tests are realised to allow a limited series of tests to verify whether the manufactured or delivered cold plastic is identical to the cold plastic that was subjected to the entire series of tests of article 3.4.1.1. The test results are compared to the declared value (see also article 3.6 type testing).

For identification the initial testing of a cold plastic, tolerances apply to the manufacturers declared values for the tested properties and the initial test results shall be within the tolerances mentioned in the next articles.

For re-identification of a cold plastic, it may not be necessary to test all the values. Reference values for the tested properties shall be the values declared by the manufacturer.

3.4.2 Chromaticity coordinates and luminance factor

The chromaticity coordinates are in accordance with EN 1871 table 2.

The class of the luminance factor is in accordance with EN 1871 article 4.3.2.1 table 6 LF6 (≥ 0,80) for white cold plastics and LF2 (≥ 0,50) for yellow cold plastics.

The chromaticity coordinates and luminance factor are determined in accordance with EN 1871 Annex A.

3.4.3 Storage stability

The cold plastic shall be free from skin and settlement that cannot be re-incorporated by stirring. The cold plastic shall have a rating equal to or above 3.

The storage stability is determined in accordance with EN 1871 Annex C.

3.4.4 Alkali resistance

This test is only applicable for cold plastics which are to be applied directly to hydraulic concrete surfaces.

The cold plastic film shall show no deterioration of the surface.

The alkali resistance is determined in accordance with EN 1871 Annex E.

3.4.5 Durability on road trial, tested on the cold plastic in a road marking assembly

The requirements for the road marking assembly are mentioned in the following table.

Characteristic	Minimum requirements			
	White			Yellow temporary
	Not structured		Structured	Not structured
	Type I	Type II	Type II	Type I
Luminance coefficient under diffuse illumination (Qd)	Q2	Q2	Q2	Q2
Retroreflection under vehicle headlamp illumination, Dry (RL)	R2	R2	R2	R3
Retroreflection under vehicle headlamp illumination, wet (RL)	RW0	RW1	RW1	RW0
Retroreflection under vehicle headlamp illumination, rain (RL)	RR0	RR1	RR1	RR0
Skid resistance	S1	S1	S0	S1
Colour (x,y)	EN 1436 Table 6	EN 1436 Table 6	EN 1436 Table 6	EN 1436 Table 6 (Y2)
Removability	NA	NA	NA	pass
Minimum roll-over class where above mentioned characteristics still comply	P5	P5	P5	T2

The road marking assembly, consisting of the cold plastic and drop-on materials is subjected to a durability test on the road, in accordance with the G0025 guide.

The results are evaluated according to G0025.

3.4.6 Density

The density shall be declared.

The maximum accepted deviation from the declared value is 0,06 g/cm^3 for type testing and for re-identification.

The density of the cold plastic is determined in accordance with either EN ISO 2811-2 (Immersed body (plummet) method) or EN ISO 2811-1 (pycnometer method) for cold plastics with low or medium viscosity. For highly viscous cold plastics the viscosity is determined in accordance with the EN ISO 2811-1 method but with the Hubbard pycnometer or with the metal pycnometer without lid.

3.4.7 Organic content

The organic content shall be declared.

The maximum accepted absolute deviation from the declared value is 2,5 percent by weight for type testing and for re-identification.

The organic content expressed as a percentage of the cold plastic is determined in accordance with EN 12802 Annex B or, if identification of the constituents is not required, in accordance with article 4.3.

3.4.8 Identification of the organic constituents

Initial type testing includes determination of the infrared spectrum of the organic constituents.

When assessing the identity of two infrared spectra (re-identification) it has to be checked if all absorption-/transmission peaks are present or there are additional occurrences which are significantly different from the baseline to stand out. The relative height levels between peaks must not change significantly.

The type of organic constituents is determined in accordance with EN 12802 Annex B but using the IR method (potassium bromide pellet), as described for thermoplastics.

3.4.9 Identification of pigment and fillers

Initial type testing includes determination of the infrared spectrum of the pigments and fillers.

When assessing the identity of two infrared spectra (re-identification) it has to be checked if all absorption-/transmission peaks are present or there are additional occurrences which are significantly different from the baseline to stand out. The relative height levels between peaks must not change significantly.

The type of pigment and fillers, is determined in accordance with EN 12802 Annex C.

3.4.10 Titanium dioxide content

The titanium dioxide content shall be declared.

The maximum accepted absolute deviation from the declared value is 1,5 percent by weight for type testing and for re-identification.

The titanium dioxide content is determined in accordance with EN 12802 Annex D.

3.4.11 Glass bead content

The glass bead content shall be declared.

The maximum accepted absolute deviation from the declared value is 5,5 percent by weight for type testing and for re-identification.

If the cold plastid contains glass beads the glass bead content is determined in accordance with EN 12802 Annex E.

3.4.12 Ash content

The ash content shall be declared.

The maximum accepted absolute deviation from the declared value is 3,5 percent by weight for type testing and for re-identification.

The ash content is determined in accordance with EN 12802 Annex H.

3.5 CLASSIFICATION

3.5.1 Classification

In function of the use or application the cold plastics can be classified in:

- White cold plastics for spray application for type I road markings,
- White cold plastics for spray application for type II road markings,
- White cold plastics, for other applications than spray and for not structured type I road markings,
- White cold plastics, for other applications than spray and for not structured type II markings,
- White cold plastics, for other applications than spray and for structured type II markings,
- Yellow temporary cold plastics for spray application.

In function of the road surface material the cold plastics can be classified in:

- cold plastics where manufacturers foresee direct application on hydraulic concrete surfaces, tested for alkali resistance,
- cold plastics, not to be applied directly to hydraulic surfaces.

3.6 TYPE TESTING

3.6.1 General

3.6.1.1 The type test comprises laboratory validation of the characteristics according to articles 3.4.2 up to 3.4.4 and validation on the road trial site on the N63 in Baillonville, Belgium for the characteristic of article 3.4.5.

3.6.1.2 The type test of the identification characteristics according to articles 3.4.6 up to 3.4.12 is only required to allow a limited series of tests to be used to verify whether the manufactured or delivered cold plastic is identical to the cold plastic that was subjected to the entire series of tests according to articles 3.4.2 up to 3.4.5.

3.6.2 Scope

Every product article is tested. For the characteristic 3.4.5 the manufacturer can determine performances with different drop on materials and/or with different dosages of cold plastic and/or drop on materials.

3.6.3 Requirements

3.6.3.1 At least the characteristics according to articles 3.4.2 up to 3.4.5 are determined in the type test, see also article 3.6.1.2.

3.6.3.2 The type test is generally performed on the samples taken during the road trials for the determination of the performances of the characteristic according to article 3.4.5. If (some) laboratory tests of articles 3.4.2 up to 3.4.4 are performed on other samples, at least the identification tests according to 3.4.6 up to 3.4.10 are performed and the results shall comply to the requirements for re-identification.

3.6.4 Type test report

The evaluation of the results of the type test is recorded in an assessment report.

3.6.5 Validity

The type test is valid as long as the raw materials are equivalent. The equivalence of the raw materials can be verified with the identification tests on the final product.

3.6.6 Modifications

If a raw material, the composition, the production process or other relevant parameters are adjusted, the supplier must assess the influence of this modification on the characteristics of the product article, including possible changes in identification (see also article 3.6.5).

It may prove necessary in this regard to re-run part the type test or a part of the type test.

3.6.7 Repeat type testing

This article is not applicable.

4 TEST METHODS

4.1 SAMPLING

4.1.1 Sampling method for representative sampling

For lot controls according to article 6.2 the sampling is according to NBN EN 13459.

4.1.2 Sampling method for spot samples

For external control of the factory production control a sample is taken from one bucket or intermediate bulk container (after homogenization).

For factory production control the manufacturer can use other method as long as he shows the method is representative for the produced batch (example given by comparing results of samples taken with this method and compared with the method of the previous paragraph.

4.2 SAMPLE PREPARATION

4.2.1 Sample preparation

The cold plastics are homogenized before testing.

4.3 ALTERNATIVE METHOD FOR DETERMINATION OF THE ORGANIC CONTENT

4.3.1 Aim and principle

When it's not requested to identify the organic constituents according to article 3.4.12 (example given for factory production control), the organic content can be obtained by this alternative method. The organic content is obtained via determination of the inorganic content by ash residue at 450 °C.

4.3.2 Instruments

Instruments:

- Electric muffle furnace, adjustable to 450 °C ± 25 °C;

- Analytical balance with an accuracy of 0,01 g;

- Crucible, adapted to temperatures of 450 °C;

- Desiccator, with drying agent, example given silica gel.

4.3.3 Sample preparation

See article 4.2.1.

4.3.4 Method

4.3.4.1 The cold plastic is ashed at 450 °C ± 25 °C in a muffle furnace and the loss in mass determined.

Carry out two determinations.

Weight the empty crucible to the nearest 0,01 g (W1). Take a portion of 1 - 10 g of the marking material, carefully homogenized, and weigh again immediately (W2). Place the crucible in the muffle furnace afterwards and raise the temperature to 450 °C ± 25 °C. Keep the crucible in the furnace for at least 2 h at 450 °C ± 25 °C or until constant mass is obtained. Remove the crucible containing the residues, cool in a desiccator and reweigh (W3).

4.3.5 Result

The organic content (OC) is calculated from the percentage of inorganic constituents (residue of combustion, IC) content by mass and shall be determined using the following equations:

$$IC = \frac{W_3 - W_1}{W_2 - W_1} \times 100$$

and OC = 100 –IC

where:

- W1 is the mass of the empty crucible,

- W2 is the mass of the crucible together with the sample in grams,

- W3 Is the mass of the crucible together with the residue in grams.

If the results of the individual determinations of the binder or inorganic content differ by more than 0,5 % by mass from the mean, repeat the procedure.

The mean of the two individual results shall be calculated and the binder content given rounded to the nearest 0,1 % by mass.

4.3.6 Test report

The test report sets out at least:

- the details and identification of the sample,
- the average of the two determinations according to the articles 4.3.4 and 4.3.5.

5 PRODUCT IDENTIFICATION

5.1 PRODUCT NAME

5.1.1 Official name

Official name:

- White cold plastics for spray application for type I road markings,
- White cold plastics for spray application for type II road markings,
- White cold plastics, for other applications than spray and for not structured type I road markings,
- White cold plastics, for other applications than spray and for not structured type II markings,
- White cold plastics, for other applications than spray and for structured type II markings,
- Yellow temporary cold plastics for spray application.
- Yellow temporary cold plastics, for other applications than spray and for not structured type I road markings,
- Yellow temporary cold plastics, for other applications than spray and for not structured type II markings,
- Yellow temporary cold plastics, for other applications than spray and for structured type II markings.

5.1.2 Commercial name

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

5.2 IDENTIFICATION

5.2.1 Delivery modes

5.2.1.1 Cold plastics can be delivered in bulk or in a package.

5.2.1.2 If cold plastic is delivered in package, it is identified on each packaging unit (example given per bucket) and per group of packages (example given 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 cold plastic,
- the quantity of the content,
- the batch or production number,
- the shelf life or production date and, if shelf life is not mentioned on the package, reference to a technical datasheet that mention the shelf life (see 5.2.4),
- statements regarding the conditions for storage and the period of storage If this is not the case, the label must refer to a technical datasheet specific to the cold plastic.

5.2.3 Group of packages

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

5.2.4 Shelf life

The shelf life of the paint is stated based on:

- the date preceded by the words: 'Best before …' when the date includes an indication of the day, 'Best before end …' in other cases,
- or based on the production date and the shelf life in months or years.

5.3 DELIVERY NOTE

5.3.1 Information

Each delivery of cold plastic 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 cold plastic,
- date of loading,
- quantity of cold plastic.

6 ASSESSMENT OF DELIVERIES

6.1 PRODUCT CHECK BY THE CUSTOMER ON DELIVERY

6.1.1 Check by the customer

On receipt of the cold plastic, 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 cold plastic is delivered under the voluntary BENOR mark, the conformity of the product is demonstrated and article 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 cold plastics 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 article 4.1.1 and is representative of the entire lot.

6.2.3 Lot size and number of samples

Number of samples are according to EN 13549.

6.2.4 Checking

At least all the characteristics of articles 3.4.2 up to 3.4.5 are tested.

6.2.6 Processing of the cold plastic

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

7 PROCESSING OF THE PRODUCT (informative)

7.1 STORAGE OF THE PRODUCT

7.1.1 Storage conditions

The different components of the cold plastics should be stored in the closed original packages, protected from heat and sun. Manufacturers can add additional recommendations on the technical data sheet.

The cold plastic should best be used within the recommended shelf life, see article 5.2.4.