



EUROPEAN ASSESSMENT DOCUMENT

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ROAD MARKING PRODUCTS

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Contents

| | | |
|----------|--|-----------|
| 1 | Scope of the EAD | 4 |
| 1.1 | Description of the construction product | 4 |
| 1.2 | Information on the intended use(s) of the construction product | 5 |
| 1.3 | Specific terms used in this EAD | 5 |
| 2 | Essential characteristics and relevant assessment methods and criteria | 7 |
| 2.1 | Essential characteristics of the product | 7 |
| 2.2 | Assessment methods and criteria for the performance of the product in relation to essential characteristics of the product | 7 |
| 3 | Assessment and verification of constancy of performance | 11 |
| 3.1 | System(s) of assessment and verification of constancy of performance | 11 |
| 3.2 | Tasks of the manufacturer | 11 |
| 3.3 | Tasks of the Notified Body | 12 |
| 4 | Reference documents | 14 |

1 SCOPE OF THE EAD

1.1 Description of the construction product

The product is not covered by a harmonised European Standard (hEN).

The construction product covered by the scope of this EAD is named "**Road Marking Product**", hereafter referred to as RMP.

A RMP is a surface coating material used for road signalization purposes when it is applied on the road with or without antiskid aggregates and with or without dropped-on glass beads. It is put on the market with indications on types and proportions of dropped-on glass beads and/or anti-skid aggregates.

In accordance with its nature, the RMP covered by this EAD are: Paints; Thermoplastics and Cold plastics. Definitions for those products are given in EN 1871; other products are not covered by this EAD.

Each RMP may be used in different combinations (proportions) and/or application instructions in order to reach different intended uses. Each of these different combinations is identified as a System of the same RMP.

Each System of the same RMP is identified by means of the trademark of the RMP followed by the word *System* and a number of order (i.e. Thermo-AX: System 1) and must include, at least, the following information:

- The nature and application instructions of the materials forming the System including the RMP as well as the drop-on materials (including their number of Certificate of Constancy of Performance).
- The color (white or yellow) of the RMP and antiskid aggregates.
- The product Trademarks.
- The identification of the producers of each material.
- The proportions (or dosages), expressed in weight of the original products as g/m² or in applied wet film thickness, in microns, in accordance with the relevant results of EN 1824 and/or EN 13197, as applied.

One RMP is the subject of one ETA and may be formed by one or several assessed Systems. The whole of assessed Systems is understood as the family of the particular Road Marking Product.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

1.2 Information on the intended use(s) of the construction product

1.2.1 Intended use(s)

A RMP is to be used for permanent road markings in trafficked areas submitted to a temperature range from -40 °C to +70 °C for outside uses and from +5 °C to +70 °C for indoor uses.

RMP can be defined by the following characteristics:

- Characteristics relevant for night and day visibility and skid resistance as defined in EN 1436.
- Durability of the above mentioned characteristics based in EN 1824 or EN 13197 as defined in clause 2.2.7.
- Aspects relating to the nature of the substrate in order to be applied directly on bituminous or cement concrete pavement as defined in EN 1871 and its roughness as defined in EN 13036-1.
- Aspects relating to climatic conditions such as indentation, softening point and UV ageing as defined in EN 1871.

1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the RMP for the intended use of a minimum of one year when installed in the works (provided that the RMP is subject to appropriate installation (see 1.1)). These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works¹.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

1.3 Specific terms used in this EAD

1.3.1 "Types I; II and NR of road markings"

Type II road markings are road markings with special properties meant to enhance the retroreflection in wet or rainy conditions, Type I road markings do not necessarily have such special properties. When the RMP or a system of a RMP is No Retroreflective it will be identified as type NR.

1.3.2 "Luminance coefficient under diffuse illumination" (Qd), "luminance factor" (β), "coefficient of retroreflected luminance" or retroreflectivity (RL), "skid resistance" (SRT)

Definitions are given in EN 1436.

1.3.3 "Glass beads" and "antiskid aggregates"

Definitions are given in EN 1423.

¹ The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

1.3.4 “Batch” and “production run”

Definitions are given in EN 13212.

1.3.5 “Roll-over”

Definition is given in EN 1824.

1.3.6 “Wheel passages”

Definition is given in EN 13197.

1.3.7 “Structured road marking”

Definition is given in EN 1436.

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 1 shows how the performance of RMP is assessed in relation to the essential characteristics.

Table 1 – Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

| Nr | Essential characteristic | | | Assessment Method | Type of expression of product performance |
|---|---|----------------------------------|---|--------------------|---|
| Basic Works Requirement 4: Safety and accessibility in use | | | | | |
| | Night visibility | No retroreflectivity | | ----- | |
| 1 | | Retroreflectivity | in dry conditions | 2.2.1 | Description, level |
| 2 | | | in conditions of wetness | 2.2.2 | Description, level |
| 3 | in conditions of rain | | 2.2.3 | Description, level | |
| 4 | Day visibility | Chromaticity co-ordinates (x, y) | | 2.2.4 | Description, level |
| 5 | | Luminance expressed EITHER | as Luminance factor (β) | 2.2.5.1 | Description, level |
| | | | or as Luminance coefficient under diffuse illumination (Qd) | 2.2.5.2 | Description, level |
| 6 | Skid resistance (SRT) | | | 2.2.6 | Description, level |
| 7 | Relating to Durability | Expressed EITHER: | Number of roll-over by method A | 2.2.7.1 | Description, level |
| | | | Number of wheel passages by method B | 2.2.7.2 | Description, level |
| 8 | Relating to the nature of the substrate | bituminous | Luminance factor (β) | 2.2.8 | Description, level |
| | | | Chromaticity co-ordinates (x, y) | | Description, level |
| 9 | | cement | Alkali resistance | 2.2.9 | Description, level |
| 10 | Relating to climatic conditions | Indentation | | 2.2.10 | Description, level |
| 11 | | Softening point | | 2.2.11 | Description, level |
| 12 | | UVB ageing | | 2.2.12 | Description, level |

2.2 Assessment methods and criteria for the performance of the product in relation to essential characteristics of the product

2.2.1 Retroreflectivity in dry conditions (R_L)

As coefficient of retroreflected luminance R_L (or retroreflectivity), according to the applicable part of EN 1436.

2.2.2 Retroreflectivity in conditions of wetness (R_L)

As coefficient of retroreflected luminance R_L (or retroreflectivity) according to the applicable part of EN 1436.

2.2.3 Retroreflectivity in conditions of rain (R_L)

As coefficient of retroreflected luminance R_L (or retroreflectivity) according to the applicable part of EN 1436.

2.2.4 Chromaticity co-ordinates (x, y)

As chromaticity co-ordinates CIE (x, y) according to the applicable part of EN 1436.

2.2.5 Luminance

2.2.5.1 Luminance Factor (β)

As luminance factor (β) according to the applicable part of EN 1436.

2.2.5.2 Luminance coefficient under diffuse illumination (Q_d)

As coefficient of luminance under diffuse illumination Q_d according to the applicable part of EN 1436.

2.2.6 Skid resistance (SRT)

As coefficient SRT according to the applicable part of EN 1436

2.2.7 Durability

This EAD considers two possible methods of verification of durability taking into account that some Member States have national regulations based on one of them and considering that the state of the art on this matter does not allow -for the time being- to define a single and unified method:

Either, method A (road trials) with the relevant test site option or method B (wear simulator), both methods described hereafter.

2.2.7.1 Test method A: ROAD TRIALS.

Unless otherwise stated in this chapter, the preparation of samples and the determination of the durability using road trials shall be carried out in accordance with EN 1824, and shall be expressed as number of roll over.

Test sites options: For the purpose of this EAD four (4) test site options have been defined (see table 2).

NOTE: the declared characteristics of the existing test sites in Europe allow characterizing the test sites into 2 climatic conditions and 2 substrate roughness (as texture depth in accordance with EN 13036-1). The 4 options are the 4 combinations between climatic conditions and substrate roughness.

Table 2 Test site options according to the climatic conditions and substrate roughness

| TEST SITE OPTION | Climatic conditions | Substrate roughness (EN 13036-1) |
|------------------|--|----------------------------------|
| 1 | For those test sites having a temperature equal or lower than -15 °C; a minimum number of 30 days per year with snow or traffic with studded tyres. | > 0.60 and ≤ 0.90 |
| 2 | For those test sites having a temperature equal or lower than -15 °C; a minimum number of 30 days per year with snow or traffic with studded tyres. | > 0.90 and ≤ 1.20 |
| 3 | For those test sites having a temperature higher than -15 °C; a number of days per year with snow lower of 30 days or traffic without studded tyres. | > 0.60 and ≤ 0.90 |
| 4 | For those test sites having a temperature higher than -15°C; a number of days per year with snow lower of 30 days or traffic without studded tyres. | > 0.90 and ≤ 1.20 |

The test report shall include the climatic conditions of the test site and the roughness of the substrate.

2.2.7.2 Test method B: WEAR SIMULATOR

Unless otherwise stated in this chapter, the preparation of samples and the determination of the durability using wear simulators shall be carried out in accordance with EN 13197.

Wear simulator: The characteristics of wear simulator facility shall comply with EN 13197 and shall be expressed as number of wheel passages.

Characteristics of the test plates: the roughness of the test plates shall comply with those specified in EN 13197. Roughness is measured as texture depth in accordance to EN 13036-1.

The test report shall include the roughness of the test plates used.

2.2.8 Bleed resistance (only for paints): When compatibility is required for paints applied directly over bituminous surfaces.

The verification shall be done according to the applicable part of EN 1871, as variation on the values for luminance factor (β) and chromaticity co-ordinates.

2.2.9 Alkali resistance: When compatibility is required for any material applied directly over cement concrete surfaces.

The verification shall be done according to the applicable part of EN 1871 and the result expressed as pass/fail.

2.2.10 Indentation (for thermoplastics): When a thermoplastic material is subjected to extreme cold weather and/or to the effect of studded tyres, in accordance with the national regulations.

The verification shall be done according to the applicable part of EN 1871.

2.2.11 Softening point (for thermoplastics): When a thermoplastic material is subjected to extreme cold or hot weather conditions, in accordance to the national regulations.

The verification shall be done in accordance with the applicable part of EN 1871.

2.2.12 UVB ageing

When a product is subjected to high incidence of UV radiation, in accordance with the national regulations.

The verification shall be done according to the applicable part of EN 1871, as variation on the values for luminance factor (β) and chromaticity co-ordinates (x, y).

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 System(s) of assessment and verification of constancy of performance

For the products covered by this EAD the applicable European legal act is: Decision 1996/579/EC².

The System to be applied is: 1.

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken the manufacturer of the product in the process of assessment and verification of constancy of performance are laid down in Table 3.

Table 3 Control plan for the manufacturer; cornerstones

| No | Subject/type of control | Test or control method | Criteria, if any ¹ | Minimum number of samples | Minimum frequency of control |
|---|--------------------------------|------------------------|-------------------------------|---------------------------|--------------------------------------|
| Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan] ² | | | | | |
| RAW MATERIALS | | | | | |
| 1 | Premix glass-beads | 3.4.1 | - | 1 | Each supplied charge |
| 2 | Binders | 3.4.2 | - | 1 | Each supplied charge |
| 3 | Solvents | 3.4.3 | - | 1 | Each supplied charge |
| MANUFACTURING PROCESS | | | | | |
| 4 | Control of dosages in formulas | 3.4.4 | - | - | Each batch or production run |
| FINISHED PRODUCT | | | | | |
| PAINTS | | | | | |
| 5 | Viscosity | 3.4.5 | - | 1 | Each batch |
| 6 | Apparent density | 3.4.6 | - | 1 | Each batch |
| 7 | Luminance factor β | 3.4.7 | - | 1 | Each batch |
| 8 | Chromaticity co-ordinates | 3.4.8 | - | 1 | Each batch |
| 9 | Solids content | 3.4.9 | - | 1 | Each batch |
| 10 | Hiding power | 3.4.10 | - | 1 | Every 25 batch. Minimum twice a year |
| 11 | Storage stability | 3.4.11 | - | 1 | Every 50 batch. Minimum twice a year |
| 12 | Ash content | 3.4.12 | - | 1 | Every 50 batch. Minimum twice a year |
| THERMOPLASTICS | | | | | |
| 13 | Apparent density | 3.4.13 | - | 1 | Every 10 batch or once daily |
| 14 | Softening point | 3.4.14 | - | 1 | Every 10 batch or once daily |
| 15 | Luminance factor β | 3.4.15 | - | 1 | Every 10 batch or once daily |
| 16 | Chromaticity co-ordinates | 3.4.16 | - | 1 | Every 10 batch or once daily |
| 17 | Ash content | 3.4.17 | - | 1 | Every 50 batch or once daily |
| COLD PLASTICS | | | | | |
| 18 | Apparent density | 3.4.18 | - | 1 | Each batch |
| 19 | Viscosity | 3.4.19 | - | 1 | Each batch |
| 20 | Luminance factor β | 3.4.20 | - | 1 | Each batch |
| 21 | Chromaticity co-ordinates | 3.4.21 | - | 1 | Each batch |
| 22 | Storage stability | 3.4.22 | - | 1 | Every 50 batch. Minimum twice a year |
| 23 | Ash content | 3.4.23 | - | 1 | Every 50 batch. Minimum twice a year |
| 1) Criteria as stated by the manufacturer on their procedures. 2) For gas chromatography (for solvents); IR spectrum (for binders) and Granulometry (for premix glass-beads); declared characteristics by the supplier may be considered sufficient. | | | | | |

² Published in the Official Journal of the European Union (OJEU) L254 of 8.10.1996, p0052 -0055

3.3 Tasks of the Notified Body

The cornerstones of the actions to be undertaken by the Notified Body in the procedure of assessment and verification of constancy of performance for RMP are laid down in Table 4.

Table 4 Control plan for the notified body; corner stones

| No | Subject/type of control (product raw/constituent material, component –indicating characteristic concerned) | Test or control method | Criteria, if any | Minimum number of samples | Minimum frequency of control |
|---|--|------------------------------|---------------------|---------------------------------|---|
| Initial inspection of the manufacturing plant and of factory production control | | | | | |
| 1 | Verification of the complete FPC, step by step to be implemented by the manufacturer. | EN 13212 | EN 13212 | 1 | When starting the production or a new production line |
| Continuous surveillance, assessment and evaluation of factory production control | | | | | |
| 2 | Verification of the controls carried out by the manufacturer on the raw materials on the process and on the finished products as indicated in table 3. | 3.2 | 3.2 | 1 | Once a year |

3.4 Special methods of control and testing used for the verification of constancy of performance

- 3.4.1 Premix glass beads:** Granulometry according to EN 1424 or documented by the approved supplier
- 3.4.2 Binder for paints, thermoplastics and cold plastics:** IR spectrum as specified in EN 12802 or documented by the approved supplier.
- 3.4.3 Solvents identification:** Gas chromatography as specified in EN 12802 or documented by the approved supplier.
- 3.4.4 Verification of dosages of different components of formula during manufacturing:** Assessment of the procedure used by the manufacturer.
- 3.4.5 Viscosity of paints:** According to the applicable part of EN 12802 (Viscosity Krebs).
- 3.4.6 Apparent density of paints:** According to the applicable part of EN 12802.
- 3.4.7 Luminance factor of paints:** According to the applicable part of EN 1871.
- 3.4.8 Chromaticity co-ordinates of paints:** According to the applicable part of EN 1871.
- 3.4.9 Solids content of paints:** According with the applicable part of EN 12802.
- 3.4.10 Hiding power of paints:** According to the applicable part of EN 1871.
- 3.4.11 Storage stability of paints:** According to the applicable part of EN 1871.
- 3.4.12 Ash content of paints:** According with the applicable part of EN 12802.
- 3.4.13 Apparent density of thermoplastics:** According to the applicable part of EN 12802.
- 3.4.14 Softening point of thermoplastics:** According to the applicable part of EN 1871.

- 3.4.15 **Luminance factor of thermoplastics**: According to the applicable part of EN 1871.
- 3.4.16 **Chromaticity co-ordinates of thermoplastics**: According to the applicable part of EN 1871.
- 3.4.17 **Ash content of thermoplastics**: According to the applicable part of EN 12802.
- 3.4.18 **Apparent density of cold plastics**: According to the applicable part of EN 12802.
- 3.4.19 **Viscosity of cold plastics**: According to the applicable part of EN 12802.
- 3.4.20 **Luminance factor of cold plastics**: According to the applicable part of EN 1871.
- 3.4.21 **Chromaticity co-ordinates of cold plastics**: According to the applicable part of EN 1871.
- 3.4.22 **Storage stability of cold plastics**: According to the applicable part of EN 1871.
- 3.4.23 **Ash content of cold plastics**: According to the applicable part of EN 12802.

4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment, is of relevance

| | |
|-------------|--|
| EN 1423 | Road marking materials - Drop on materials - Glass beads, antiskid aggregates and mixtures of the two |
| EN 1423/A1 | Road marking materials - Drop on materials - Glass bead, antiskid aggregates and mixtures of the two |
| EN 1424 | Road marking materials - Premix glass beads |
| EN 1424/A1 | Road marking materials - Premix glass beads |
| EN 1436 | Road marking materials - Road marking performance for road users |
| EN 1436/A1 | Road marking materials - Road marking performance for road users |
| EN 1824: | Road marking materials - Road trials |
| EN 1871: | Road marking materials - Physical properties |
| EN 12802: | Road marking materials - Laboratory methods and identification |
| EN 13036-1 | Road and airfield surface characteristics – Test method – Part 1: Measurements of pavement surface macrotexture depth using volumetric patch technique |
| EN 13197 | Road marking materials - Wear simulators - Turntable |
| EN 13197/A1 | Road marking materials - Wear simulators - Turntable |
| EN 13212 | Road marking materials – Requirements for factory production control |
| EN 13459 | Road marking materials: Sampling and testing from storage |