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**Materiali za označevanje vozišča - Pogoji za odstranjevanje/prekrivanje označb vozišča**

Road marking materials - Conditions for removing/masking road markings

Straßenmarkierungsmaterialien - Bedingungen für das Entfernen/Abdecken von Strassenmarkierungen

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Materiali za gradnjo cest

Road construction materials

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**Road marking materials - Conditions for  
removing/masking road markings**

Straßenmarkierungsmaterialien - Bedingungen für das  
Entfernen/Abdecken von Strassenmarkierungen

This draft Technical Report is submitted to CEN members for Technical Committee Approval. It has been drawn up by the Technical Committee CEN/TC 226.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## European foreword

This document (FprCEN/TR 16958:2016) has been prepared by Technical Committee CEN/TC 226 “Road equipment”, the secretariat of which is held by AFNOR.

This document is currently submitted to the vote.

There are many situations in which road marking removing or masking become necessary. This document is intended to give some guidance about how to proceed in these cases.

This Technical Report (TR) describes a number of methods for removal and masking and gives guidance for the appropriate selection. Not all methods are valid or recommended in all cases; some methods are limited by the kind and nature of existing road marking and the pavement surface. Also the cost of the operation is depending on the amount of marking to be removed.

In some countries these operations are regulated, in particular in some countries masking the existing road marking only with black paint is forbidden.

The quality of the removal or masking or any combination of them, may be not enough or result in a new “phantom line”, which, under particular illumination conditions, may be more visible than the real road markings (introducing confusion) or may change the surface texture (introducing hazard). Works shall be done in such a way that the risk for confusion or hazard for drivers be minimized.

Furthermore, recommendations are given for some frequent works such as: removing and masking road studs, removing wet paints, removing curing membranes in new cement concrete pavements and cleaning existing road markings.

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## 1 Scope

This document provides guidance for removal or/and masking existing road markings. It includes methods of removal and criteria for selecting the removal method, as well as the requirements for the masking materials and the performance requirements of the resulting surface.

It does not apply to removable temporary road markings, which shall be removed in accordance to the manufacturer instructions.

Some recommendations are given for removing and masking road studs, removing wet paints, removing curing membranes in new cement concrete pavements and cleaning existing road markings.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1436, *Road marking materials - Road marking performance for road users*

EN 1824, *Road marking materials - Road trials*

EN 13197, *Road marking materials — Wear simulator Turntable*

EN ISO 2813, *Paints and varnishes - Determination of gloss value at 20°, 60° and 85° (ISO 2813)*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1 removal**  
permanent elimination of road markings, that may be partial or complete

**3.2 masking**  
temporary hiding of existing road marking using a topcoat of a material similar in color, luminance and specular gloss, to the pavement surface

**3.3 phantom line**  
**shadow line**  
road marking or print resulting from removal or masking process

**3.4 specular gloss**  
ratio of the luminous flux reflected from an object in the specular direction for a specified source and receptor angle to the luminous flux reflected from a glass with a refractive index of 1,567 in the specular direction

#### 4 Criteria for selecting removal or/and masking procedure

There are situations in which existing road marking shall be obliterated so as to not function as a recognizable road marking (phantom line). In order to do it, Removal or Masking techniques may be used. Removal may be done totally or partially and masking may be done as the unique procedure or after a partial removal. In order to take the good decision it is also important to know if the obliterated road marking shall be renewed or not and if the surface will be repaved or not. Table 1 gives a guidance to apply these criteria.

**Table 1 — Guidance for removal/masking procedures in different situations**

Situations for removal or masking			Removal/masking criteria			
			Removal		Masking	
Work needed	Road marking renewal is foreseen?		Totally	Partially	Only	After partial removal
			1	2	3	4
Permanent change on the road marking lay out	NOT	A	YES	Only in some cases	NO	Only in some cases
Preparation of the substrate	YES	B	YES	YES	NO	NO
Hiding road marking on temporary basis	YES or NOT	C	YES	YES with masking	YES	YES

When a road marking has to be applied and removed after a short period of time, (for instance less than 6 months) removable temporary materials, in accordance to EN 1824, shall be used.

Removal of such removable temporary materials shall be done in accordance to the manufacturer instructions.

For each case, some criteria are given in the following:

- A.1 When permanent changes in road markings lay out occurs (as for instance. new exits/entrances from main road, exchange from continuous line to interrupted line, direction of arrows, etc); unwanted road markings should be totally removed.
- A.2 When the existing road marking has poor adhesion or is covering less than 70 % of the marked area; partial removal can be accepted. The removal processing shall not adversely damage the pavement surface. There are limits (see Clause 6.1.2) for changes in surface texture and grooving and for the residual road markings. If damage to the pavement exceeds the limits, then for a complete obliteration of the road marking, a complementary masking with a blend of bitumen and fine aggregate may be used to minimize the difference in level and appearance.
- A.3 When permanent changes in road marking occur; unwanted road marking shall never be obliterated by masking.
- A.4 Same comments as in A.2.
- B.1 Existing road markings (formed for one or several layers) that have lost adhesion to the pavement or inter- layers (more than 30 % of the marked area is affected) shall be totally removed before renewal.

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- B.2 Existing multilayer road markings not fulfilling with the essential requirements (EN 1436) may be renewed with a new layer whenever the resulting thickness of the whole multilayer system does not exceed 6 000 microns. If this thickness is exceeded they shall be partially removed. The resulting surface shall be compatible (chemically) with the new material; otherwise the existing road marking should be totally removed or treated with a primer.
- Existing structured road markings which have to be renewed with another structured pattern shall be fully or partially removed. The thickness extent will depend on the patterns of the existing and the renewed structure.
- B.3 Masking is not accepted for preparing surfaces before renewal. Primers may be used in order to improve the adhesion and compatibility conditions of the existing substrate with the new material, but it cannot be considered a masking material.
- B.4 Partial removal followed of a masking is not a recommended procedure for preparing substrate for road marking renewal, with the exception mentioned in B.3 in the case of the application of a primer could be considered convenient.
- C.1 In case of temporary hiding without subsequent renewal (because of changes in the lay out) and without repaving; a total removal should be done.
- C.2 In case of temporary hiding with subsequent renewal: Total removal is recommended but partial removal may be used in combination with masking. Removal is necessary when the existing road marking is a structured road marking Comments given in A.2 are applicable.
- C.3 In case of temporary hiding with subsequent renewal or repaving: When the thickness of the existing road marking is lower than 3 000 microns and the number of layers less than 3, just masking may be used.
- C.4 In case of temporary hiding with subsequent renewal: When the thickness is higher than 3 000 microns or there are more than 3 layers; totally removal is recommended but partial removal and masking may be allowed.

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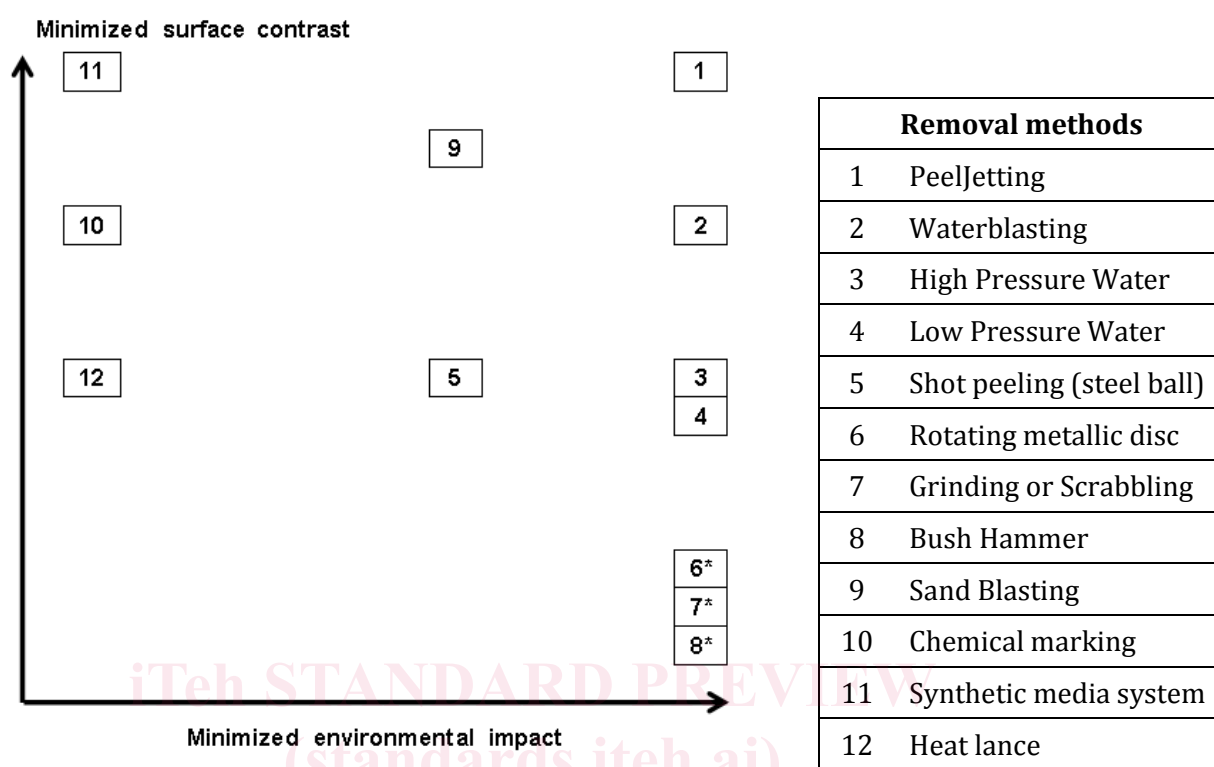
**5 Removal methods and masking materials****5.1 Removal methods**

The selection of the most efficient method to remove road markings depends on the type of road marking material and on the type of pavement surface. Table 2 gives a list with the most common types of removal methods. A more detailed description of each of the removal methods listed in Table 2 may be found in Annex A.

The selection shall take into account if the removal has to be done totally or partially and in which extent. The selection will take also into account thickness of the existing road marking and the nature and texture of the pavement surface.

The complete removal (with not more than a 5 % of old marking particles remaining) means also removal of material in between the aggregates at the surface. The more important issue is the grade of aggregate (stone) loss – or “surface grooving” upon marking removed from asphalt surfaces.

Removal road marking formed by a multilayer system, thermoplastics and/or cold plastics will, in consequence, require a more aggressive removal process than removal of an old, worn, paint. Moreover, removal thermoplastic is recommended to be done at low temperatures (at cooler seasons and at night better than during hot and sunny days).

**Table 2 — List of removal methods all types of pavement and all types of road marking materials**

It is obvious that an old (more worn) material, will give less impact than a new durable marking. Furthermore, it is clear that a hard concrete surface is less depending on a gentle removal technology than open porous asphalt.

\*6; 7; 8 is not recommended others than for partial removal, unless strong concrete surface or sealing component.

## 5.2 Masking materials

Masking of existing road marking only may be used on temporary basis. Masking may be used as the unique method but also after a partial removal.

For masking the unwanted road markings, coloured paints, thermoplastics, cold plastics and preformed road markings may be used. These materials may be removable or non-removable.

Application instructions may include drop-on materials or the addition of some dye in order to adjust the contrast (lower as possible) with the existing pavement and to avoid specular gloss. Suppliers are required to provide comprehensive application instructions.

Materials shall be tested on Road Trials (in accordance to EN 1824) or on Wear Simulator (in accordance to EN 13197). The application shall be done onto a previous existing white road markings. The requirements to be fulfilled by the masking products are:

- Luminance Factor (EN 1436):  $\leq 0,06$ ;
- specular gloss (EN ISO 2813) a 85°:  $\leq 0,50$ ;
- skid resistance (EN 1436) SRT units:  $\geq 45$  SRT units;

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- durability (EN 1824 or EN 13197):  $\geq P2$ .

## 6 Performance requirements

### 6.1 Removal

#### 6.1.1 General

The main target of the work is that the quality of the removal shall minimize the risk for confusion and hazard for the drivers considering visual aspects and changes on surface properties.

Visual aspects: After removal the resulting phantom lines shall not be visible at night or day, so that there will be some limits for:

- retroreflection and luminance;
- luminance contrast with the adjacent pavement surface (minimized “Phantom lines”);
- remaining road marking.

NOTE 1 Normally the luminance deviation will be automatically evened out; by the normal dirt pick up and wearing from traffic. This will happen in a fairly short period of time (approximately 2 months depending on the ADT). However – if the initial values from the luminance deviation (contrast) are unacceptable; the contrast can be adjusted by a sprayable, coloured, bitumen.

NOTE 2 The use of aggressive (Metallic) removal technologies, may require to “seal” the surface with some Sealing or masking material.

Changes on surface properties: There will be some limits for:

- changes in the surface texture;
- grooving.

NOTE 3 After removal there are two things that may change: texture and level compared with the adjacent pavement. Texture may be measured with a simple test method (sand patch) by using the MTD (mean texture depth) and expressed as  $(MTD_d - MTD_u) = x \text{ mm}$  (d damaged; u undamaged) or by a profilometer by using the MPD (mean profile depth) and expressed as  $(MPD_d - MPD_u) \leq y \text{ mm}$

NOTE 4 The level of the damaged area is lower than the adjacent level of the pavement. The texture can be rougher, similar or smoother. This damage is hereafter called “grooving”. Level difference by measuring the depth of a groove (D).

#### 6.1.2 Test methods

Test methods for visual aspects.

**6.1.2.1 Coefficient of retroreflected luminance  $R_L$ :** Shall be measured in accordance to EN 1436 (classes for road markings are not applicable).

**6.1.2.2 Coefficient of retroreflected luminance under diffuse illumination  $Q_d$ :** Shall be measured in accordance to EN 1436 (classes for road markings are not applicable).

**6.1.2.3  $Q_d$  contrast** defined as  $(Q_{d_{RM}} - Q_{d_P})/Q_{d_P}$  and expressed as a ratio; where  $Q_{d_{RM}}$  is  $Q_d$  on the road marking and  $Q_{d_P}$  is  $Q_d$  on the adjacent pavement.

**6.1.2.4 Remaining road marking.** This parameter may be evaluated with reference to a number of the photographic reference in Annex B or as the percentage of remaining road marking calculated with recognized electronic devices and image treatment.

#### 6.1.2.5 Test methods for evaluating changes in surface properties

Properties of texture depths following the original surface specifications, will be allowed, if there are changes they will be evaluated as follows:

- **x** is the difference between the mean texture depth between the zones damaged and the undamaged ( $MTD_d - MTD_u = x$  mm) and is measured in accordance to the test method defined in Annex C and expressed in classes X1 and X2 in accordance to Table 3;
- **y** is the difference between the mean profile depth between the zones damaged and the undamaged ( $MPD_d - MPD_u = y$  mm) and is measured in accordance to the test method defined in Annex C and expressed in classes Y1 and Y2 in accordance to Table 3;
- **D** is the difference between the level of the zones damaged and undamaged by measuring the depth of a groove and is measured in accordance to the test method defined in Annex C and expressed in classes D1 and D2 in accordance to Table 3.

**Table 3 — Classes for the characteristics defining the changes in surface properties**

Changes in surface properties	Characteristic and symbol		Requirement		Not requirement
			Classes		NPR is used when Not Performance is Requested
	1	2			
	Texture depth or	X	≤ 1 mm	1 mm ≤ x ≤ 2 mm	
Profile depth (optional)	Y	≤ 1 mm	1 mm ≤ y ≤ 2 mm		
Grooving	D	≤ 1 mm	1 mm ≤ D ≤ 2 mm		

#### 6.1.3 Table of performance requirements

For the parameters described above, when required, the threshold values are in Table 4.

**Table 4 — Performance requirements for removal**

Performance requirement	Parameter and expression		Removed	
			Totally	Partially
Visual aspects	Coefficient of retroreflected luminance $R_L$ in $\text{mcd} \cdot \text{m}^{-2} \cdot \text{lx}^{-1}$		$\leq 40$	NPR*
	Contrast ratio of Qd defined as $(Qd_{RM} - Qd_P)/Qd_P$		$\leq 0,5$	NPR*
	Remaining road marking (optional)	Photographic reference $n^\circ$	$> 8$	As necessary
		Image treatment %	$\leq 5$	
Surface changes	Mean Texture depth (MTD) or	x (class)	X2	NPR*
	Mean profile depth (MPD)	y (class)	Y2	
	Deep of a groove	D (class)	D1	

\* NPR: Not Performance Requested.