

# DRAFT UGANDA STANDARD

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## Hot applied thermoplastic road marking paint — Part 2: Specification for road performance

PUBLIC REVIEW DRAFT



Reference number  
DUS DEAS 928-2: 2018

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This Draft Uganda Standard, DUS DEAS 928-2: 2018, *Hot applied thermoplastic road marking paint — Part 2: Specification for road performance*, is identical with and has been reproduced from an International Standard, DEAS 928-2: 2018, *Hot applied thermoplastic road marking paint — Part 2: Specification for road performance*, and is being proposed for adoption as a Uganda Standard.

This standard was developed by the Chemicals and environment Standards Technical Committee (UNBS/TC 5).

Wherever the words, "East African Standard " appear, they should be replaced by "Uganda Standard."



**DEAS 928-2: 2018**

ICS 87.040

## **DRAFT EAST AFRICAN STANDARD**

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**Hot applied thermoplastic road marking paint - Part 2: Specification for road performance**

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## Foreword

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The committee responsible for this document is Technical Committee EASC/TC 070, *Paints, varnishes and related products*.

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During the preparation of this Standard, reference was made to the following document:

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Acknowledgement is hereby made for the assistance derived from this source.

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# Hot applied thermoplastic road marking paint - Part 2: Specification for road performance

## 1 Scope

This Draft East Africa Standard prescribes the performance requirement for thermoplastic material which have been melted and applied on road surfaces by spray, screed or extruded.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CD/K/05:2018, *Road marking paints — Specification*

CD/K/6:2018, *Hot applied thermoplastic road marking paint — Specification, Part 1: Constituent material and mixtures*

ISO 4618, *Paints and varnishes — Terms and definitions*

ISO 591-1, *Titanium dioxide pigments for paints — Part 1: Specifications and methods of test*

EN 1423, *Road marking materials — Drop on materials — Glass beads, antiskid aggregates and mixtures of the two*

ISO 11664-2, *Colorimetry — Part 2: CIE standard illuminants*

## 3 Terms and definitions

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

### 3.1

#### **aggregate**

a granular material of mineral composition, such as calcite, quartz or flint, used to provide bulk of thermoplastic road marking material.

### 3.2

#### **binder**

a thermoplastic resinous material which, with any included oils or other plasticizers provide adhesion to the road surface and cohesion between the other components.

### 3.3

#### **extender**

a powder added to assist the dispersion of the pigment and impart body to the mixture.

**3.4**

**luminance factor**

the ratio of the luminance of a reflecting surface in a given direction to that of the ideal white diffusing surface, when viewed in same direction and illuminated in the same way, expressed as a percentage.

**3.5**

**retroreflectivity**

the property of some material such as solid glass beads, to reflect incident light in direction close to the direction from which it came.

**3.6**

**thermoplastics**

a solvent-free marking substance supplied in block, granular or powder forms. It's heated to a molten state and then applied with appropriate hand or mechanical applicator. It forms cohesive films by cooling

**3.7**

**thermoplastic road marking material**

a material consisting of aggregate, pigment, binder, glass beads and extenders, capable of being softened by heating and hardened by cooling, which is used for road marking.

**4 Designations**

Road marking material whose properties remain in accordance with clause 5.2 for a minimum of two years after laying shall be designated as class A, for a minimum of one year but less than two years shall be designated as class B material.

**5 Performance requirement**

**5.1 Material**

**5.1.1 White material**

The white material and its constituents shall meet the requirement of CD/K/6:2008. The white material shall conform to the requirements of clause 5.2.

**5.1.2 Yellow material**

The yellow material and its constituents shall meet the requirement of CD/K/6:2008. The yellow material shall conform to the requirements of clause 5.2.

**5.1.3 Surface applied glass beads**

Surface applied glass beads shall comply with class B requirements of EN 1423 and shall be applied at suitable rate to provide specified retroreflectivity.

**5.1.4 Laying of the material**

The application of the material and shall be in accordance with annex B.

## 5.2 Requirement for the laid material

### 5.2.1 Luminance factor

The luminance factor for the test area on each of the non-reflectorized beaded stripes tested in accordance with CD/K/6:2008 shall be  $50 \pm 2$  yellow pigments not less 70 % white paints.

### 5.2.2 Degree of erosion

When tested in accordance with Annex A the total wear Index for the test area on each stripe shall not exceed 35 % at each of the regular inspection.

### 5.2.3 Spread of markings

When tested in accordance to CD/K/5:2008 the width of each stripe, measured between 600 mm and 900 mm from the near Kerb, shall not have increased, at each of the regular inspection intervals by more than 10% of its initial value.

### 5.2.4 Retroreflectivity

When tested in accordance with Annex C, the retroreflectivity of each stripe with surface applied beads shall be not less than 1000 mcd / (1x m<sup>2</sup>).

### 5.2.5 Skid resistance

When tested in accordance with Annex D, the skid resistance for the test area on each surface beaded stripe for reflectorized materials and each stripe of non-reflectorized materials measured at a distance of 650 mm  $\pm$  50 mm from the nearest kerb shall not be less than 45 on the day of application of the material after a period of not less 1 h and shall not be less than 45 at each of the regular inspection intervals.

## Annex A (normative) Determination of degree of erosion

### A1 Principle

Erosion of the surface of each of the paint stripes is assessed by reference to a rating system from which a 'Wear Index' may be determined.

### A2 Procedure

#### A2.1 Preparation of Test Area

Mark on each of the reflectorized and non-reflectorized strips the extremes of the test area, which shall be 750 mm  $\pm$  50 mm and 1250 mm  $\pm$  50 mm, measured from the near side kerb.

Thoroughly wet the test area with one litre of clean water and, using a brush, brush the area evenly to dislodge superficial dirt. Rinse the area with a further one litre of clean water and remove the surface water with a soft sponge.

#### A2.2 Assessment of wear

##### A2.2.1 On-site assessment

Immediately after preparing each test area, position the test grid as shown in Figure A1. Assess the degree of paint erosion of each of the 20 grid squares according to the ratings as defined in Table A.1 and record the number of squares in each grade. (The tabular form shown in **Table A.2** is recommended.)

**Table A.1 — Assessment of rating of grid squares**

Grade	Area of paint remaining	Weighting factor
<i>a</i>	Greater than or equal to 75 %	X 1
<i>b</i>	Greater than or equal to 50 % and less than 75%	X 2
<i>c</i>	Greater than or equal to 25 % and less than 50 %	X 3
<i>d</i>	Less than 25 %	X 4

Table A.2 — Specimen 'wear index' table

Grade	Number of squares	Weighting factor	Wear index
<i>a</i>		X 1	
<i>b</i>		X 2	
<i>c</i>		X 3	
<i>d</i>		X 4	
	Total: 20		Total:

If skid marks or other non-erosion characteristics make it difficult in the opinion of the assessors to obtain an assessment of a grid square, ignore the affected square and, after recording the results of those squares which can be assessed, the grid shall be moved to include new squares in order to bring the total number up to 20. Up to eight new squares may be used in the position and sequence given in Figure A2 but assess only one new square for each square that cannot be assessed with the grid in the original position. Calculate the 'wear index' by multiplying the number of squares in each grade by the respective weighting factor for that grade and add together the four subtotals to give the total 'wear index'.

Compare the results of the five assessors and discard the highest and lowest results and calculate the mean of the remaining results.

If the value of the mean is in excess of 35 carry out the procedure described in A2.2.2. If the value of the mean is not in excess of 35, report the values obtained from the on-site assessment as the total 'wear index'.

#### **A2.2.2 Measurement on Photographs**

Photograph the test area with grid in position with a 35 mm camera using a 50-mm lens and monochromatic film. Hold the camera on a tripod at a distance between 750 mm and 800 mm above the test area.

Enlarge the photograph of the test area of the marking to half actual size. Assess the area of marking remaining within each of the 20 grid squares as depicted in the enlarged photograph with area analysis equipment, which is based on the magneto scription technique.

Trace with the stylus of the equipment around each area of eroded marking; that is, those areas, which are not substantially, white, within each of the 20 grid squares. Calculate the percentage of marking remaining within each grid square using the relationship 100- (% eroded). Grade each of the grid squares as defined in Table A.1 and record the number of squares in each grade. (The tabular form shown in Table A.2 is recommended). Calculate the total 'Wear Index' as described in A2.2.1.

Report the value obtained from the measurements made on the photographs as the total 'Wear index'.

Nearside kerb.

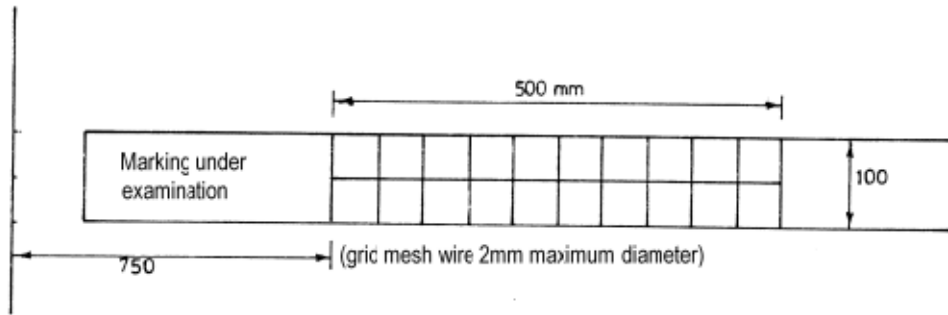


Figure A.1 —Grid mesh

- a) The location of the test grid on a road marking (each grid square is approximately 50 mm X 50 mm).

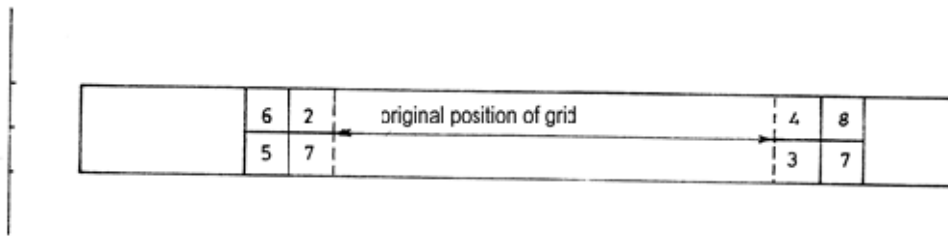


Figure A.2 — Grid mesh

## Annex B (normative)

### Laying and examination of material

#### B.1 Conditions for application of marking material

Apply marking material in stripes of 100 mm  $\pm$  10 mm in accordance with B.2 to the road surface that is free from moisture and loose particles at the following condition and temperature and humidity.

- a) Air temperature: 10 °C and 25 °C.
- b) Relative humidity: Not greater than 85 %.
- c) Road surface temperature not more than 40 °C.

Apply the stripes in a single pattern of the left hand lane of the carriageway transverse to its length.

#### B.2 Procedure

**B.2.1** Apply two stripes of the material on the surface using commercial stripping equipment to give a stripe having a thickness as follows:

- a) for synthetic resin binders: For screed and extruded lines 2.5 mm  $\pm$  0.5.
- b) For sprayed lines: 2.0 mm  $\pm$  0.5mm
- c) for products containing Gum or Wood resin binders: 3.00 mm  $\pm$  0.5.

**B.2.2** Place metal sheets of dimension, minimum thickness 1.5 mm and minimum dimensions 300 mm long and 50mm wider than the line being laid. One at the beginning of the run and the other at the end. Verify the thickness in accordance to CD/K/5:2008.

**B.2.3** Measure the width of each stripe to an accuracy of  $\pm$  2 mm at five points equally placed along the stripe and calculate the mean value.

**B.2.5** Apply to the Road surface two stripes of each material to be surface beaded. Before the material dries apply solid glass beads evenly to each stripe. Determine the thickness of each stripe in accordance to B.2.2 and measure the width of each stripe in accordance to B.2.3.

NOTE The beads should be applied by machine.

**A.2.6** After a period of 12 months from the dates on which the initial tests were conducted, retest the stripe in accordance with B.2.2 and Annex C as appropriate.

## Annex C (normative)

### Determination of retroreflectivity of laid stripes

#### C.1 Standard measuring conditions

The coefficient of retroreflected luminance,  $R_L$  of the coefficient of a field of a road marking shall be determined by:

$$R_L = L/E \text{ Unit: mcd.m}^{-2}.\text{lx}^{-1}.$$

Where:

$L$  is the luminance factor of the field under illumination by a single light source at a relatively small angular separation from location which the Luminance is Measured:  $\text{mcd.m}^{-2}$ .

$E$  is the illuminance created by light source at the field on a plane perpendicular to the direction of illumination; unit lx.

**C.1.1** In the standard measuring conditions, the directions of measurement and illumination define a plane perpendicular to the plane of the field. The observation angle  $\alpha$  (the angle between the central measuring direction and the plane of field) is  $2.29^\circ$  and the illumination angle  $\epsilon$  (the angle between central illumination direction and the plane of the field) is  $1.24^\circ$ . The measuring field shall be illuminated by a Standard Illuminant A as defined in ISO 11664-2,

**C.1.2** The total angular spread of the measuring directions shall not exceed  $0.33^\circ$ . The total angular spread of the measuring directions shall not exceed  $0.33^\circ$  in the parallel plane to the plane of the field of road marking and  $0.17^\circ$  in the plane containing the direction of measurements of illumination.

**C.1.3** The measure field of the road marking shall have a minimum area of  $50 \text{ cm}^2$ . For some profiled Road markings, with considerable spacing between the profiles, the total measured field shall be long enough to include at least one such spacing. The most reliable result is obtained when the total length includes an exact multiple of spacing. All of the measured field shall be illuminated with uniform Illuminance.

#### C.1.4 Procedure

Calibrate the instrument in accordance with manufacturer's instructions.

**C.1.4.1** Take the measurements only on a dry and, where necessary, dry the test area before test.

**C.1.4.2** Take five measurements a round a point within 200 mm of where the test stripe would be bisected by an imaginary centre line and record the result.

#### C.1.5 Expression of result

Calculate the arithmetic mean of five readings taken and express this in  $\text{mcd} / (\text{lx.m}^{-2})$  to the nearest whole numbers as the retroreflectivity of the stripe.



**Annex D**  
**(normative)**

**Determination of Skidding resistance**

**D.1 Apparatus**

**D.1.1 Portable skid resistance tester**

**D.2 Test area**

Mark on the Stripe the extremes of the test area, at a distance of  $650 \text{ mm} \pm 50 \text{ mm}$  and  $3150 \text{ mm} \pm 50 \text{ mm}$  from the nearside white edge-line.

**D.3 Procedure**

Calculate the arithmetic mean of five readings taken and express this in  $(\text{mcd} / \text{lx.m}^2)$ , to the nearest whole numbers, as the retroreflectivity of the Stripe.

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**Bibliography**

[1] KS 2157-2:2018, Hot applied Thermoplastic Road Marking paint — Specification Part 2: Specification for road performance

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