ICS 93.080.30

DMS 664-1:2000
First edition

DRAFT MALAWI STANDARD

Road signs
Part 1: Retro-reflective sheeting material

NOTE: *This is a draft Malawi Standard and it shall neither be used nor regarded as a Malawi Standard*

ICS 93.080.30

DMS 664-1:2000
First edition

Road signs
Part 1: Retro-reflective sheeting material

Obtainable from the
Malawi Bureau of Standards
Moirs Road
P O Box 946
BLANTYRE

Tel: +265 1 870 488
Fax: +265 1 870 756
E-mail: mbs@mbsmw.org
Web-site: www.mbsmw.org

Price based on 14 pages

© Copyright reserved

TABLE OF CONTENTS

Contents **Page**

FOREWORD

This draft standard is an adoption of the SANS 1519-1:2018, *Road signs – Part 1: Retro-reflective sheeting material.*

Acknowledgement is made for the use of the information.

TECHNICAL COMMITTEE

This draft standard was developed by MBS/TC 61, the Technical Committee on *Road construction and road signs* and the following companies, organizations and institutions were consulted:

– Blithe Construction Limited;
– Directorate of Road Traffic and Safety Services;
– Fargo Limited;
– Lilongwe City Council;
– Malawi Bureau of Standards;
– Malawi Transportation Technology Transfer Centre;
– Ministry of Transport, Roads Department;
– Mkaka Construction Company Limited;
– Mota-Engil;
– National Construction Industry Council; and
– The Polytechnic.

NOTICE

This approved standard shall be reviewed every five years, or earlier whenever it is necessary, in order to keep abreast of progress. Comments are welcome and shall be considered when the standard is being reviewed.

DRAFT MALAWI STANDARD
Road signs
Part 1: Retro-reflective sheeting material

1 SCOPE

This part of DMS 664 specifies requirements for retro-reflective sheeting material and non-retroreflective black sheeting for use on road signs on public roads.

NOTE 1 – The material covered in this part of DMS 664 is intended for use on road signs, the design, layout, size and colour combinations of which are specified in the *Southern African Development Community road traffic signs manual.*

NOTE 2 – Non-retro-reflective black sheeting is included in this part of DMS 664, since it forms an integral part of the material used on road signs.

2 NORMATIVE REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of this draft standard. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this draft standard are encouraged to take steps to ensure the use of the most recent edition of the standards indicated below. Information on current valid national and international standards can be obtained from the Malawi Bureau of Standards.

CIE Publication 15 (E.1.3.1), *Colorimetry.*1);

CIE Publication 54, *Retro-reflection – Definition and measurement.*1);

SANS 2813/ISO 2813, *Paints and varnishes – Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°;* and

SANS 4892-2/ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*.

3 DEFINITIONS

For the purposes of this part of DMS 664, the following definitions apply:

3.1
acceptable
acceptable to the authority administering this standard, or to the parties concluding the purchase contract, as relevant

3.2
coefficient of retro-reflection (of a plane retro-reflecting surface)
R'
quotient obtained by dividing the luminous intensity *I* of the light reflected by the surface in the direction of observation, by the illuminance $E_{\perp}$at the retro-reflecting surface on a plane perpendicular to the direction of incidence (i.e. the direction of the incident light), and by the illuminated area *A* of the retro-reflective surface

$$R' = I/E_{\perp}A$$

NOTES

1 The coefficient of retro-reflection is expressed in candelas per lux per square metre (cd/lx·m^2).

2 This quantity is especially useful for describing materials in sheet form. For such materials, the measurements are customarily made with the direction of incidence, the direction of observation, and the normal to the surface, all in the same plane.

3.3
colour
colour of the light reflected by the surface, defined in terms of its chromaticity co-ordinates, using the trichromatic system recommended by the International Commission of Illumination (see **CIE Publication 15 (E.1.3.1)**)

NOTE 1 – In this system, the colour is expressed by the chromaticity co-ordinates *x*, *y* and *z*, the sum of which is unity. The co-ordinate *x* is an indication of the proportion of red, *y* of the proportion of green, and *z* of the proportion of blue.

NOTE 2 – In this part of DMS 664, only the daytime colours of the material are specified.

3.4
entrance angle
illumination angle
β
angle between the illumination axis and the reference axis (see **Figure 1**)

NOTE – A positive entrance angle is an angle measured when the receiver (for example, a photocell or an eye) is between the illumination axis and the reference axis of the retro-reflective surface.

3.5
illumination axis
line from the reference centre to the centre of the light source (see **Figure 1**)

3.6
initial value(s)
with reference to a specific test, the value of the coefficient of retro-reflection at the start of the test, or the values of the chromaticity co-ordinates *x*, *y* and *z* at the start of the test, as relevant

3.7
luminance factor (at a point on the surface of a non-self-radiating body, in a given direction under specific conditions of illumination) ratio of the luminance of the material to that of a perfect reflecting diffuser when the material and the diffuser are identically illuminated

3.8
observation angle
α
angle between the illumination axis and the observation axis

NOTE – The observation angle is always positive and, in the context of retro-reflection, is restricted to small acute angles.

3.9
observation axis
line from the reference centre to the receiver (for example, a photocell or an eye) (see **Figure 1**)

3.10
reference axis
designated line originating in the reference centre, and used in describing the position of the entrance angle and observation angle of the retro-reflective surface (see **Figure 1**)

3.11
reference centre
point on or near a retro-reflective surface, for the purpose of specifying its performance (see **Figure 1**)

3.12
retro-reflection
reflection in which light is preferentially reflected in directions close to the opposite of the direction of incidence, this property being maintained over wide variations in the direction of incidence

3.13
specimen
except where otherwise indicated, a rectangle of size 150 mm × 70 mm, cut from a sheet of material applied to a sign board panel of equal size

4 REQUIREMENTS

4.1 Constructional requirements

4.1.1 Retro-reflective sheeting shall consist of a smooth, flat, transparent or translucent film that has retro-reflective elements beneath the surface, forming an optical reflecting system that has a non-exposed lens.

4.1.2 Non-retro-reflective sheeting shall have a smooth, flat, exterior surface.

4.2 Visual performance

4.2.1 Classification

Retro-reflective materials shall be classified as class I, class II, class III, class IV A or class IV B in accordance with the minimum coefficient of retro-reflection (see **Table 1**).

4.2.2 Coefficient of retro-reflection

4.2.2.1 When the coefficients of retro-reflection of new retro-reflective sheeting are measured in accordance with **5.2**, they shall be not less than the relevant values given in table 1, appropriate to the colour and class of the material.

4.2.2.2 After new retro-reflective sheeting has been weathered in accordance with **5.4** or **5.5**, the coefficient of retro-reflection at an observation angle of 0.33° and an entrance angle of 5° shall be at least 80 % of the relevant value given in Table 1.

Table 1 – Minimum coefficients of retro-reflection (new materials)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Class	**Observation Angle** degrees	**Entrance Angle** degrees	**Minimum coefficient of retro-reflection for different colours of material, when measured with standard illuminant A**[1)] cd/(lx·m^2)											
			Red	**Orange**	**Yellow**	**Green**	**Blue**	**Purple**	**White**	**Brown**	**Grey**	**Fluorescent orange**	**Fluorescent yellow**	**Fluorescent yellow/green**
I	0.33	5	10.0	20.0	35.0	7.0	2.0	2.0	50.0	0.6	30.0	–	–	–
	1.5	30	0.5	0.5	1.5	0.3	0.1	0.1	2.5	0.1	1.5	–	–	–
II	0.33	5	20.0	40.0	70.0	14.0	6.0	4.0	100.0	0.6	60.0	–	–	–
	1.5	30	0.5	0.5	1.5	0.3	0.1	0.1	2.5	0.1	1.5	–	–	–
III	0.33	5	25.0	65.0	120.0	21.0	14.0	6.0	180.0	8.0	90.0	–	–	–
	1.5	30	0.4	1.0	1.5	0.3	0.1	0.1	2.5	0.1	1.2	–	–	–
	0.33	40	13.0	20.0	60.0	11.0	7.0	3.2	95.0	3.0	47.0	–	–	–
IV A	0.2	5	100.0	250.0	360.0	55.0	31.0	–	600.0	18.0	–	180.0	340.0	435.0
	0.2	30	51.0	130.0	200.0	28.0	16.0	–	325.0	10.0	–	90.0	200.0	225.0
	0.33	5	78.0	190.0	250.0	36.0	25.0	–	390.0	12.0	–	115.0	225.0	310.0
	0.33	30	40.0	100.0	130.0	18.0	11.0	–	205.0	6.0	–	65.0	125.0	158.0
	0.5	5	36.0	94.0	128.0	14.0	8.0	–	165.0	5.0	–	45.0	95.0	130.0
	0.5	30	20.0	45.0	70.0	8.0	3.0	–	80.0	2.0	–	23.0	45.0	65.0
IV B	0.33	5	75.0	90.0	250.0	35.0	17.0	–	300.0	15.0	–	90.0	180.0	240.0
	0.33	30	35.0	45.0	130.0	18.0	7.0	–	150.0	7.0	–	45.0	90.0	120.0
	0.33	40	7.0	9.0	25.0	4.0	2.0	–	30.0	1.0	–	9.0	18.0	24.0
	1.0	5	20.0	24.0	65.0	10.0	5.0	–	80.0	4.0	–	24.0	45.0	65.0
	1.0	30	13.0	15.0	40.0	5.0	2.5	–	50.0	2.0	–	15.0	30.0	40.0
	1.0	40	5.0	4.5	13.0	2.0	1.0	–	15.0	0.5	–	4.5	9.0	12.0

[1)] See **CIE Publication 15 (E.1.3.1).**

4.2.3 Colour

4.2.3.1 When the chromaticity co-ordinates of new sheeting material are measured in accordance with **5.3**, they shall be within the relevant region on the chromaticity diagram (see **Figure 2**), appropriate to the colour of the sheeting. The chromaticity co-ordinates of the corners of the regions on the diagram (see **Figure 2**) for new sheeting material are given in Table 2.

Table 2 – Chromaticity co-ordinates (new and weathered materials)

1	2	3	4	5	6
Colour	**Chromaticity co-ordinates**				
	Co-ordinate	**1**	**2**	**3**	**4**
White	x y	0.355 0.355	0.305 0.305	0.285 0.325	0.335 0.375
Yellow	x y	0.545 0.454	0.487 0.423	0.427 0.483	0.465 0.534
Orange	x y	0.610 0.390	0.535 0.375	0.506 0.404	0.570 0.429
Red	x y	0.735 0.265	0.674 0.236	0.569 0.341	0.655 0.345
Blue	x y	0.078 0.171	0.150 0.220	0.210 0.160	0.137 0.038
Green	x y	0.007 0.703	0.248 0.409	0.177 0.362	0.026 0.399
Brown	x y	0.430 0.340	0.430 0.390	0.550 0.450	0.610 0.390
Grey	x y	0.350 0.360	0.300 0.310	0.285 0.325	0.335 0.375
Black	x y	0.385 0.355	0.300 0.270	0.260 0.310	0.345 0.395
Fluorescent orange	x y	0.583 0.416	0.535 0.400	0.595 0.351	0.645 0.355
Fluorescent yellow	x y	0.479 0.520	0.446 0.482	0.512 0.421	0.557 0.442
Fluorescent yellow/green	x y	0.387 0.610	0.369 0.546	0.428 0.496	0.460 0.540

4.2.3.2 After the sheeting material has been weathered in accordance with **5.4** or **5.5,** the chromaticity co-ordinates shall be within the relevant region on the chromaticity diagram (see **Figure 2**) appropriate to the colour of the sheeting. The chromaticity co-ordinates of the corners of the regions on the diagram (see **Figure 2**) for weathered sheeting material are given in **Table 2**.

4.2.3.3 Night-time colour

The night-time colour of the sheeting shall conform to the requirements of Table 3 when measured and evaluated using the CIE system. The saturation limit shall be considered to extend to the boundary of the chromaticity locus of spectral colours. Measure using CIE Illuminant A, observation angle of 0.33°, entrance angle of + 5°, source and receiver apertures each not exceeding 10 min of arc, **CIE 1931** (2°) standard observer.

Table 3 – Night-time chromaticity co-ordinates

1	2	3	4	5	6	7	8	9
Colour	**Co-ordinates**							
	x	**y**	**x**	**y**	**x**	**y**	**x**	**y**
Fluorescent orange	0.625	0.375	0.589	0.376	0.636	0.330	0.669	0.331
Fluorescent yellow	0.554	0.445	0.526	0.437	0.569	0.394	0.610	0.390
Fluorescent yellow/green	0.480	0.520	0.473	0.490	0.523	0.440	0.550	0.449

4.2.4 Luminance factor

When the luminance factor of new or weathered sheeting material is measured in accordance with **5.3,** it shall be at least the relevant value given in Table 4, appropriate to the colour and class of the material.

Table 4 – Luminance factor

1	2	3	4	5
Minimum luminance factor				
Colour	**Retro-reflective class**			
	I	**II**	**III**	**IV A & IV B**
Red	0.05	0.04	0.03	0.03
Orange	0.17	0.15	0.14	0.14
Yellow	0.27	0.21	0.16	0.16
Green	0.04	0.03	0.03	0.03
Blue	0.01	0.01	0.01	0.01
Purple	0.03	0.02	0.02	0.02
White	0.35	0.31	0.27	0.27
Grey	0.12	–	0.18	0.18
Brown	0.03 to 0.09			
Fluorescent orange	–	–	–	≥0.22
Fluorescent yellow	–	–	–	≥0.35
Fluorescent yellow/green	–	–	–	≥0.55
NOTE – The luminance factor for black non-retro-reflective sheeting shall not exceed 0.03.				

4.2.5 Specular gloss

Where the manual specifies that the colour of a coating for a sign shall be mattblack, the specular gloss of the coating at 60°, when measured in accordance with **5.11,** shall be not more than 35.

4.3 Physical performance

4.3.1 Resistance to weathering

After specimens have been weathered in accordance with **5.4** and **5.5,** the specimens shall show no evidence of cracking, scaling, pitting, blistering, delamination, distortion, blooming, staining, corrosion or chalking. There shall be no shrinkage in excess of 2 mm from any edge. In addition, there shall be no evidence of adhesion failure, such as an edge lifting from the substrate. At the end of the test period, the specimens shall be cleaned and the luminance factor shall be determined and comply with the relevant requirements of **4.2.4**. In addition, the coefficient of retro-reflection *R'* of retro-reflective material shall be measured as specified in **4.2.2** at an entrance angle of 5° and at an observation angle of 0.33°. The coefficient of retro-reflection of the exposed specimens shall be at least 80 % of the values given in **Table 1,** in accordance with the class of material.

The colour of the specimens shall still comply with **4.2.3.2.**

4.3.2 Flexibility

When classes I, II and III are tested in accordance with **5.6,** the retro-reflective or non-retroreflective material shall show no cracking or delamination.

Flexibility is not applicable to classes IV A and IV B.

4.3.3 Impact resistance

When a specimen is tested in accordance with **5.7,** there shall be no cracking and no delamination of the sheeting material outside a circle of radius 10 mm, centred on the point of impact.

4.3.4 Adhesion

When the sheeting material is tested in accordance with **5.8,** in neither specimen shall:

a) the liner break or tear or remove any of the adhesive backing during its removal from the sheeting material; or

b) the distance of peeling exceeds 40 mm.

4.3.5 Resistance to corrosion

After the specimen has been tested in accordance with **5.9,** the coefficient of retro-reflection *R'* at an observation angle of 0.33° and an entrance angle of 5° shall be at least 80 % of the relevant value given in **Table 1** and there shall be no evidence of colour change.

4.3.6 Resistance to temperature changes

When a specimen is tested in accordance with **5.10**, it shall show no signs of deterioration, such as cracking, blistering, delamination, distortion, blooming, staining and loss of adhesion. The coefficient of retro-reflection *R'* at an observation angle of 0.33° and an entrance angle of 5° shall still be at least 80 % of the relevant value given in Table 1. The colour and luminance factor limits in **Table 2** and **Table 4,** respectively, and the night-time colour limits in **Table 3** shall be maintained.

5 INSPECTION AND METHODS OF TEST

5.1 Inspection

Visually examine the sample for compliance with the requirements of this part of DMS 664 for which tests to assess compliance are not given in **5.2** to **5.11** (inclusive).

5.2 Test for coefficient of retro-reflection

Determine the coefficients of retro-reflection of the material in accordance with **CIE Publication 54**. On each specimen, take a reading at a 0° orientation angle. Check for compliance with **4.2.2.1, 4.2.2.2, 4.3.5** or **4.3.6,** as relevant.

5.3 Colour and luminance factor test

Using a spectrophotometer or other, equally suitable colour-measuring device, determine the chromaticity co-ordinates and luminance factor of the material in accordance with **CIE Publication 15 (E.1.3.1)** and **CIE Publication 54**, using standard illuminant D_{65} and 45/0 geometry. Check for compliance with **4.2.3.1, 4.2.3.2** or **4.3.6,** as relevant.

5.4 Accelerated natural weathering test

So mount a specimen of sheeting material that it faces northwards, with the inclination to the horizontal appropriate to the latitude angle. Protect cut edges and corners of the specimen in accordance with the sheeting manufacturer's recommendations and subject the specimen to unprotected outdoor exposure for the appropriate period given in **Table 5.**

At six-monthly intervals during the test, rinse the specimen with water, and, using a soft bristle brush or a sponge to avoid scratching, wash it with a neutral detergent solution. Give it a final rinse with deionized water. Examine the specimen and then repeat the tests given in **5.2** and **5.3** and check for compliance with **4.2.2.2, 4.2.3.2** or **4.2.4,** as relevant. Subject the specimen to further weathering until the duration given in Table 5 has been reached.

Table 5 – Duration of weathering

1	2	3	4
Material class	**Material warranty grade** years	**Duration of accelerated natural weathering** years	**Duration of artificial weathering test** (see 5.5) h
I	7	2	1200
II, III, IV A and IV B	10	3	1800
Non-reflective black	7	2	1200

5.5 Accelerated artificial weathering test

Using the apparatus and procedure given in **SANS 4892-2,** expose the specimens accordingly using the parameters given in **Table 6,** for the appropriate period given in **Table 5.**

Table 6 – Artificial weathering test parameters

1	2	3
Exposure parameters	**Air cooled lamp**	**Water cooled lamp**
Light/dark/water spray cycle	Continuous light with water spray on specimens for 18 min every 2 h (18/102)	Continuous light with water spray on specimens for 18 min every 2 h (18/102)
Black standard temperature during light only periods	65 °C ± 3 °C using a black standard thermometer	63 °C ± 2°C using a black panel temperature
Relative humidity	50 % ± 5 %	50 % ± 5 %
Irradiance (W/m^2) controlled at - over a 300 nm - 400 nm range - over a 300 nm - 800 nm range	 60 550	 60 550

NOTE 1 – Water used for specimen spray should contain no more than 1 ppm silica. Higher levels of silica could produce spotting on samples and variability in results. Water of the required purity can be obtained by distillation or by a combination of deionisation and reverse osmosis.

NOTE 2 – Whilst irradiance levels should be set at the above levels, variations in filter ages and transmissivity, and in calibration variations, will generally mean that irradiance error will be in the order of ± 10%.

Examine the specimen and then repeat the tests given in **5.2** and check for compliance with **4.2.2.2, 4.2.3.2** or **4.2.4,** as relevant.

5.6 Flexibility test

Condition a specimen, complete with liner, and a mandrel, of diameter 20 mm or of appropriate length, at 25 °C ± 2 °C for 4 h. Immediately after conditioning, wrap the specimen, with the reflecting surface facing outwards, around the mandrel. Check for compliance with **4.3.2.**

5.7 Impact test

5.7.1 Apparatus

The apparatus required for this test comprises a steel rod plunger, of mass 1 kg and that has a hemispherical tip of diameter 15 mm, which can be dropped from a height of 100 mm through a graduated 16 mm diameter tube onto the back of the supported test panel. The support shall consist of an annular die, with an internal diameter of 16 mm, centrally located under the plunger.

5.7.2 Procedure

Drop the plunger onto the back of the test panel in three different places.

Check for compliance with **4.3.3.**

5.8 Adhesion test

5.8.1 Equipment

5.8.1.1 Oven, maintained at 70 °C ± 2 °C.

5.8.1.2 Two specimens (of each type of material), each of size 50 mm × 150 mm.

5.8.1.3 Flat metal sheet, of size at least 100 mm × 150 mm and of mass 225 g.

5.8.1.4 Two masspieces, each of mass 750 g.

5.8.2 Procedure

5.8.2.1 Pressure-sensitive material: Place two specimens side by side in the oven and cover them with the metal sheet for 4 h. Remove the specimens from the oven and condition them at 25 °C ± 2 °C for 24 h. Then cut one 25 mm × 150 mm piece from each specimen, remove the liner by hand without the use of water or other solvent(s), and examine the liner and the adhesive backing for compliance with **4.3.4.**

5.8.2.2 Heat-sensitive material: Cut two 25 mm × 150 mm pieces from the specimen, remove the liner by hand without the use of water or other solvent(s), and examine the liner and the adhesive backing for compliance with **4.3.4.**

5.8.2.3 All material: Apply 75 mm of one end of each specimen to a test panel in accordance with the manufacturer's instructions and condition the specimens at 25 °C ± 2 °C for 24 h. Suspend the panels in a horizontal position, with the specimens hanging downward. Attach a 750 g masspiece to the free end of each specimen and allow it to hang free at right angles to the panel surface for 5 min. Measure the distance of peeling and check for compliance with **4.3.4.**

5.9 Corrosion test

5.9.1 Apparatus and materials

5.9.1.1 Supply of an atmosphere, comprising between 1 µL/L and 10 µL/L of sulphur dioxide (SO_2) in air.

5.9.1.2 Apparatus, similar to that shown in **Figure 3,** in which the specimens are exposed to the sulphur dioxide atmosphere.

5.9.2 Procedure

5.9.2.1 Place the specimen in the desiccator bowl and evacuate the air.

5.9.2.2 Restore the bowl to atmospheric pressure by bleeding in the diluted sulphur dioxide atmosphere.

5.9.2.3 Repeat the process of evacuating and bleeding in new dilute gas once every 24 h for 7 d.

5.9.2.4 Carry out the test in **5.2.**

5.9.2.5 Check for compliance with **4.3.5.**

5.10 Temperature test

5.10.1 Apparatus

5.10.1.1 Oven, the temperature of which can be maintained at 80 °C ± 2 °C for classes I, II and III and at 55 °C ± 2 °C for classes IV A and IV B.

5.10.1.2 Freezer, the temperature of which can be maintained at −12 °C ± 2 °C.

5.10.2 Procedure

5.10.2.1 Bring the oven temperature to the appropriate value specified in **5.10.1.1.**

5.10.2.2 Place the specimen in a vertical position in the oven at 80 °C ± 2 °C for 60 min.

5.10.2.3 Remove the specimen from the oven and immediately place the specimen in a vertical position in the freezer at −12 °C ± 2 °C for 60 min.

5.10.2.4 Repeat the procedure in **5.10.2.2** and **5.10.2.3** three times (i.e. perform the procedure a total of four times).

5.10.2.5 Carry out the tests in **5.2** and **5.3.**

5.10.2.6 Check for compliance with **4.3.6.**

5.11 Specular gloss test

Measure the 60° specular gloss of the matt-black coating in accordance with **SANS 2813.** Check for compliance with **4.2.5.**

6 PACKING AND MARKING

6.1 Sheeting

6.1.1 Retro-reflective material shall bear, in legible marking, a watermark or other permanent marking or pattern that is visible on the face of the material and that identifies the manufacturer of the material and the class or warranty grade.

6.1.2 The liner of non-retro-reflective material shall bear the manufacturer's name or trade name or trade mark.

6.2 Packaging

The packaging within which the material is shipped, shall bear the following information:

– the manufacturer's name or trade name or trade mark;

– the class or warranty grade of the retro-reflective material; and

– the batch number (on the packaging and core of the roll of material).

6.3 Legibility of marking

When retro-reflective material is tested in accordance with **5.4** or **5.5,** the marking in **6.1.1** shall remain legible.

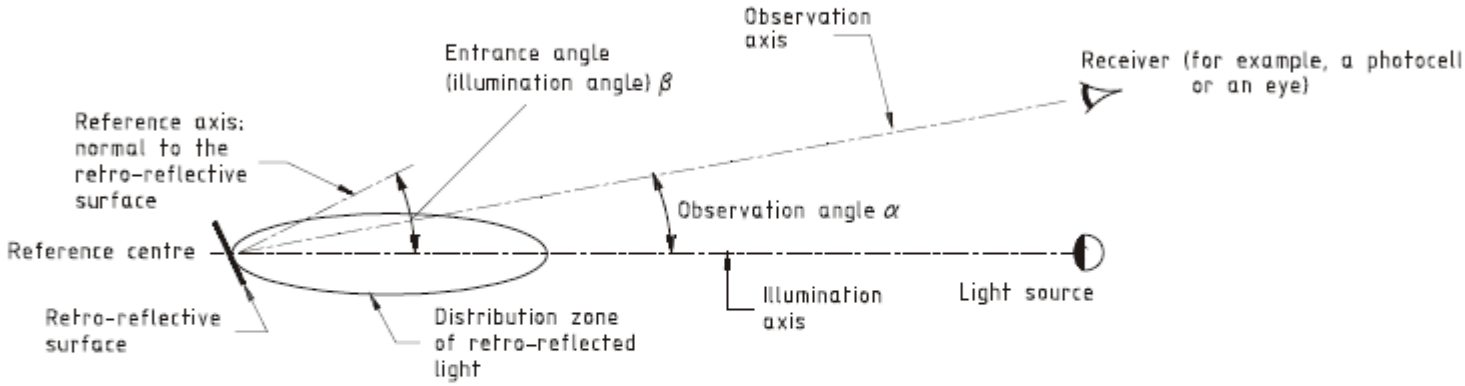

Figure 1 — Typical parameters in retro-reflection

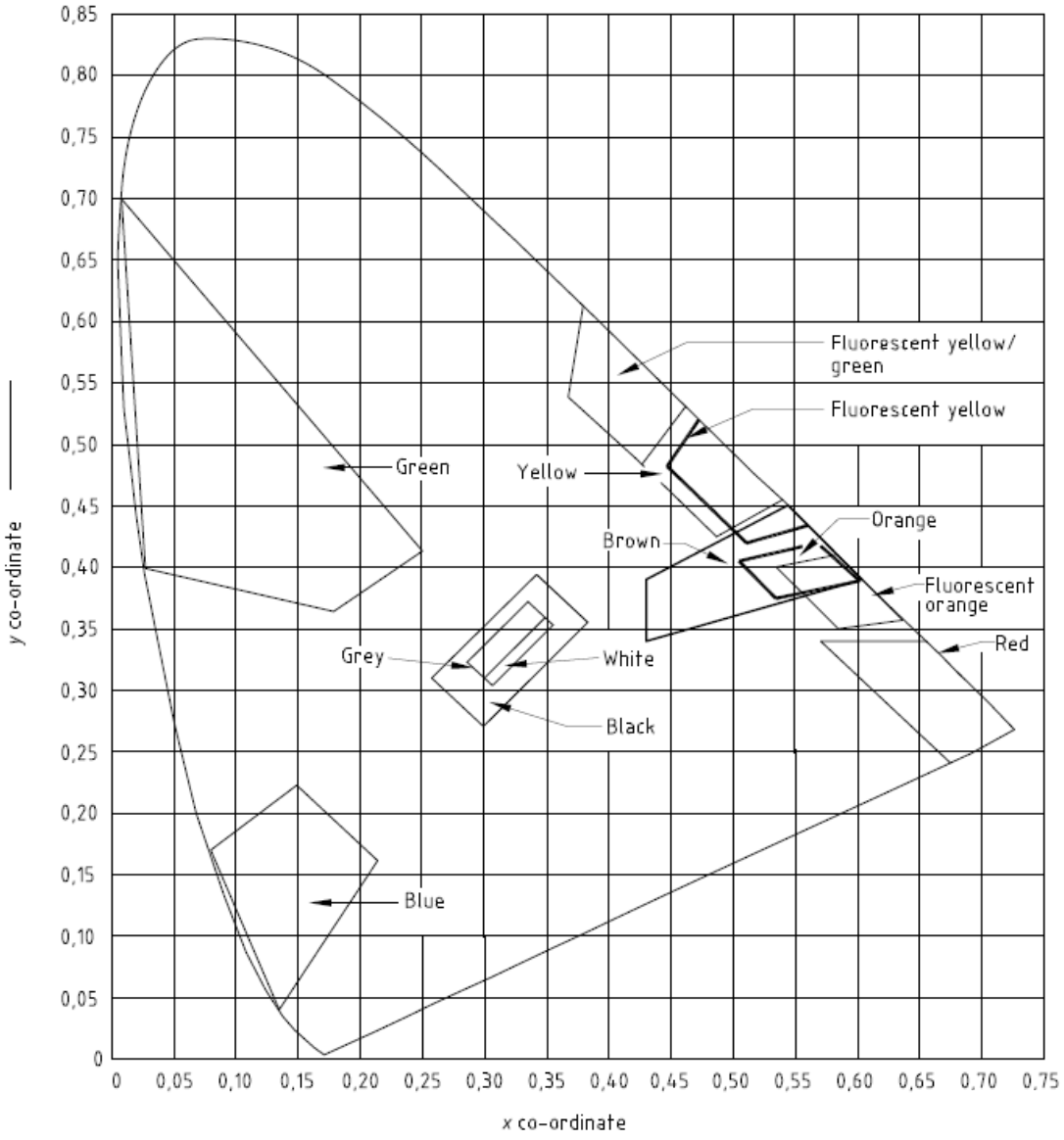

Figure 2 – Chromaticity diagram

ANNEX A
(informative)

Quality verification of retro-reflective and non-retro-reflective black sheeting material

When a purchaser requires ongoing verification of the quality of retro-reflective and non-retroreflective black sheeting material, it is suggested that, instead of concentrating solely on evaluation of the final product, he also direct his attention to the manufacturer's quality system. In this connection it should be noted that **MS-ISO 9001** covers the provisions of an integrated quality system.

Bibliography

[1] MS-ISO 9001: 2015, *Quality management systems – Requirements*.

ICS 93.080.30

DMS 664-1:2000
First edition

THE MALAWI BUREAU OF STANDARDS

The Malawi Bureau of Standards is the standardizing body in Malawi under the aegis of the Ministry of Industry, Trade and Tourism. Set up in 1972 by the Malawi Bureau of Standards Act (Cap: 51:02), the Bureau is a parastatal body whose activities aim at formulating and promoting the general adoption of standards relating to structures, commodities, materials, practices, operations and from time to time revise, alter and amend the same to incorporate advanced technology.

CERTIFICATION MARK SCHEME

To bring the advantages of standardization within the reach of the common consumer, the Bureau operates a Certification Mark Scheme. Under this scheme, manufacturers who produce goods that conform to national standards are granted permits to use the Bureau's "Mark of Quality" depicted below on their products. This Mark gives confidence to the consumer of the commodity's reliability.