



EAST AFRICAN STANDARD

**Retro-reflective and fluorescent warning signs for road vehicles —
Specification — Part 3: Signs other than triangles, chevron signs
and abnormal load vehicle signs**

EAST AFRICAN COMMUNITY

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

© East African Community 2010 — All rights reserved*

East African Community

P O Box 1096

Arusha

Tanzania

Tel: 255 27 2504253/8

Fax: 255-27-2504481/2504255

E-Mail: eac@eachq.org

Web: www.each.int

Contents

1	Scope	1
2	Normative references.....	1
3	Definitions.....	2
4	Requirements	2
4.1	Type.....	2
4.2	Materials	2
4.3	Construction	3
4.4	Application of materials and of corrosion protection coating	5
4.5	Workmanship.....	5
4.6	Performance	5
5	Packing, marking and labelling	7
5.1	Packing.....	7
5.2	Marking.....	7
5.3	Labelling	7
6	Inspection and methods of test	7
6.1	Inspection	7
6.2	Test specimens.....	8
6.3	Reflected luminous intensity test.....	8
6.4	Colour and luminance factor test for fluorescent surfaces.....	8
6.5	Test for resistance to artificial weathering.....	9
6.6	Test for resistance to impact.....	10
6.7	Test for resistance of coatings to flaking (signs having a plastics substrate).....	10
6.8	Test for resistance of coatings to scratching	10
6.9	Test for resistance to salt fog.....	10
6.10	Colour and luminance factor test	11
6.11	Flexibility test	11
	Annex A (informative) Notes to purchasers.....	17
	Annex C (informative) Quality evaluation of signs produced to the requirements laid down in this part of the specification.....	18

Draft for comments only — Not to be cited as East African Standard

Retro-reflective and fluorescent warning signs for road vehicles — Specification — Part 3: Signs other than triangles, chevron signs and abnormal load vehicle signs

1 Scope

This part of the specification covers requirements for signs, including decals, that are retro-reflective and fluorescent, and that are intended to indicate:

- a) the maximum permissible speed;
- b) the width of motor vehicles operating on public roads; and
- c) identification of emergency vehicles.

NOTE

- a) The signs covered by this part of the specification may be used to give advance warning to approaching traffic¹⁾ of
 - 1) in the case of the circular signs, a vehicle that has a restricted maximum speed (see Figure 1); and
 - 2) in the case of the rectangular signs, the width of a vehicle (see Figure 2).
- b) The standards referred to in this part of the specification are listed in Clause 2.
- c) Requirements that must be specified by the purchaser are listed in Annex A.
- d) Guidance on the verification of the quality of signs produced to this part of the specification is given in Annex C.

2 Normative references

The following referenced documents are indispensable for the application of this East African Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CIE 15, *Colorimetry*

CIE 54, *Retro-reflection — Definition and measurement*

SABS 630, *Decorative high gloss enamel paint for interior and exterior use*

ISO 7724, *Paints and varnishes — Colorimetry*

ISO 6745, *Zinc phosphate pigments for paints — Specifications and methods of test*

EAS 293-1, *Road marking materials — Part 1: Physical properties*

ISO 8502, *Preparation of steel substrates before application of paints and related products*

ISO 105-A02, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour*

ISO 3575, *Continuous hot-dip zinc-coated carbon steel sheet of commercial, lock-forming and drawing qualities*

¹⁾ To ensure correct use of these signs, the user should consult the relevant road traffic regulations.

ISO 3668, *Paints and varnishes — Visual comparison of the colour of paints*

ISO 4998, *Continuous hot-dip zinc-coated carbon steel sheet of structural quality*

ISO 7724-2, *Paints and varnishes — Colorimetry — Part 2: Colour measurement*

ISO 9001, *Quality management systems — Requirements*

SABS SMs 146, 147, 155.

3 Definitions

For the purposes of this part of the specification the following definitions shall apply:

3.1

fluorescence

the phenomenon that occurs when light of a certain wavelength is absorbed by a chemical substance in the surface of a material and part of the light energy is reradiated as light of a longer wavelength

3.2

retro-reflective surface

a surface from which light is reflected in directions close to the direction of incidence within a wide range of angles of incidence at the reflecting surface

3.3

warning face

a surface of a warning sign that is intended to be displayed when the sign is in use

4 Requirements

4.1 Type

A sign shall be a type H sign (i.e. an indicator of the restricted maximum speed of a vehicle) or a type I sign (i.e. an indicator of the width of vehicle).

4.2 Materials

4.2.1 Substrate materials

The substrate material of a sign shall be such that

- a) when, at an ambient temperature of 20 ± 1 °C, a specimen of the substrate material of length and width approximately 150 mm and 70 mm, respectively, is placed on two parallel knife-edge supports that are each not more than 10 mm from an end of the specimen, and a force of $20 \begin{matrix} +1 \\ -0 \end{matrix}$ N is applied vertically downwards at the centre of the specimen and maintained for a period of at least 5 s,
 - 1) the deflection does not exceed 3,0 mm; and
 - 2) there is no permanent deflection after the force has been removed;
- b) it is, when relevant, suitable for the embossing process;
- c) in the case of a plastics material²⁾, it is of the thermoplastics type, has a high impact resistance, is water resistant and fuel resistant, contains ultraviolet light absorbers and anti-oxidants and may contain a red fluorescent colorant; and

²⁾ In the case of a sign that has retro-reflective material on the warning face, before specifying a plastics material for the substrate material the purchaser should consult with the manufacturer or the supplier of the retro-reflective material regarding the compatibility of the retro-reflective material and the plastics material.

- d) the completed sign complies with the performance requirements given in 4.6.

4.2.2 Retro-reflective materials

Retro-reflective material shall comply with the requirements for

- a) reflected luminous intensity given in 4.6.1; and
 b) the chromaticity co-ordinates given in 4.6.2;

and, in the case of a pressure-sensitive adhesive material, with the requirement for strength of adhesion given in EAS 293-1. The colour of the retro-reflective material shall be red or yellow, as appropriate (see 4.3.4).

4.2.3 Retro-reflector units

The colour of the retro-reflective part of a retro-reflector unit shall be red and each retro-reflector shall comply with the relevant requirements for a class 1A retro-reflector given in CIE 72 for

- a) general construction;
 b) shape;
 c) colour;
 d) resistance to penetration by water, except that the CIL value of the retro-reflector shall be at least 90 % of the initial value or at least equal to the appropriate value given in CIE 72;
 e) adhesion of mirror coating;
 f) resistance to heat;
 g) resistance to motor fuel; and
 h) resistance to lubricating oil.

4.2.4 Fluorescent materials

Fluorescent material shall comply with the requirements for colour and for luminance factor given in 4.6.2. Fluorescent material shall be in the form of

- a) sheeting, having a pre-coated adhesive backing and complying with the requirement for strength of adhesion given in EAS 293-1; or
 b) fluorescent paint³⁾; or
 c) in the case of a plastics substrate material and, when appropriate, a fluorescent colorant incorporated in the substrate material.

4.3 Construction

4.3.1 General

A type H sign shall be circular in shape and a type I sign shall be rectangular in shape and a sign shall be generally in accordance with Figure 1 or Figure 2, as relevant. A sign shall be so constructed that it is suitable for being attached to the rear of a vehicle (see Figure 4). In the case of a type I sign, the corners of the sign may be rounded, if required.

³⁾ A suitably prepared surface shall have a final coat of fluorescent paint.

4.3.2 Dimensions

The dimensions of a sign shall, subject (when relevant) to the appropriate tolerances given in 4.3.3, be as follows:

- a) **type H sign:** diameter 200 mm;
- b) **type I sign:** height 450-550 mm and width 175-225 mm.

4.3.3 Tolerances

The dimensions shall, when relevant, be subject to the appropriate of the following tolerances:

Range of dimensions	Tolerance, \pm
mm	mm
0 — 50	0.5
51 — 200	1
201 — 500	2
>500	3

4.3.4 Warning face

A sign shall have one warning face. The warning face shall, with the exception of numerals, be retro-reflective in the case of a type H sign and retro-reflective and fluorescent in the case of a type I sign. Retro-reflection shall be provided by retro-reflective material or, when relevant, retro-reflectors (or both) and fluorescence shall be provided by fluorescent sheeting or fluorescent paint or, when appropriate, a fluorescent colorant in the substrate material. Where retro-reflectors are used to provide retro-reflectivity in a type I sign and the reflector units cover less than 30 % of the surface shown in Figure 2 as retro-reflective, the rest of the said surface shall, to maintain the integrity of the sign, be covered with red retro-reflective material or a matt red coating of a shade that is a practical match to colour No. A11 "Signal red" of ISO 7724. The warning face shall be applied symmetrically to the surface of a sign and shall consist of the appropriate of the following:

- a) Type H signs. An outer annulus of width 25 mm (subject to the appropriate tolerance given in 4.3.3) and consisting of red retro-reflective material, the remainder of the warning face (except the numerals) consisting of yellow retro-reflective material and the colour of the numerals being matt black (see Figure 1).
- b) Type I signs. A rectangle divided longitudinally into two rectangular sections, one section consisting of red retro-reflective material or a combination of red retro-reflective material or a matt red coating and red retro-reflectors, as appropriate, and of area not less than 0.047 m² and not more than 0.092 m² and the other section consisting of fluorescent material of area at least 0.032 m² (see Figure 2).

4.3.5 Numerals

The warning face of a type H sign shall have numerals complying with the following requirements:

- a) **Number.** The warning face shall display the required numerals and the number shall be centrally located on the warning face.
- b) **Shape, dimensions and setting out of numerals.** The shape and dimensions of each numeral shall conform to those of the appropriate numerals given in Figure 3. Each numeral shall lie within a frame of height 75 mm (see frame lines "c" and "d") and of width equal to the distance between the frame lines "a" and "b" applicable to that numeral. In addition, the location of each numeral with reference to the frame lines "a" and "b" shall be as shown in Figure 3. Numerals shall be so set out that the frame lines "a" and "b" of adjacent numerals coincide.

- c) **Application.** Numerals shall have been applied by a process (which may include embossing) such that the sign complies with the appropriate performance requirements given in 4.6. The height of each embossed numeral above the surface of the warning face shall exceed 1 mm but shall not exceed 2 mm and embossing shall have been carried out after the application of the yellow retro-reflective material.

4.4 Application of materials and of corrosion protection coating

4.4.1 Application of materials

Before the application of any material to the warning face, both surfaces of a sign shall have been cleaned of all grease, oil, corrosion products and other foreign matter, and dried. The edges of a steel sign shall be adequately protected from weathering by at least the application of a zinc phosphate primer that complies with the requirements of type II, grade I of ISO 6745.

4.4.2 Corrosion protection coating

Corrosion protection for a sign that has a steel substrate shall be as follows:

- a) a sign shall have
 - 1) a galvanized coating applied by a continuous hot-dip galvanizing process, in accordance with the requirements given in ISO 3575 and ISO 4998; and
 - 2) an epoxy primer coating of minimum dry film thickness 3 µm; and
- b) the sign shall have a finishing coat of siliconized polyester paint of minimum thickness 20 µm, applied by a continuous coil coating process and oven cured, to the warning face at least.

4.5 Workmanship

The boundaries between the different areas and, when relevant, the edges of numerals on the warning face of a sign shall be clearly defined. Surfaces covered with fluorescent and retro-reflective material and protective and other coatings, shall be free from creases, cracks, blisters, discoloration and lack of adhesion. A sign shall be free from sharp and jagged edges and the edges of a sign that has a metal substrate shall be free from corrosion.

4.6 Performance

4.6.1 Reflected luminous intensity

- a) Type H signs and type I signs using reflective sheeting. When measured in accordance with 6.3 at an observation angle of 0.33° and at an angle of incidence of 5°, the calculated reflected luminous intensity shall be at least 30 cd/m² per incident lux for the red areas and at least 105 cd/m² per incident lux for the yellow areas.
- b) Type I signs using retro-reflectors. When measured in accordance with 6.3 for each observation angle and each angle of incidence, the reflected luminous intensities shall be as given in Table 1.

Table 1 — Reflected luminous intensities of retro-reflective surfaces

1	2	3	4	5
	Reflected luminous intensity cd per incident lux, min.			
	Angle of incidence, degrees			
Vertical	0	±20	0	0
Horizontal	*0	0	+30	+40
Observation angle: 20'	8.00	4.00	1.75	0.60
1° 30'	0.60	0.20	0.10	0.05

* ± 5° in the case of retro-reflective material (see 4.2.2).

4.6.2 Colour and luminance factor of surfaces

4.6.2.1 Colour of surfaces

When the surface of a sign is tested in accordance with 6.10 before artificial weathering, the chromaticity co-ordinates of the surface shall be within the area on the chromaticity diagram bounded by the limits given in Table 2.

Table 2 — Chromaticity co-ordinates of the points of intersection of the boundary lines of the limiting area on the chromaticity diagram — Before artificial weathering

1	2	3	4	5
Co-ordinate	Value of co-ordinate			
Red x	0.690	0.595	0.569	0.655
y	0.310	0.315	0.341	0.345
Yellow x	0.545	0.487	0.427	0.465
y	0.454	0.423	0.483	0.534

4.6.2.2 Luminance factor of fluorescent surfaces

When the fluorescent surface of a type I sign is tested in accordance with 6.4, the luminance factor shall be not less than 20 % before artificial weathering, and not more than 60 % after artificial weathering.

4.6.3 Resistance to artificial weathering

When a sign is tested in accordance with 6.5,

- retro-reflective and fluorescent surfaces shall show no sign of cracking, blistering or lack of adhesion;
- each value of reflected luminous intensity of each retro-reflective surface shall be at least 50 % of the corresponding value given in 4.6.1.
- the chromaticity co-ordinates of the surface shall be within the area on the chromaticity diagram bounded by the limits given in Table 3, and the luminance factor shall comply with the requirements of 4.6.2.2;
- protective and other coated surfaces, when relevant, shall show no sign of chalking, checking or a visual colour change rating lower than 4 (based on a Figure of 5 for no colour change); and
- uncoated surfaces, when relevant, shall show no sign of deterioration.

Table 3 — Chromaticity co-ordinates of the points of intersection of the boundary lines of the limiting area on the chromaticity diagram — After weathering

1	2	3	4	5
Co-ordinate	Value of co-ordinate			
Red x	0.690	0.595	0.535	0.610
y	0.310	0.315	0.375	0.390
Yellow x	0.545	0.487	0.487	0.465
y	0.454	0.423	0.423	0.534

4.6.4 Resistance to impact

When a sign is tested in accordance with 6.6, coatings on surfaces, including fluorescent coatings and coverings of retro-reflective material, shall show no evidence of cracking or loss of adhesion.

4.6.5 Resistance of coatings to flaking

When the warning face and other coated surfaces of a sign having a plastics substrate are tested in accordance with 6.7, coatings shall show no sign of flaking.

4.6.6 Resistance of coatings to scratching

When the warning face and other coated surfaces of a sign are tested in accordance with 6.8, the scratch produced shall be free from jagged edges and shall not have penetrated to the substrate.

4.6.7 Resistance to salt fog

When a sign is tested in accordance with 6.9,

- a) there shall be no sign of cracking, blistering or loss of adhesion on any fluorescent coating or retro-reflective material;
- b) there shall be no sign of corrosion or lack of adhesion on any retro-reflector or its fastener(s);
- c) in the case of other coated surfaces, there shall be no sign of corrosion of the substrate, except at the scribe mark where corrosion, creep or blisters (or any combination of these) shall not extend further than 2 mm on each side of the mark; and
- d) there shall be no sign of deterioration of surfaces or of edges.

4.6.8 Flexibility of decals

When tested in accordance with 6.11, the decal shall show no evidence of cracking.

5 Packing, marking and labelling**5.1 Packing**

Signs shall be so packed that they are protected from damage during normal transportation and storage.

5.2 Marking

Each sign shall bear, in legible and indelible marking on the warning face, the manufacturer's name, trade name or trade mark. The space occupied by this marking shall be of height and length approximately 5 mm and 25 mm, respectively. The quality of the marking shall be such that, when the sign is tested in accordance with 6.5 and 6.9, there is no loss of integrity of the marking.

5.3 Labelling

Each sign shall bear, on the reverse face, a securely attached label that provides, in legible and indelible printing, at least the following information:

- a) a warning that the sign should not be fastened by any means that interferes with or diminishes its visibility or, when relevant, its legibility;
- b) in the case of a sign that has an aluminium alloy substrate, a warning that fasteners used for attaching the sign to a vehicle shall on no account be made from copper, brass, bronze or unprotected mild steel;
- c) in the case of a sign that has a mild steel substrate, a warning of the danger that steel surfaces that become exposed during the fitting of a sign will corrode unless they are adequately protected from corrosion, e.g. by being coated with a zinc phosphate primer.

6 Inspection and methods of test**6.1 Inspection**

Visually examine and measure each sign in the sample for compliance with all the relevant requirements of this part of the specification for which tests to assess compliance are not given in 6.3 – 6.9 (inclusive).

6.2 Test specimens

From the signs in the sample prepare the following test specimens:

- a) Reflected luminous intensity. A test specimen of size approximately 70 mm x 150 mm, the face of which includes as much of the retro-reflective surface of the sign as is practicable.

NOTE In the case of a type H sign, obtain a specimen of the red retro-reflective material from the material used in the manufacture of the sign and place it on a test plate of the size given above.
- b) Colour and luminance factor of fluorescent surface. Three test specimens of size approximately 70 mm x 150 mm, the faces of which are entirely covered by the fluorescent material.
- c) Resistance to weathering. Three test specimens of size approximately 70 mm x 150 mm that include as much of the retro-reflective and fluorescent surfaces and any other coating, edges, marking (see 5.2) and, when relevant, holes (for attachment) as is practicable. In the case of signs that have a mild steel substrate, seal the newly cut edges.
- d) Resistance to impact. A test specimen of any convenient size that, when relevant, includes no retro-reflector but, in the case of a type H sign, includes a numeral.
- e) Resistance of coatings to flaking. In the case of a sign that has a plastics substrate, a test specimen of size approximately 50 mm x 50 mm that includes as much of the retro-reflective and fluorescent material and any other coating as is practicable.
- f) Resistance to scratching. A test specimen of size approximately 55 mm x 100 mm that includes as much of the retro-reflective and fluorescent material and any other coating as is practicable.
- g) Resistance to salt fog. One test specimen in the case of a sign without any protective coating, and two specimens in other cases, each specimen being similar to the specimens described in (c) above, but of size approximately 100 mm x 150 mm.

6.3 Reflected luminous intensity test

Use the method given for the photometric test in EAS 293-1 to determine the reflected luminous intensity of the specimen (see 6.2(a)) for one of the observation angles and one of the angles of incidence given in table 1. From the area of the specimen and that of the retro-reflective surface of the sign under test, calculate the reflected luminous intensity of the warning face.

NOTE Where the warning face comprises non-continuous retro-reflector units, only whole units shall be included in the test sections.

Repeat the procedure for every other combination of observation angle and angle of incidence and check for compliance with 4.6.1. Repeat the test after the specimen has been weathered in accordance with 6.5 and check for compliance with 4.6.3(b).

6.4 Colour and luminance factor test for fluorescent surfaces

Use a suitable colorimeter with illumination and viewing conditions as recommended by the International Commission of Illumination, i.e. angles of incidence and observation of 45° and 0° respectively. Illuminate the type I sign specimen (see 6.2(b)) with illuminant C and determine the chromaticity co-ordinates and the luminance factor of the light diffusely reflected from the surface. Check for compliance with the applicable requirements of 4.6.2.

NOTE If the colorimetric characteristics have been calculated in the XYZ system, determine the luminance factor by applying the ratio $Y:Y_0$ where Y is the tristimulus value of the sample and Y_0 is that of a perfect diffuser observed under the same conditions. The test report shall contain at least the following information:

- the type of instrument (spectrophotometer, tristimulus colorimeter, etc.),
- its designation (manufacturer and type),
- identification of the illuminant used, and

— lighting and viewing angles.

6.4.1 After weathering

Repeat the test after the specimen has been weathered in accordance with 6.5 and check for compliance with 4.6.3(c).

6.4.2 Painted surfaces

Test as described in 6.4 and check for compliance with the applicable requirements of 4.6.2 before weathering.

After the specimen has been weathered in accordance with 6.5, check for compliance with 4.6.3(d).

NOTE Rating of the change in colour according to the grey scale described in ISO 105-A02 shall be detailed according to the method for visual comparison contained in ISO 3668.

6.5 Test for resistance to artificial weathering

6.5.1 Apparatus

A weathering unit consisting of a test chamber constructed of corrosion-resistant materials and enclosing eight fluorescent UV lamps, a heated water pan and test specimen racks, and providing means for controlling and recording operating times and temperatures. The essential features of the unit are as follows:

- a) Lamps. The lamps are of type FS 40 fluorescent UV lamps or equivalent, the spectral energy distribution curve having a maximum at a wavelength of 313 nm with less than 1 % of the peak intensity at 280 nm. The lamps have a length of 1 220 mm and a nominal rating of 40 W when operated from a ballast providing a controlled current of 430 mA at 102 V.

The lamps are so mounted in two banks of four lamps each as to provide a uniform distribution of irradiance. The lamps in each bank are parallel and spaced at 70 mm centres.

- b) Racks for test specimens. Two racks for mounting the test specimens (see 6.2(c)) are provided in the chamber, each rack being of height 300 mm and width 1154 mm, and so positioned that a surface of each test specimen is parallel to the plane of one bank of lamps and at a distance of 50 mm from the nearest surface of the lamps. The specimen racks and the test specimens themselves constitute the side walls of the chamber. The back surface of each test specimen is thus exposed to the ambient air.

The test specimens are so arranged that condensate forming on each test surface is caused by gravity to run off the test surface and is replaced by fresh condensate in a continuous process. Vents provided along the bottom of the test chamber admit ambient air and so prevent oxygen depletion of the condensate.

- c) Water pan. Water vapour is generated by the heating of water in a water pan extending under the entire specimen area and containing water to a depth of at least 25 mm.
- d) Water supply. The water supply has an automatic control to regulate the level in the water pan. (Distilled, de-ionized or potable tap water may be used.)
- e) Cycle timer. The test chamber has a continuously operating cycle timer and a controller that controls the UV radiation periods and the condensation periods as selected. An hour meter records the total time of operation and the total time of UV exposure.
- f) Thermometer. The temperature in the test chamber is measured by means of a thermocouple, the junction of which is inserted in a black aluminium panel of size 75 mm × 100 mm × 2.5 mm. The thermometer measures a range of 30-80 °C and is accurate to within 1 °C. The indicator dial of the thermometer is located outside the test chamber. The aluminium panel and thermocouple junction are so positioned in the centre of the exposure rack that they are subjected to the same conditions as the specimens.

- g) Temperature control

- 1) During UV exposure, the selected equilibrium temperature is maintained to within 3 °C by the supply of heated air to the test chamber.
- 2) During condensation exposure, the selected equilibrium temperature is maintained to within 3 °C by the heating of the water in the pan.
- 3) The UV temperature and condensation temperature are controlled independently of each other.
- 4) Doors are located on the ambient air side of the specimen rack to act as insulation during the UV exposure and to minimize draughts. The doors are so arranged that they do not interfere with the ambient air cooling of the specimens during the condensation exposure.

6.5.2 Procedure

- a) Seal the cut edge of each specimen (see 6.2(c)).
- b) Mount the test specimens in the specimen racks with the test surfaces facing the lamps.
- c) Select the following cycle conditions:
 - 1) 4 h of UV exposure at 60 °C;
 - 2) 4 h of condensation exposure at 50 °C.
- d) Except for servicing the apparatus and inspecting the specimens, repeat the cycle continuously over a period of 100 h for fluorescent material and 800 h for retro-reflective material.
- e) At regular intervals during the specified exposure period, examine the specimens under 10x magnification.
- f) Check for compliance with the applicable requirements of 4.6.3 and 4.2.

6.6 Test for resistance to impact

Use the apparatus and procedure described in SABS SM 146 to subject each of the appropriate parts (see 4.6.4) of each test specimen (see 6.2(d)) to an impact energy of 2.25 J in the case of a sign having a steel substrate, 1.15 J in the case of a sign having an aluminium alloy substrate and an impact energy of a suitable value in the case of a sign having a substrate of another material⁴⁾. Check for compliance with 4.6.4.

6.7 Test for resistance of coatings to flaking (signs having a plastics substrate)

On the specimen (see 6.2(e)) make, with a razor blade, a series of parallel cuts 2 mm apart through the coating to the plastics substrate, then make a second similar series of cuts at right angles to the first, and check for compliance with 4.6.5. When relevant, repeat the test on the other coating(s) on the specimen.

6.8 Test for resistance of coatings to scratching

Use the apparatus and procedure described in SABS SM147, with the needle loaded with masspieces of total mass 2 000 g, to test the coating on each specimen (see 6.2(f)). Check for compliance with 4.6.6.

6.9 Test for resistance to salt fog

In the case of specimens that have one or more coated surfaces, make on each such surface (with the cutting edge of the cutting tool held at an angle of about 30° to the surface and the plane of the blade perpendicular to the surface), a scribe mark of length about 75 mm and that penetrates through the coating to the substrate.

⁴⁾ In the case of a sign having a substrate of a material other than steel or aluminium alloy, the value of the impact energy to be applied should be obtained from a recognized testing authority.

Then, using the apparatus and method described in SABS SM 155, subject the test specimen(s) (see 6.2(g)) to the test for a period of 240 h. After a 24 h recovery period, examine for compliance with 4.6.7 and 5.2.

6.10 Colour and luminance factor test

Determine the chromaticity co-ordinates and luminance factor of the specimen with a spectrophotometer or other equally suitable colour measuring device in accordance with the method given in CIE 15 and CIE 54, using Standard Illuminant D65 and 45/0 geometry. Check for compliance with 4.6.2.

6.11 Flexibility test

6.11.1 Specimens

Condition a 25 mm × 50 mm specimen of the decal, having removed the backing and having covered the adhesive with talk powder to prevent sticking, for 2 h under standard test conditions.

6.11.2 Procedure

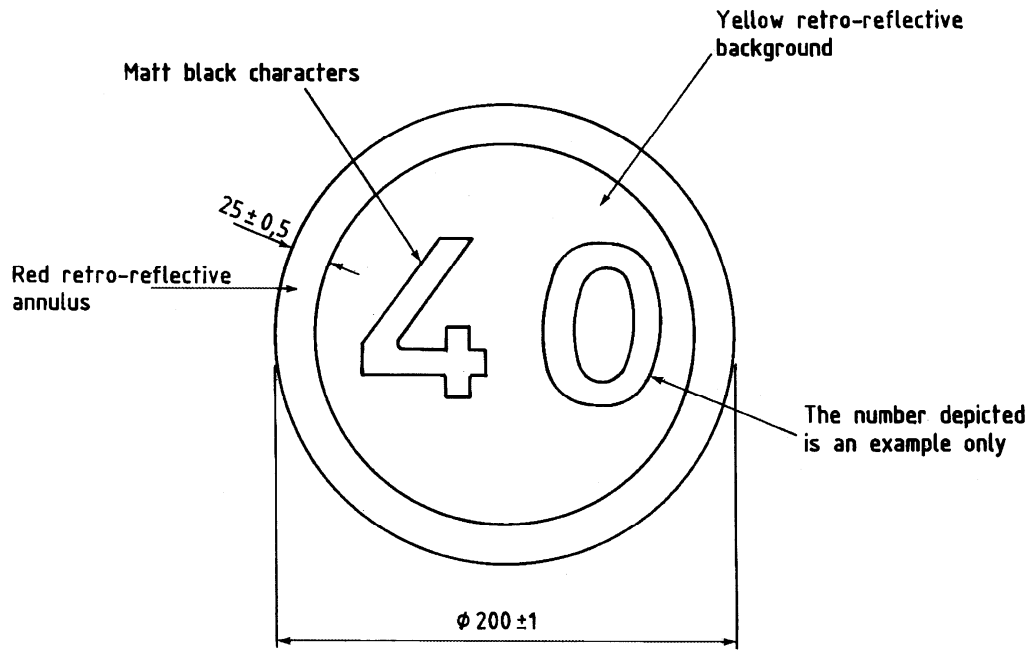
Fold the specimen forward and backward on itself 20 times while exerting pressure with the thumb and forefinger on the creased section each time the specimen is folded. After 20 folds inspect the creased section for cracking.

ward

®

Draft for comments only — Not to be cited

Dimensions in millimetres
Not to scale

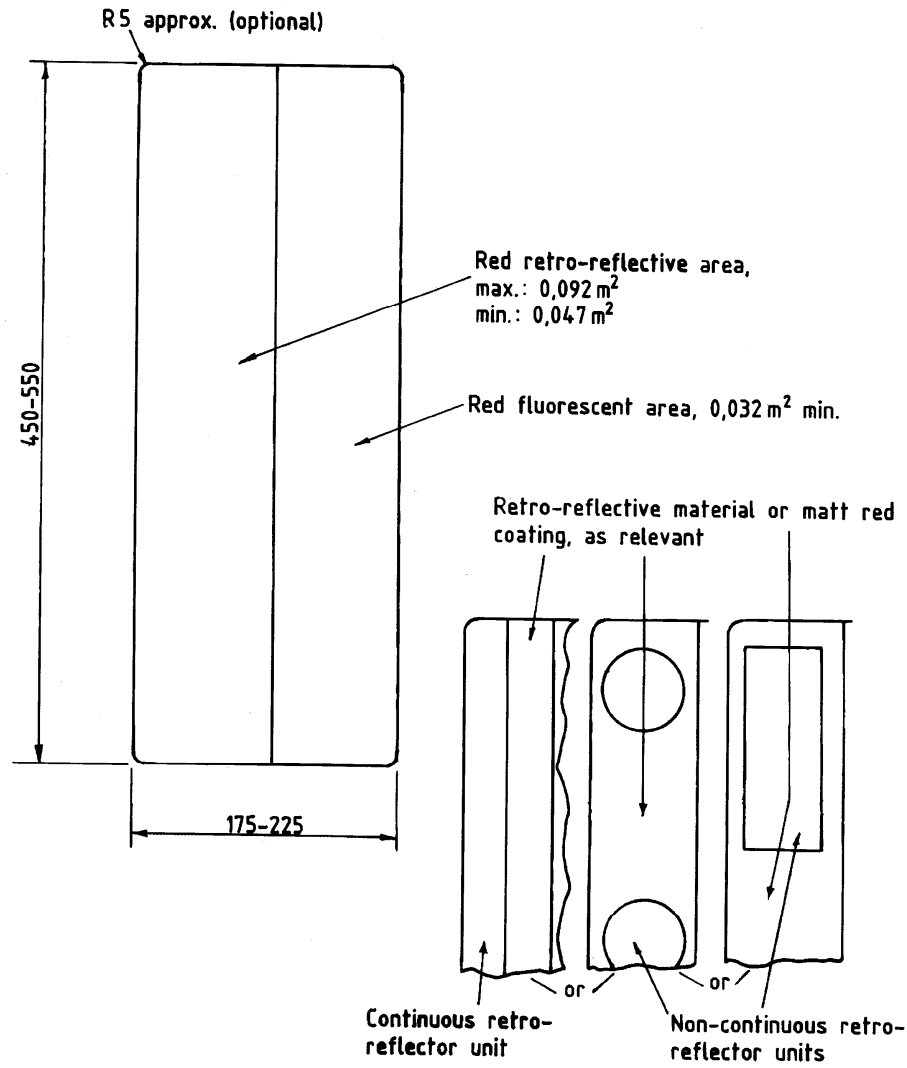


NOTE The drawing given in Figure 1 is purely to identify parts and to specify dimensions. It is not intended as a design guide.

Figure 1 — Type H (indicator of maximum speed) sign

Draft for comments only — Not to scale

Draft



Typical layouts of retro-reflective surfaces incorporating retro-reflector units.

NOTE The drawings given in Figure 2 are purely to identify parts and to specify dimensions. They are not intended as design guides.

Figure 2 — Type I (indicator of width) sign

Draft for comments

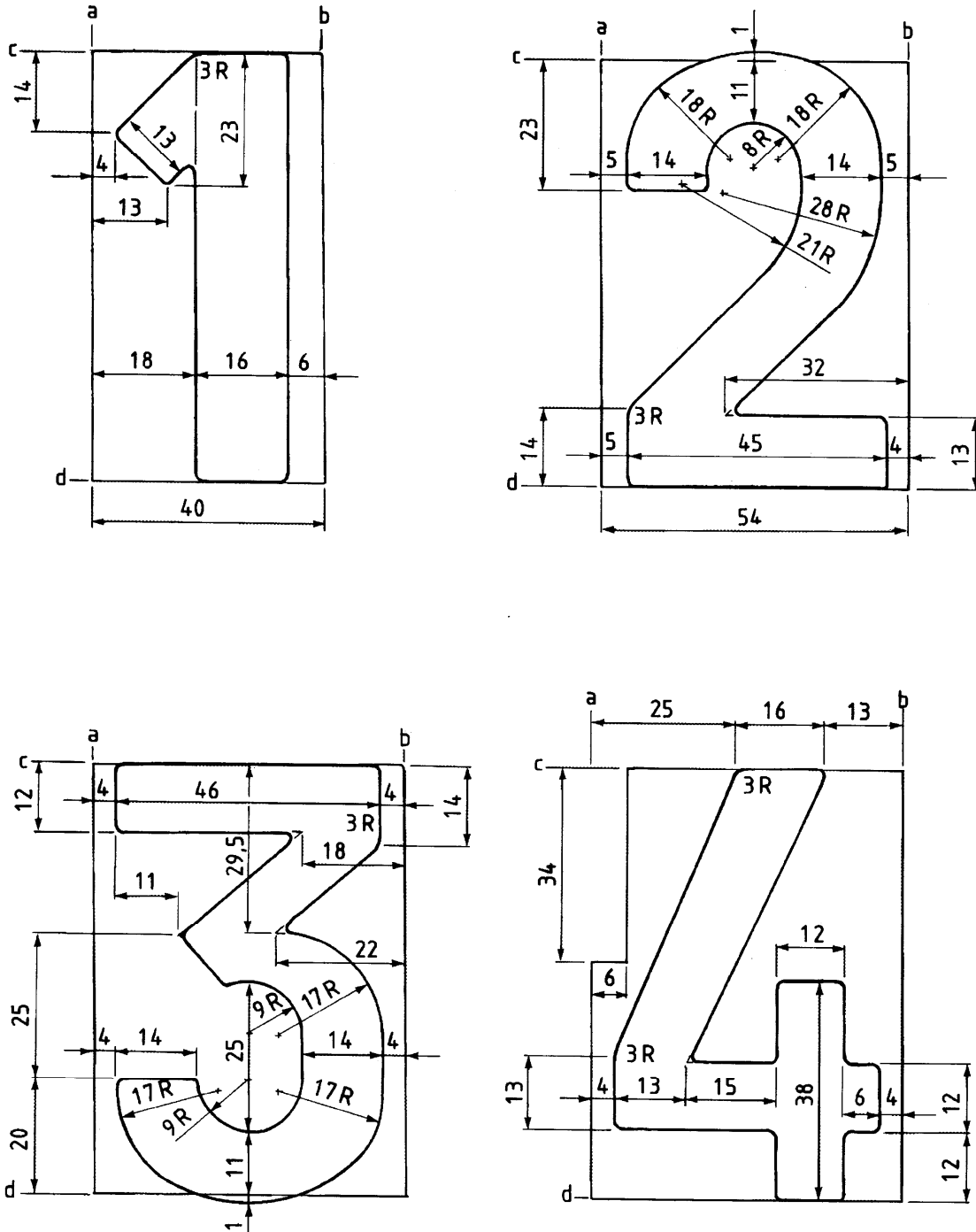


Figure 3 — Numerals

Draft

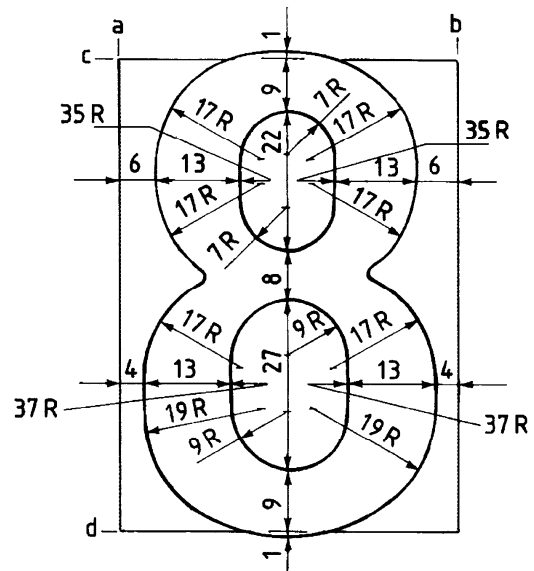
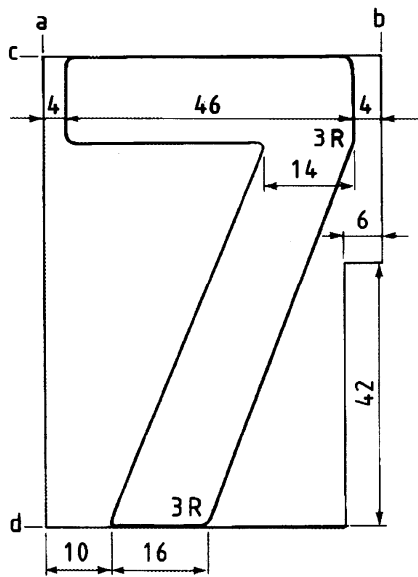
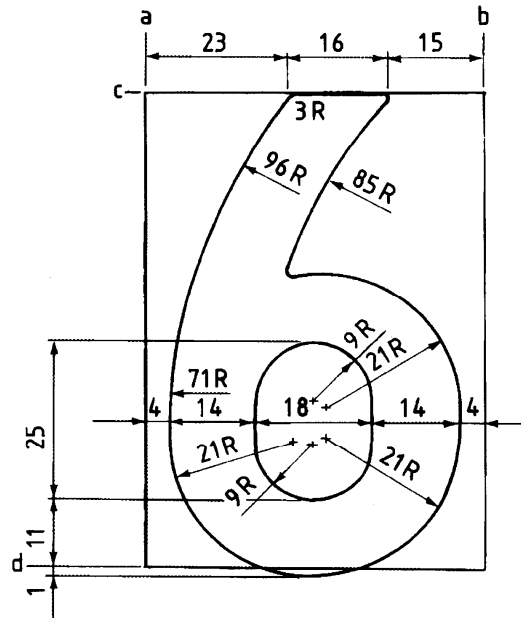
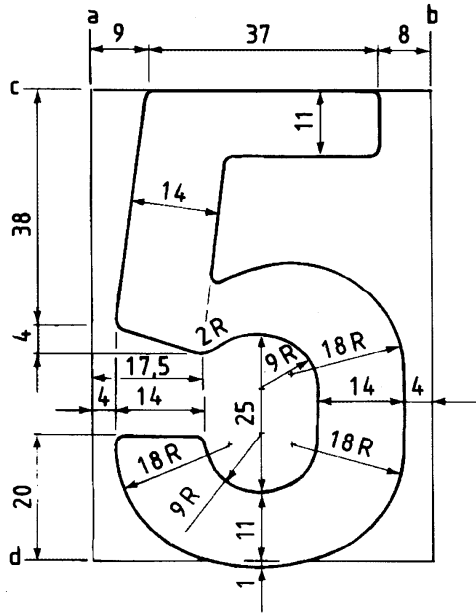


Figure 3 (continued)

Draft for

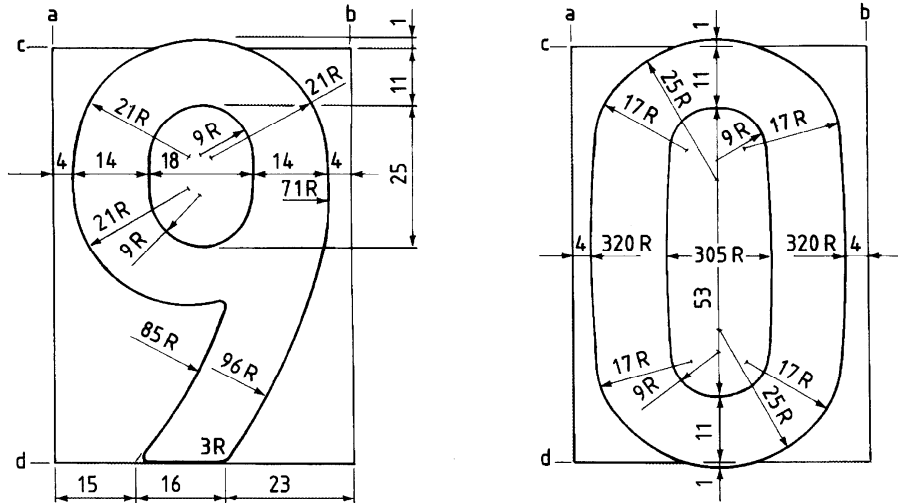
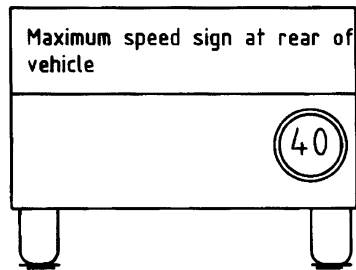
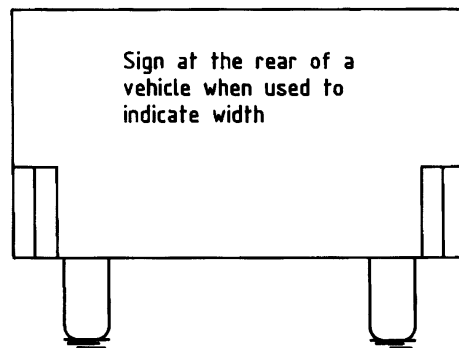


Figure 3 (Concluded)



(a) Type H (Indicator of Maximum Speed) Sign



(b) Type I (Indicator of Width) Sign

Figure 4 — Typical locations of signs

Annex A
(informative)

Notes to purchasers

The following requirements must be specified in tender invitations and in each order or contract:

- a) the type of sign (see 4.1);
- b) the substrate material and, in the case of a plastics material, whether it is to contain a red fluorescent colorant (see 4.2.1);
- c) in the case of a type I sign, the dimensions and whether the corners are to be rounded (see 4.3.1 and 4.3.2);
- d) in the case of a type I sign, the material to be used to provide retro-reflection on the warning face (see 4.3.4);
- e) in the case of a type H sign, the required numerals and their application (see 4.3.5);
- f) whether a sign having a substrate of material other than mild steel is to be given a protective coating (see 4.4).

Draft for comments only — Not to be cited

Annex C
(informative)

**Quality evaluation of signs produced to the requirements laid down in this part
of the specification**

C.1 Quality verification

C.1.1 When a purchaser requires quality verification on an ongoing basis of signs produced to this part of the specification, it is suggested that, rather than to evaluation of the final product only, he also direct his attention to the quality management system applied by the manufacturer. In this connection it should be noted that ISO 9001 covers the provision of an integrated quality management system.

Draft for comments only — Not to be cited as East African Standard

Draft for comments only — Not to be cited as East African Standard