

**PHYSICAL ENVIRONMENT SERVICE UNIT**

**PART "TB"**

**DEPARTMENTAL SPECIFICATION**

**FOR**

**ROAD MARKINGS**



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## **PART "TB" : ROAD MARKINGS**

### **TB.1      SCOPE**

This section covers the permanent marking of the road surface with white, yellow or red painted lines or symbols and the supply and fixing of retro-reflective roadstuds as indicated on the drawings or required by the Engineer.

### **TB.2      INTERPRETATIONS**

The following standards are referred to in this specification:-

S.A.B.S. 731, S.A.B.S. 1442, CKS 192, CKS 279 and the South African Road Traffic Signs Manual.

### **TB.3      MATERIALS**

#### **TB.3.1    PAINT**

##### **a)    Road Marking Paint**

Road marking paint shall comply with the requirements of SABS 731.

The paint shall be delivered at the site in sealed containers bearing the name of the manufacturer and the type of paint.

The viscosity of the paint shall be such that it can be applied without being thinned down.

##### **b)    Retro-reflective Road Marking Paint**

Retro-reflective road marking paint shall comply with the requirements of CKS 192 and SABS 731.

##### **c)    Plastic Road Marking Material**

Where specified in the project specifications, plastic road marking material of an approved proprietary brand shall be used.

##### **d)    Colour**

The colours to be used shall be bright white, yellow or red.

The colour of the yellow paint shall match colour number D26 (golden yellow) of CKS 279.

**TB.3.1**      **PAINT (CONT'D)**

e)      **Skid Resistance**

All types of paint shall have an acceptable skid resistance.

**TB.3.2**      **ROADSTUDS**

Roadstuds shall comply with the requirements of SABS 1442 and shall be of the size and type indicated on the drawings or specified in the project specifications. The contractor shall, prior to delivery, submit to the engineer samples of the type of roadstuds he proposes to supply for approval. All studs subsequently used shall be of an equal quality or better.

**TB.4**      **PLANT**

Where applicable the mechanical equipment shall consist of an apparatus for cleaning the surfaces, a mechanical road painting machine and all additional hand-operated equipment necessary for completing the work. The mechanical road marking machine shall be capable of applying the paint to a uniform film thickness at the rates of application specified hereinafter. The machine shall be so designed that it will be capable of painting the road markings everywhere to a uniform width with sides within the tolerances specified hereinafter, without the paint running or splashing. The machine shall further be capable of painting lines of different widths by adjusting the spray jets on the machine or by means of additional equipment attached to the machine.

The machine shall be capable of spraying at a speed of not less than 5,0 km/h and shall be provided with clearly visible amber warning flashing lights which shall always be in operation when the machine is on the road.

**TB.5**      **CONSTRUCTION**

**TB.5.1**      **SURFACE PREPARATION**

Traffic markings shall be applied to bituminous surfaces only after sufficient time has elapsed to ensure that damage will not be caused to the painted surface by volatiles evaporating from the seal. After completion of the seal, no less than 2 weeks or such longer periods as may be directed by the engineer shall elapse before any traffic markings shall be applied. However, the engineer may, in certain cases, require traffic markings to be painted without waiting for the seal to harden, in which case it shall be done as soon as possible after the instruction had been given.

Before the paint is applied, the surface shall be clean and dry and completely free from any soil, grease, oil, acid or any other material which will be detrimental to the bond between the paint and the surface. The surface where the paint is to be applied shall be properly cleaned by means of watering, brooming or compressed air if required.

#### TB.5.1 SURFACE PREPARATION (CONT'D)

Where road markings are to be applied to a concrete pavement, all laitance and loose curing compound shall be removed. Particular care shall be taken to ensure that the surface shall be clean, fresh concrete on all areas where roadstuds are to be fixed.

#### TB.5.2 SETTING OUT THE ROAD MARKINGS

The lines, symbols, figures or marks shall be premarked by means of paint spots of the same colour as that of the final lines and marks. These paint spot shall be at such intervals as will ensure that the traffic marking can be accurately applied, and in no case shall they be more than 1,5 m apart. Normally spots of approximately 10 mm in diameter should be sufficient.

The dimensions and positions of road marking shall be as shown on the drawings or as specified in the appropriate statutory provisions and the South African Road Traffic Signs Manual.

After spotting the positions of the proposed road markings such as broken lines and the starting and finishing points of barrier lines shall be indicated on the road. These premarkings shall be approved by the engineer prior to any painting operations being commenced.

The positions and outlines of special markings shall be produced on the finished road in chalk and shall be approved by the engineer before they are painted. Approved templates may be used on condition that the positioning of the marking is approved by the engineer before painting is commenced.

The position of roadstuds shall be marked out on the road and shall be approved by the engineer before they are fixed in position.

#### TB.5.3 APPLYING THE PAINT

The figures, letters, signs, symbols, broken or unbroken lines or other marks shall be painted as shown on the drawings or as directed by the engineer.

Where the paint is applied by machine, it shall be applied in one layer. Before the road marking machine is used on the permanent work, the satisfactory operation of the machine shall be demonstrated on a suitable site which is not part of the permanent works. Adjustments to the machine shall be followed by further testing. Only when the machine has been correctly adjusted and its use has been approved by the engineer after testing, may the machine be used on the permanent work. The operator shall be experienced in the use of the machine.

### TB.5.3 APPLYING THE PAINT (CONT'D)

After the machine has been satisfactorily adjusted, the rate of application shall be checked and adjusted if necessary before application on a large scale is commenced.

Where two or three lines are required next to each other, the lines shall be applied simultaneously by the same machine. The paint shall be stirred before application in accordance with the manufacturer's instructions. Paint shall be applied without the addition of thinners.

Where painting is done by hand, it shall be applied in two layers, and the second layer shall not be applied before the first layer has dried out sufficiently. As most road marking paint reacts with the bitumen surface of the road, the paint shall be applied with one stroke only of the brush or roller.

Ordinary road marking paint shall be applied at a nominal rate of 0,42 l/m<sup>2</sup> or as directed by the engineer and proprietary brand paints shall be applied at the rates specified in the project specifications.

Unless otherwise prescribed by the engineer, the road marking shall be completed before a particular section of the road is opened to traffic. Each layer of paint shall be continuous over the entire area being painted.

### TB.5.4 APPLYING THE RETRO-REFLECTIVE BEADS

Where retro-reflective paint is required, the retro-reflective beads shall be applied by means of a suitable machine in one continuous operation, immediately after the paint has been applied. The rate of application of the beads shall be 0,8 kg/l of paint or such other rate as may be directed by the engineer. Machines which apply the beads by means of gravity only shall not be used. The beads shall be sprayed onto the paint layer by means of a pressure sprayer.

### TB.5.5 ROADSTUDS

Roadstuds shall be of the type indicated on the drawings and shall be fixed in the positions indicated and approved by the engineer.

The roadstuds shall be fixed by means of an approved epoxy resin in accordance with the manufacturer's instructions, subject to such amendments to the method as may be required by the engineer. The studs shall be protected against impact until the adhesive has hardened. Before fixing the roadstuds, the surface shall be thoroughly cleaned as specified in Clause TB.5.1.



**TB.5.6**      **WEATHER LIMITATIONS**

Road marking paint shall not be applied to a damp surface or at temperatures lower than 10°C, or when, in the opinion of the engineer, the wind strength is such that it may adversely affect the painting operations.

**TB.5.7**      **GENERAL**

In broken lines the length of segments and the gap between segments shall be as indicated on the drawings. If these lengths are altered by the engineer, the ratio of the lengths of the painted section to the length of the gap between painted sections shall remain the same. Lines shall not be painted more than 3 months prior to the road being opened to public traffic.

Lines on curves, whether broken or unbroken, shall not consist of chords but shall follow the correct radius.

Where plastic road marking material is used, the manufacturer shall produce an approved guarantee as specified in the project specifications.

**TB.5.8**      **FAULTY WORKMANSHIP OR MATERIALS**

If any material which does not comply with the requirements is delivered to the site, or is used in the works, or if any work of an unacceptable quality is carried out, such material or work shall be removed, replaced or repaired as required by the engineer at the contractor's own cost. Rejected traffic markings and paint which has been splashed or dripped onto the pavement, kerbs, structures or other such surfaces, shall be removed by the contractor at his own cost, in an approved manner so that the markings or spilt paint will not show up at all.

**TB.5.9**      **PROTECTION**

After the paint has been applied, the traffic markings shall be protected against damage by traffic or other causes. The contractor shall be responsible for erecting, placing and removing all warning boards, flags, cones, barricades and other protective measures which may be necessary in terms of any statutory provisions and/or as may be recommended in the South African Road Traffic Signs Manual.

**TB.6**      **TOLERANCES**

**TB.6.1**      **WIDTH**

The width of lines and other markings shall not be less than the specified width, nor shall it exceed the specified width by more than 10 mm.

**TB.6.2      POSITION**

The position of lines, letters, figures, arrows, retro-reflective roadstuds and other marking shall not deviate from the true position by more than 100 mm in the longitudinal and 20 mm in the transverse direction.

**TB.6.3      ALIGNMENT OF MARKINGS**

The alignment of the edges of longitudinal lines shall not deviate from the true alignment by more than 10 mm in 15 mm.

**TB.6.4      BROKEN LINES**

The length of segments of broken longitudinal lines shall not deviate by more than 150 mm from the specified length.

**TB.7        TESTING**

Acceptance testing to ensure compliance with the specification will be undertaken by, and at the discretion of, the Engineer.

**TB.8        MEASUREMENT AND PAYMENT**

**TB.8.1      ROAD MARKINGS**

**TB.8.1.1    Lines**

The unit of measurement shall be the kilometre (km). Separate items will be scheduled for each specified width, type of material, and colour of line and the quantity paid for shall be the actual length of line painted in accordance with the instructions of the Engineer, excluding the length of gaps in broken lines.

The rates shall include for procuring and furnishing all material, including the retro-reflective beads in the case of retro-reflective paint, and the necessary equipment, and for painting, protecting and maintenance as specified, including the setting-out and premarking of the lines.

**TB.8.1.2    Lettering, Symbols and Traffic-Island Markings**

The unit of measurement shall be the square metre (m<sup>2</sup>). Separate items will be scheduled for each specified type of material and colour and the quantity paid for shall be the actual surface area of lettering, symbols or traffic-island markings completed.

The rates shall include for procuring and furnishing all material, including the retro-reflective beads in the case of retro-reflective paint, and the necessary equipment, and for painting, protecting and maintenance as specified, including the setting-out of lettering, symbols and traffic-island markings.

## TB.8.2 VARIATIONS IN RATE OF APPLICATION

The unit of measurement for variations in the rate of applying the paint shall be the litre (l).

Where the actual rates of application used in the works vary from the specified nominal rates, adjustment of compensation will be made :-

- a) As a payment to the Contractor in respect of any authorised increase in quantities which exceed those specified, where such increase has been ordered, in writing, by the Engineer.

or

- b) As a refund to the Employer in respect of the decrease in quantities which are less than those specified, irrespective of whether such decrease results from an authorised decrease in the rates of application or from unauthorised reductions on the part of the Contractor.

Payment for a prescribed rate of application shall be based on the actual rate of application used, provided that this does not exceed the prescribed rate of application, plus any tolerance in the rate of application allowed. If the actual rate of application exceeds the prescribed rate, payment shall be based on the prescribed rate of application, plus any tolerance allowed. If the actual rate of application is below the prescribed rate of application ordered, payment shall be based on the actual rate of application regardless of any tolerance allowed. Notwithstanding the above, the Engineer shall be fully entitled to reject work which has not been constructed in accordance with the specifications or the rates of application prescribed by him.

The employer shall be refunded for any decrease in the specified rates of application at the same rate per unit of measurement as that tendered by the contractor for additional materials required by an increase in the rates of application.

## TB.8.3 ROADSTUDS

The unit of measurement shall be the actual number (No.) of roadstuds placed. Separate items will be scheduled for different types of roadstuds.

The rate shall include for procuring and furnishing all the necessary material, labour and equipment, and for fixing and maintenance as specified.