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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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Replacing GB/T 16311-2009, GB/T 21383-2008

Specification and test method for road traffic markings

道路交通标线质量要求和检测方法

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1 Scope

1 The document lays down the classification, quality requirements and test methods for road traffic markings.

1 It applies to the quality requirements for, and the testing of, traffic markings newly applied on roads.

3 Terms and definitions

3 The terms and definitions given in GB/T 8416 and JT/T 688 apply, together with those below.

3.1 Markings surface colour is the ordinary colour of the surface of the marking material after the coating has been formed on the road by the marking paint and the drop-on glass beads have been applied to it. A note explains that the ordinary colour of a surface is the colour shown after the selective absorption of the light falling on it.

3.2 Retroreflective colour is the colour of the retroreflected light observed from a direction close to that of the incident light when a retroreflective material or retroreflector is illuminated at night, that is, with illuminant A.

3.3 Zone of measurement is the length of road covered by the traffic marking being measured.

3.4 Check point area is the area of road traffic marking to be evaluated within each zone of measurement.

3.5 Test point is a point within the check point area at which a test is carried out.

4 Classification of markings

4.1 By type of material, markings are classified as solvent-borne paint markings, hot-melt paint markings, water-borne paint markings, two-component paint markings, preformed marking tape markings and markings of other materials.

4.2 By function, markings are classified as retroreflective markings, raised or rumble markings, crack-resistant markings, skid-resistant markings, self-draining markings and markings of other functions.

4.3 By the way they are laid, markings are classified as longitudinal markings, transverse markings and other markings.

5 Quality requirements

5.1 The marking materials used are to comply with the requirements of GB/T 24717, GB/T 24722, JT/T 280, JT/T 712 and other related standards.

5.2 As to appearance, markings are to be readily seen, of even colour, with tidy edges, regular line form and smooth lines; the coating is to be of even thickness and free of obvious blistering, spotting, wrinkling, blooming, tackiness, cracking and loss of adhesion; the drop-on glass beads of retroreflective markings are to be evenly spread and their performance and particle size distribution are to meet GB/T 24722; and no obvious change of colour is to appear within the stated service life.

5.3 The mass of glass beads contained in a hot-melt paint marking is to be not less than 30% of the mass of the marking material, and the roundness of those contained beads is to be not lower than that required by GB/T 24722.

5.4 The total organic content of a hot-melt paint marking is to be not less than 19% of the mass of the marking material.

5.5 The heavy metal content of hot-melt paint markings is to meet Table 1, which limits each of lead, cadmium, chromium, mercury, arsenic and antimony to not more than 100 mg/kg.

5.6 The permitted deviation on the width of a marking is 0 mm to 5 mm, and that on the length of a marking and on the longitudinal spacing of broken lines is plus or minus 5%.

5.7 The thickness of markings is to fall within the ranges of Table 2, which is given in millimetres and covers six kinds of marking. For hot-melt retroreflective paint markings the dry film thickness DF is to be not less than 0.7 and not greater than 2.5, with no wet film requirement. For solvent-borne paint markings DF is to be 0.2 to 1.5 and the wet film thickness WF 0.3 to 2.0. For two-component paint markings DF is to be 0.4 to 2.5, with no wet film requirement. For water-borne paint markings DF is to be 0.2 to 1.8 and WF 0.3 to 2.5. For preformed marking tape markings DF is to be 0.3 to 2.5, with no wet film requirement. For raised or rumble markings the base line thickness is to be 1 to 2 and the height of the raised part 3 to 7, with no wet film requirement.

5.8.1 The colours of markings are white, yellow, orange, grey, green, red, blue, purple, brown and black.

5.8.2 The marking surface colour is to meet GB 2893 and GB/T 8416, and its chromaticity coordinates and luminance factor should fall within the ranges of Table 3 and Figure 1. Table 3 gives, for each of the ten colours, the chromaticity coordinates of the four corner points of the chromaticity area under standard illuminant D65 with the 45 degree over 0 degree illuminating and viewing geometry and a 2 degree field, together with the luminance factor. The four pairs of coordinates in each row run together in the extracted text and are not reproduced here. The luminance factors are separately legible: not less than 0.35 for white, 0.27 for yellow, 0.17 for orange, 0.04 for green, 0.05 for red, 0.01 for blue and 0.03 for purple, while no luminance factor is set for grey, brown or black.

5.8.3 The chromaticity coordinates of the retroreflective colour of retroreflective markings should fall within the ranges of Table 4 and Figure 2. Table 4 gives the coordinates of the four corner points of the chromaticity area under standard illuminant A, for white as x and y pairs of 0.480 and 0.410, 0.430 and 0.380, 0.405 and 0.405, and 0.455 and 0.435, and for yellow as 0.575 and 0.425, 0.508 and 0.415, 0.473 and 0.453, and 0.510 and 0.490.

5.9.1 Type I retroreflective markings are markings for use other than on rainy nights. Their initial coefficient of retroreflected luminance is graded in Table 5 and is to satisfy night-time visibility. The initial coefficient of retroreflected luminance is to be not less than 150 mcd per square metre per lux for white Type I markings and not less than 100 mcd per square metre per lux for yellow. Table 5, in the same units and for the dry condition, gives four grades: grade I, ordinary brightness, from 150 up to but not including 250 for white and from 100 up to but not including 125 for yellow; grade II, medium brightness, from 250 up to but not including 350 for white and from 125 up to but not including 150 for yellow; grade III, high brightness, from 350 up to but not including 450 for white and from 150 up to but not including 175 for yellow; and grade IV, extra brightness, not less than 450 for white and not less than 175 for yellow.

5.9.2 Type II retroreflective markings are markings for rainy nights. They are to retroreflect in dry, wet and continuous rainfall conditions and to be readily seen on a rainy night, and their initial coefficient of retroreflected luminance is to meet Table 6. In millicandela per square metre per lux, that table requires not less than 350 for white and 200 for yellow in the dry condition, not less than 175 for white and 100 for yellow in the wet condition, and not less than 75 for both white and yellow under continuous rainfall.

5.10 The initial skid resistance of markings is to meet Table 7, which requires a skid value of not less than 45 BPN for the ordinary skid-resistant type and not less than 55 BPN for the high skid-resistant type. A note explains that the skid value is the surface skid resistance measured with a pendulum friction tester, expressed as the British Pendulum Number and abbreviated BPN.

6 Test methods

6.1.1 For the glass beads contained in hot-melt paint markings, the total organic content and the heavy metal content, sampling is as follows. Where the zone of measurement of a longitudinal marking is not more than 10 km, the whole zone forms one inspection unit and three check point areas of 100 m are chosen at the start, the end and the middle of the marking; where the zone exceeds 10 km, each 10 km forms one inspection unit and three check point areas of 100 m are chosen within it. For transverse and other markings, each 1500 square metres of marking area forms one inspection unit, within which three representative figures, characters or pedestrian crossing lines are chosen as check point areas. Within each check point area one test point is chosen at random on the lane centre line, the lane dividing line, the lane edge line or a similar position, and one group of samples is taken with a core drill, the sample being 5 cm to 15 cm in diameter, or by hand, the sample being of 5 cm to 15 cm equivalent diameter; three groups are taken from each inspection unit and each group is to be large enough for the tests.

6.1.2 to 6.1.6 For external dimensions, marking thickness, chromaticity, photometric performance and skid resistance, the check point areas are chosen as in 6.1.1 and three test points are chosen at random within each area. Three readings are taken at each test point for external dimensions, chromaticity and skid resistance, six for marking thickness and nine for photometric performance.

6.2 The appearance of markings is checked visually.

6.3.1 The mass percentage of the contained glass beads is found by grinding the surface of the sample to remove asphalt, concrete, drop-on beads and other foreign matter, breaking the sample into pieces below 2 mm, weighing about 60 g into a conical flask, dissolving the resin and other organic components in a one to one mixture of ethyl acetate and xylene under continuous stirring and decanting the suspension, repeating with a further portion of the mixed solvent three times over, rinsing with acetone, evaporating the residual solvent in a boiling water bath for about 30 min, treating with dilute sulfuric acid, or a one to one mixture of dilute sulfuric acid and dilute hydrochloric acid, under a watch glass in a boiling water bath for about 30 min, washing repeatedly with water and then with 50 mL of 95% ethanol, evaporating the ethanol in a boiling water bath, transferring the beads to a watch glass of known mass, drying for 1 h at 105 °C to 110 °C in a forced air oven and weighing after cooling in a desiccator; where the original sample contains quartz sand, the sand is removed with a bead sorter before weighing. Three parallel tests are run and the percentage is calculated by formula (1) from the mass of the glass beads and the mass of the sample, the drop-on beads that have sunk into the marking during application being disregarded; the mean of the three results is taken.

6.3.2 The roundness of the contained glass beads is determined on the beads recovered in 6.3.1 by the method of GB/T 24722.