

SPECIFICATION NUMBER: TI/SPC/OHE/00033A / (12/97) Rev.9



**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

**SPECIFICATION FOR
NON-RETRO-REFLECTIVE BACKGROUND
OF
STRUCTURE NUMBER PLATES & CAUTION / WARNING BOARDS
WITH
RETRO-REFLECTIVE LETTERS, FIGURES & SYMBOLS**

(FOR official use only)

ISSUED BY

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For : Non-Retro-Reflective Background of Structure Number Plates & Caution / Warning Boards with Retro-Reflective Letters, Figures & Symbols:

1. SCOPE:

This specification covers the requirement of 'Structure Number Plates, Caution & Danger Boards etc' using Non-Retro-Reflective Background and Retro-Reflective Letters, Figures & Symbols.

2. GENERAL

The colour, configuration, size and all other requirements of Structure Number Plates, Caution & Danger Boards etc. shall be in accordance with RDSO drawings. The numerals/letters/symbols shall be characterized using Retro-Reflective sheeting as required. The background shall be Non-Retro Reflective.

3. MATERIAL FOR BASE PLATE :

The plate/boards shall be manufactured from smooth, hard and corrosion resistant aluminum alloy sheets conforming to designation 24345 or 19000 condition 'O' of IS: 737-2008 or latest. The thickness of the aluminum alloy sheets shall be 2.00 mm .

4. MATERIAL FOR NUMERALS/LETTERS/SYMBOLS:

The Retro-Reflective 'High Intensity Micro- Prismatic Sheeting (Type V)' used on the numerals/letters/symbols shall conform to ASTM D-4956- 19 and shall have a smooth surface which has the property of retro-reflection over its entire surface. The sheeting shall be weather-resistant and show colour fastness. They shall show no evidence of cracking, peeling, pitting, blistering, edges lifting or curling and shall have no shrinkage or expansion.

The manufacturer shall give certificate of having tested the sheeting for these properties in an unprotected outdoor exposed environment from a reputed laboratory. The purchaser shall be free to test the sheeting at suppliers cost for which necessary means shall be provided by the supplier at his own cost.

5. MATERIAL FOR NON-REFLECTIVE BACKGROUND:

The Non-Retro Reflective used on the background of Structure Number Plates & Caution / Warning Boards shall conform to the following standards:

- (i) ASTM D-882-18 OR LATEST (Tensile Properties of thin plastic sheeting).
- (ii) PSTC [Pressure Sensitive Tape Council) -1(Peel Adhesion for Single Coated Pressure Sensitive Tapes at 180°Angle "1 is the selected standard test method to measure adhesion on a prototype tape).
- (iii) DIN30646 (Technical delivery conditions for signs made of plastic film).

The Non-Retro Reflective used on the background of Structure Number Plates & Caution / Warning Boards shall have a smooth surface. The sheeting shall be weather-resistant. They shall show no evidence of cracking, peeling, pitting, blistering, edges lifting or curling and shall have no shrinkage or expansion.

The manufacturer shall give certificate of having tested the sheeting for these properties in an unprotected outdoor exposed environment from a reputed laboratory. The purchaser shall be free to test the sheeting at suppliers cost for which necessary means shall be provided by the supplier at his own.

6. Testing for numerals/letters/symbols:

Type tests:

The following tests are to be conducted on Retro-reflective sheet used for numerals/letters/symbols.

1. Day time colour
2. Shrinkage
3. Flexibility
4. Adhesion test
5. Gloss value (60° Angle) .
6. Liner Removal
7. Effect of change of temperature
8. Humidity test
9. Salt spray test
10. Co-efficient of retro-reflection

7. Brilliance of Numerals/Letters/Symbols

The Retro-Reflective surface after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro- reflection determined in accordance with ASTM: 4956-04 -18 which is given in Table as under.

Minimum co-efficient of retro-reflection in candles per lux per sqm.

Observation angle in Deg.	Entrance angle in Deg.	White	Yellow	Orange	Green	Red	Blue
0.2	-4	360	270	145	50	65	20
0.2	+30	170	135	68	25	30	11
0.5	-4	150	110	60	21	27	7.5
0.5	+30	72	54	28	10	13	5.0

When totally wet the sheeting shall not show less than 90% of the above

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values of retro-reflectance. At the end of 10 years the sheeting should have at least 75% of its original retro-reflectance.

Retro-reflective sheets shall be tested in accordance with ASTM D: 4956-04 for S.No.1 to 7 and 10, S.No.8 and 9 shall be tested in accordance with IS: 9000 (Part XII)-1981 (Reaffirmed 2004) as follows.

8. Routine Test

These tests shall be done by manufacturer on all pieces and report shall be submitted at the time of acceptance test.

1. Visual Examination
2. Measurement of dimensions.

9. Acceptance Test

The following test shall be done on lots offered for acceptance.

1. Visual Examination
2. Dimensional verification .

10. Sampling Plan ,

The samples size for acceptance tests shall be taken in random from the lot in accordance with table given below:

Lot size	Sample size	No. of conforming for Acceptance
Up to 100	3	3
101-200	5	5
201-300	8	7
301-500	10	9
501and above	12	10

- For acceptance of the lot. In each of the specified test, the number of Samples conforming to specification shall be equal to or more numbers indicated above.

11. FNISHED PRODUCTS

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The finished product shall have a non-retro reflective background conforming to ASTM D-882-18 OR LATEST / PSTC-1/ DIN 30646. The letters and figures shall be of High Intensity Retro Reflective sheeting conforming to ASTM D: 4956-04. The non-retro reflective background and retro-reflective sheeting should cover the surface evenly and shall be free from twists, cracks and folds. The rear side of the plate shall be given two coats

of weather proof paints or powder colour coated, colour grey or black.

11. GUARANTEE

Structure Number Plates, Caution and Danger Boards with non-retroreflective background conforming to ASTM D-882/ PSTC-1/ DIN 30646 and Retro-Reflective sheeting conforming to ASTM D: 4956-04 -18 shall withstand normal vertical stationary exterior exposure condition and sheeting shall have an effective performance life of at least of 10 years.

A guarantee to this effect shall be furnished by the manufacturer and in case of any dispute the same shall be replaced free of cost by the supplier.

12. The "Make in India" policy of Government of India shall be applicable.