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1. SCOPE

This specification covers general and technical requirements of anodized aluminum Braille stickers to be used as signage for passengers on Indian Railways. These stickers may be provided onto the interior and exterior of coaches.

2. OPERATING CONDITIONS

Ambient Condition: On fitment in the coaches, the sticker will be subjected to the following climatic conditions.

2.1. Ambient temperature: -5 °C to 55 °C
2.2. Altitude: from sea level up to 2500 meters
2.3. Relative humidity: maximum up to 100%
2.4. Rainfall: fairly heavy
2.5. Coaches may operate in coastal areas with continued exposure to salt laden air
2.6. Coaches exteriors are cleaned with liquid cleaning agent to RDSO spec no. M&C/PCN/101/2007 using brushes with non-metallic bristles or in automatic car washing plants. The interiors are cleaned with wet/dry wiping.

3. TECHNICAL REQUIREMENTS

3.1. The base material of the sticker shall be anodised aluminium of designation 19002 as per IS 737. The sticker may have two layers: base layer and Braille layer. The base layer is to provide strength and rigidity to the sticker. Braille layer shall display the information along with tactile Braille script. The sticker shall be homogenous and layers shall be imperceptible.

3.2. The required text and graphic shall be integrated and sealed with a transparent anodic oxide layer. The sticker shall be free from dents and defects. No top coating layer shall be used as protection to the top surface.

3.3. The sticker shall have mounting holes and adhesive tape (3M 467MP Acrylic Adhesive or equivalent) for installation.

3.4. The sticker shall conform to the performance/requirements as laid out in para 3.

3.5. The stickers shall not have any harmful effect on living beings, coaches, or the environment.

3.6. The thickness and tolerance over dimensions of the sticker shall be per the tender drawings and IS: 2676 - 1981, respectively.

4. PROPERTIES AND PERFORMANCE CHARACTERISTICS

4.1. Acceptance Tests

S N	Characteristics	Requirements	Test Method
1.	Abrasion Resistance	No pronounced loss of readability after 7000 abrasion cycles on Taber 171 Abraser CS-17 Calibrase Wheels with 1 kg weight	ASTM D 4060
2.	Acid Corrosion Resistance	Weight loss of anodized surface not to exceed 0.2 mg/cm^2	IS 5523:83 Sodium Sulphite Immersion Test
3.	Heat Resistance 120 °C for 3 hours	No pronounced loss or degradation of readability	Appendix-I
4.	Adhesion between Base and Braille layers test	17-25 Newton	ASTM D3330 Procedure A for 180° peel strength
5.	Stain Resistance Test	There shall be no colour stain after the test	IS 5523:83 Marking Test
6.	Ease of Cleaning	Rating of 8 and above	Appendix-II
7.	Aluminium grade	Should match the composition of 19002	IS 737

4.2. Type Tests To Be Conducted Once In Two Years

S. N	Characteristics	Requirements	Test Method
1.	Artificial Sea Water Spray Test	No Deterioration or softening of anodic layer for 96 hours	Para 4 of IS: 101 (Part 6 Sec 1) - 1988
2.	Accelerated Weathering Test	No deterioration of the image or pronounced loss of readability after 102 minute cycle	C4 of IS 2932:2003

5. TEST AND TEST CERTIFICATES

5.1. The stickers shall be accepted based on NABL, nationally or internationally accredited laboratory test certificates. However, the purchaser shall reserve the right to conduct tests for any parameter at any point of time of whose charges shall be borne by the supplier.

5.2. Certificate against above parameters mentioned in clause 3.1 & 3.2 shall be submitted from accredited lab to ISO/IEC 17025 like NABL/international agency.

5.3. All tests prescribed in 3.1 shall be furnished with each lot of purchase order.

5.4. First time suppliers shall conduct both the tests (3.1 & 3.2) and furnish the reports.

6. PROTOTYPE APPROVAL

6.1. The supplier shall supply a sample sticker as per the properties and performance characteristics mentioned above (Clause 3) along with the test reports.

6.2. The prototype sample may be examined and tested as per the tests specified at clause 3. Suppliers shall incorporate changes suggested by railway in the prototype as well as in the bulk supply. The bulk manufacturing shall be undertaken only after approval of the prototype. This clause of prototype approval is applicable for the first supply of the supplier. However, railway shall have the right to repeat prototype approval in subsequent orders also. The decision of the railway in this regard shall be final.

7. MARKING

7.1. The sticker must have the manufacturer's identification mark along with the date of manufacturing in MMYYYY format.

8. PRINTING OF STICKERS

8.1. The print has to be sub surface, sealed and non destructible by abrasion, solvents and acids.

8.2. Instructions in Braille should be embossed at a height of 0.6 mm minimum. The text, text size, distance between two text and word embossed on the sticker should be as per the Braille standard ISO 17049-2013.

8.3. Braille text may be positioned suitably or as per drawing to minimize the distortion of ordinary text/graphics.

9. DOCUMENTS TO BE SUBMITTED ALONG WITH OFFER FOR FIRST TIME SUPPLIER

The firm shall submit following documents along with the offer.

9.1. Technical data sheets and material safety data sheet for the sticker

9.2. Test reports as per para 3 by an accredited agency.

9.3. Certificate from the National Association for Blind (NAB) or equivalent agency for readability and correctness of the Braille text on the stickers. In its certificate, the agency shall specify the language (English/Hindi/other) and the message of the Braille text on the sticker.

9.4. Clause wise comments and technical deviation, if any.

10. WARRANTY

10.1. The anodized aluminum sticker supplied shall have warranty against defective material and performance for colour, text, graphics, and Braille text for a minimum period of 6 years from the date of installation for interior and exterior application.

10.2. In case the material shows any defect, fades, or fails to perform as per the specification within the warranty period, it shall be replaced free of cost by the supplier.

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APPENDIX-1 : HEAT RESISTANCE

An electric oven capable of maintaining a continuous heat of 200 ℃ shall be used for this test. Sample shall be tested in an electric oven which has been preheated to 40 ℃. The temperature of the oven is then increased to 120 ℃ and maintained at this temperature for 3 hours. Remove the sample from the oven and visually examine. There shall be no pronounced legibility loss or degradation.

APPENDIX-II : Ease of Cleaning

A regular cleaning agent, having a pH of 6.5-8.0, shall be diluted with water of any hardness in the ratio of 1:10 with which it shall be possible to achieve a cleaning rating of at least 8, as given in table A.

Table A

Surface Condition	Rating
Clean, no dirt or stains	10
Very slight dirt or stains visible	8
Slight dirt/stains visible	6
Moderate dirt and stains visible	4
Severe dirt and stains visible	2
Extremely dirty/stained	0