



Engineering Material Specification

Material Name

POLYVINYL CHLORIDE, EXTRUSION
AND MOLDING GRADE - EXTERIOR

Specification Number

ESB-M4D284-A
V ESB-M4D284-B

RECEIVED

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CHARDON RUBBER COMPANY

The material defined by this specification is a color pigmented, weather resistant polyvinyl chloride thermoplastic compound. This specification offers various durometer hardnesses and a range of physical properties.

1. SCOPE

2. APPLICATION

This specification was released originally for material used in the manufacture of molded or extruded exterior parts.

3. REQUIREMENTS

All tests shall be conducted on finished parts where possible; otherwise, tests shall be conducted on molded 6 x 6 x 0.075 ± 0.005 in (150 x 150 x 1.91 ± 0.13 mm) slabs, made from production stocks.

3.1 CONDITIONING

All test values indicated herein are based on materials conditioned in a controlled atmosphere of 23 ± 2°C and 50 ± 5% relative humidity for 24 h prior to testing and tested under the same controlled conditions.

3.2 PHYSICAL PROPERTIES

Type I Type II Type III Type IV

3.2.1 Color As specified on the engineering drawing

3.2.2 Specific Gravity, max (ASTM D 792) 1.35 1.35 1.40 1.45

3.2.3 Hardness - Durometer "A" (ASTM D 2240, instantaneous reading) 55 - 65 65 - 75 75 - 85 85 - 95

3.2.4 Tensile Strength, psi (MPa), min (ASTM D 412, Die "C") 1000 (6.9) 1400 (9.6) 1500 (10.3) 1800 (12.4)

Elongation, % min 250 250 250 200

3.2.5 Tear Strength, lb/in (kN/m), min (ASTM D 624, Die "C") 100 (18) 150 (26) 200 (35) 250 (44)

3.2.6 Cold Flexibility, +1°C (FLTM BN 2-1, except sample size shall be 1 x 6 in (25 x 150 mm)) -40 -40 -34 -29
No cracking at specified temperature

Date	Para. No.	Revisions
1978 11 13	✓	Metricated, Renumbered and Retyped CAHI-RD572066 - 171
1971 08 13		Released V ESB-M4D284-B AB1-302-10
1969 01 24		Released ESB-M4D284-A AY1-455



3.3 HEAT RESISTANCE

Test Method: Expose a minimum of three 0.075 x 1 x 2 in (1.91 x 25 x 50 mm) samples for 7 days at $102 \pm 1^\circ\text{C}$ for each test listed in para. 3.3.1 through 3.3.4 below. Cool to $23 \pm 2^\circ\text{C}$ before conducting the indicated tests. Weight change shall be reported as the percent change in weight, measured before and after heat exposure.

3.3.1 Weight Change, max

Type I and II	3%
Type III and IV	2%

3.3.2 180° Bend Test

No cracks when bent back against itself

3.3.3 Hardness - Durometer "A", change, max
(ASTM D 2240, instantaneous reading)

+ 10

3.3.4 Color Stability

Shall not stain, exhibit color change or change in hue in accordance with rating 3 minimum of the AATCC Gray Scale for evaluating change in color (10 step).

3.4 ABRASION RESISTANCE, min
(FLTM BN 8-2, CS#10 wheels, 1000 g load)

1000 cycles

The wear pattern and color shall be compatible in appearance with the adjacent unabraded area.

3.5 CROCKING
(FLTM BN 7-1)

Shall correspond to rating 3 minimum when compared to the AATCC Chart for measuring the transference of color.

3.6 FOGGING
(FLTM BO 16-2)

Light transmission, min

75

Exudation resulting in running liquid, heavy beads, droplets, or a continuous film deposit on the surface of the glass are not desired and shall be reported along with the numerical results, but shall not be cause for rejection.

3.7 HEAT RESISTANCE, Finished parts

3.7.1 Shrinkage, max

5%, unless otherwise specified on engineering drawing

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Test Method: Condition the parts for 30 min in a mechanical convection oven maintained at $121 \pm 3^{\circ}\text{C}$ (or as otherwise specified on the engineering drawing).

3.8 PAINT STAINING (FLTM BO 15-1)

No visible stain produced on the painted panel beyond the boundaries of the test specimen.

The raised wetting of painted surfaces in direct contact with the test specimen resulting from this test method is characteristic of plasticized vinyl compounds and shall not be cause for rejection.

Test Method: Securely attach a test specimen $0.075 \times 1 \times 2$ in ($1.91 \times 25 \times 50$ mm) to a 3×3 in (75×75 mm) painted panel. (The panel shall be painted with ESB-M32J100 quality light colored enamel per FLTM BI 3-2). Expose the assembly in the fluorescent sunlamp cabinet for 48 h. Remove the test specimen from the panel and reexpose the painted panel in the fluorescent sunlamp cabinet for 24 h. Remove panel and reexamine for staining.

3.9 COLOR STABILITY AND WEATHER RESISTANCE

3.9.1 Fade, min 200 SFH
(FLTM BN 1-1)

Shall not stain, exhibit color change or change in hue, in accordance with rating 5 of the AATCC Gray Scale for evaluating change in color (10 step).

3.9.2 Weatherometer, min 1600 h
(FLTM BO 1-1)

Shall not stain, chalk, exhibit color change or change in hue in accordance with rating 4 of AATCC Gray Scale for evaluating change in color (10 step).

3.9.3 Florida Exposure 1 year, direct weathering
inland

Shall not stain, chalk, exhibit color change or change in hue in accordance with rating 4 of the AATCC Gray Scale for evaluating change in color (10 step).

3.10 CONTACT MIGRATION STAINING (FLTM BN 3-1)

Shall show no evidence of exudation, adhesion (tackiness), color transfer, or flattening of embossing when placed face to face with itself and materials of the ESB-M2F4, 2F9, 2F6Z, etc., series.

3.11 H_2S STAINING (FLTM AN 2-1)

Shall correspond to a rating of 5 minimum when compared to the AATCC Chart for measuring the transference of color.

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3.12 MILDEW (FLTM BN 12-3)

Shall be formulated to prevent mildew growth in service and shall not exhibit mildew staining.

3.13 ODOR

Not disagreeable

3.14 OZONE RATING (FLTM BP 1-1)

"O" Maximum

3.15 ESB-M4D284-A FLAMMABILITY, max (FLTM BN 24-2, without the lot sampling plan)

4 in (101 mm)/min

In addition, the test specimen shall not exhibit any flashing or sudden flaming on either surface in excess of the above maximum value

3.16 V ESB-M4D284-B FLAMMABILITY

V3.16.1 In order to comply with Federal Motor Vehicle Safety Standard No. 302, the materials, portions of components, and composites shall not burn, or transmit a flame across its surface, at a rate of more than 4 in (101 mm) per minute. To demonstrate compliance, the sample size and method of testing shall be in accordance with FLTM BN 24-2.

3.16.2 Performance - Environmental Aging

All materials, portions of components, and composites defined by this specification that have not been treated, modified or reformulated and exceed a maximum burn rate of 3.0 in (76 mm) per minute as specified by the Flammability Lot Sampling Plan of FLTM BN 24-2, must be evaluated for permanency of the materials' flame retardant properties per ESB-M25P3-A according to the accelerated environmental aging requirements applicable to the basic material category of this particular specification.

Any material, portions of components, and composites defined by this specification that have been treated, modified or reformulated to conform to Flammability Lot Sampling Plan of FLTM BN 24-2, regardless of maximum burn rate, must be evaluated for both permanency of materials' flame retardant properties and changes in mechanical, chemical and physical properties per ESB-M25P3-A applicable to the basic materials category of this particular specification.

3.16.3 Flammability Test Program

Materials, portions of components, and composites governed by this specification must also comply with the requirements of V ES-D3AB-11014-AA.

3.17 PAINTABILITY, ESB-M4D284-A Only

When painted, the finished part shall conform to the requirements of Engineering Performance Specification ESB-M2P105.

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3.18 SUPPLIER'S RESPONSIBILITY

Material supplied to this specification must be equivalent to that originally approved. Changes in formulation or processing shall not be made without prior approval as described in Supplier Procedure I-A.

4. APPROVAL OF SUPPLIERS

Suppliers to this specification must be approved by the affected product engineering office. Procedure for gaining approval of a specific material to a new/existing ES-M specification is contained in Supplier Procedure I-A. Approved new suppliers will be added to the Engineering Materials Approved Source List.

5. GENERAL INFORMATION

This information is for direction of the user and is not a requirement for the supplier.

Specific part requirements such as compression set, joint strength, etc. shall be shown on the engineering drawing.

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