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BRITISH STANDARD : AUTOMOBILE SERIES

SPECIFICATION FOR

CELLULAR RUBBER COMPONENTS

FOREWORD

This British Standard, which is published under the authority of the Automobile Industry Standards Committee of the B.S.I., is based upon data-sheet SMMT NM-8B : 1963 of the Society of Motor Manufacturers and Traders Ltd.

The majority of cellular rubber used in a motor vehicle is in the form of weatherseals having complicated cross sections, but the values quoted in this standard are for samples in sheet form or from plane sections not less than ¼ in thick, cut from components.

SPECIFICATION

SCOPE

1. This British Standard specifies requirements for cellular rubber components of the following types :

Cellular rubber No.1. Open cell type, generally known as sponge rubber.

Cellular rubber No.2. Closed cell type, generally known as expanded rubber.

A summary of the physical properties and an indication of typical applications of each type are given in Appendix E.

Three grades of rubber are specified for each type.

The standard does not deal with components made from latex foam rubber. These are covered in B.S.3157*.

SECTION ONE: GENERAL REQUIREMENTS

APPEARANCE AND FINISH

2. The surfaces of all components shall be smooth and free from irregularities, and from foreign matter likely to impair the appearance or to affect adhesion. The components shall maintain a satisfactory colour during their service life.

BONDING

3. Unless otherwise specified by the purchaser, components whose surfaces are to be bonded by means of an adhesive shall be free from 'live' skin on the relevant surfaces.

The compounding of the cellular rubber, in particular extruded synthetic rubber, shall be such that no ingredient will affect the efficiency of the adhesive used for bonding.

ORGANIC MATERIALS STAINING

4. Cellular rubber components shall not cause staining when in contact with paint surfaces or trim material. Testing shall be carried out in accordance with B.S.AU 111†.

*B.S. 3157, 'Latex foam rubber components for transport seating'.
†B.S. AU 111, 'Method of test for discoloration of organic finishes and plastics materials by rubber'.

SAMPLES

5. If requested by the purchaser, the manufacturer shall submit samples with the original quotation. The samples shall be fully representative of the material to be supplied.

Prior notice shall be given by the manufacturer of any subsequent alteration in formulation or construction, or both, as distinct from specification, and further samples, if required by the purchaser, shall be submitted for approval.

The samples shall be in the form of sheet or slab suitable for carrying out the tests required by this standard. Samples of finished parts of a similar type to those covered by the quotation may also be requested.

Where components are covered by a 'live' skin, samples of the covered cellular rubber shall be submitted for the appropriate tests.

SECTION TWO: SPECIFIC REQUIREMENTS

The requirements stated in this section for each type of rubber are to be read in conjunction with Section One

CELLULAR RUBBER NO. 1 (SPONGE)

MATERIAL

6. Cellular rubber No. 1 shall be a material in which the cells are entirely or substantially intercommunicating. It shall normally be natural rubber, but other polymers may be used provided that they satisfy the requirements of this standard.

GRADING AND CODE FOR ORDERING

7. *a. Grading.* The three grades specified below shall be designated A, C and E, according to the physical properties listed in Table 1.

b. Code for ordering. If the component is required to have a 'live' skin, the suffix 'L' shall be added to the specification number. When the 'live' skin is required to be of a particular type, the suffix shall be as follows :

LN = Natural rubber.

LS = Synthetic rubber..

Example. B.S.AU 107 Cellular rubber No. 1 Grade A/LN denotes cellular rubber with Grade A properties, with a natural rubber 'live' skin.

PHYSICAL PROPERTIES

8. When tested by the appropriate method, cellular rubber No. 1 shall comply with the requirements given in Table 1.

TABLE 1. PHYSICAL REQUIREMENTS CELLULAR RUBBER NO. 1

	Grade			Method of test
	A	C	E	
Compression set (at 70 ± 2°C) per cent max.	30	30	30	Appendix A
Compressibility at 5 lbf/in² :				Appendix B1
per cent at 20 ± 2°C	3 – 8	24 – 35	50 – 60	
per cent at −30 ± 2°C	1 – 5	12 – 25	40 – 55	
Atmospheric exposure resistance	shall not show cracks			B.S. AU 112*
Ozone resistance	shall not show cracks with a rating greater than 1 unless otherwise agreed			B.S. AU.... †

*B.S.AU 112, 'Atmospheric exposure testing of rubber'.

†B.S.AU ...., 'Test for ozone resistance of solid and cellular rubber components'. (In course of preparation).

NOTE. For compressibility of components of non-rectangular section i.e. weatherseal type, see Appendix B2.

continued

CELLULAR RUBBER NO. 2 (EXPANDED)

MATERIAL AND CONSTRUCTION

9. Cellular rubber No. 2 shall have a cellular system in which the cells are substantially non-intercommunicating, i.e., closed cell or expanded rubber.

The components may be moulded, extruded or cut from sheet.

The rubber may be natural or synthetic, depending upon application the (see Appendix E), but the following materials are normally appropriate:

Grade A. Natural rubber.

Grade C. Synthetic (oil and fuel resistant).

Grade E. Extruded synthetic (weather resistant).

When used for sealing purposes, the material shall be such that it will not permanently crease when bent or folded.

GRADING

10. The three grades specified below shall be designated A, C and E, according to the physical properties listed in Table 2.

PHYSICAL PROPERTIES

11. When tested by the appropriate method, cellular rubber No. 2 shall comply with the requirements given in Table 2.

TABLE 2. PHYSICAL PROPERTIES CELLULAR RUBBER NO. 2

	Grade			Method of test
	A	C	E	
Compression set (at 20 ± 1°C) per cent max.	30	30	50	Appendix A
Compressibility at 10 lbf/in² per cent at 20 ± 1°C	16 - 26	16 - 26	-	Appendix B1
Fuel resistance percentage volume increase max.	-	50	125	Appendix C
Water absorption percentage weight increase max.				Appendix D
Method 1	-	-	5	
Method 2	10	10	5	
Atmospheric exposure resistance	shall not show cracks			B.S. AU 112*
Ozone resistance	shall not show cracks with a rating greater than 1 unless otherwise agreed			B.S. AU....†

*B.S.AU 112, 'Atmospheric exposure testing of rubber'.

† B.S.AU....., 'Test for ozone resistance of solid and cellular rubber components'. (In course of preparation).

NOTE 1. Because of the nature of the material, expanded rubbers are not generally recommended for conditions where elevated temperatures are encountered, particularly when the material is under compression. The following temperatures are suggested maxima:

Continued exposure 46°C (115°F)
Intermittent exposure 60°C (150°F)

NOTE 2. The properties exhibited by expanded rubber, particularly regarding compression, bear no relationship to those on sponge rubber having the same density.

NOTE 3. For the compressibility of components of non-rectangular section i.e. weatherseal type, see Appendix B2.

continued overleaf

APPENDIX A. COMPRESSION SET

For sheet material or substantially rectangular samples, the method of test for compression set shall be as given in B.S.903, Part F6*, except that expanded rubber shall be tested for 22 hours at a temperature of 20 ± 1°C instead of 70 hours at 70 ± 2°C as specified in that method.

APPENDIX B. COMPRESSIBILITY

B1. Sheet material or substantially rectangular samples. The method of test shall be as given in B.S.903, Part F4†.

B2. Strip or irregular section components. The component shall be supported in a manner which allows loads to be applied corresponding to service conditions. The loads shall be so arranged that two six-inch lengths are compressed simultaneously in the direction indicated by the component drawing.

The original thickness of the component shall be measured under a preload of 1 lb over the entire test length of 12 inches.

The result shall be expressed as the additional load required to compress the component to dimensions specified by the purhcaser.

The limits of acceptance shall be as agreed between the purchaser and the manufacturer.

APPENDIX C. FUEL RESISTANCE

The fuel resistance test is applicable to components having either a continuous moulded or a 'live' skin.

Whole components shall be used for the test.

The component shall be immersed in the standard fuel (70 per cent iso-octane, 30 per cent toluene) for 24 hours at 20 ± 1° C, after which the volume change shall be determined.

APPENDIX D. WATER ABSORPTION

D1. Method 1. A sample, 12 inches long, shall be weighed, and the weight per inch calculated. The sample shall then be bent into a U-shape, and submerged in distilled water with 1 inch of each end out of the water.

After 22 hours, during which time the water with submerged sample shall be maintained at room temperature, the sample shall be removed and the ends severed at the water-line.

The new length shall be measured and weighed and the weight per inch calculated.

From the above results the percentage weight change shall be calculated.

D2. Method 2. A sample 3 inches long, shall be weighed and totally immersed in distilled water at room temperature, in a vacuum desiccator. A vacuum of 10 inHg shall be applied for 10 minutes and then released, after which the sample shall be left immersed under normal pressure for a further 10 minutes.

The surface of the sample shall then be blotted, care being taken not to squeeze the sample, and it shall then be reweighed, and the percentage weight change calculated.

*B.S.903, 'Method of testing vulcanized rubber', Part F6, 'Compression set'.
†B.S.903, 'Methods of testing vulcanized rubber', Part F4, 'Compression stress-strain'.

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