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SPECIFICATION FOR

SOLID RUBBERS FOR AUTOMOBILE INDUSTRY

SRI LANKA STANDARDS INSTITUTION

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SLS 924:1991

Gr.12

SRI LANKA STANDARDS INSTITUTION
53, Dharmapala Mawatha,
Colombo 3,
Sri Lanka.

DRAFTING COMMITTEE ON RUBBER COMPONENTS FOR AUTOMOBILES

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SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
SPECIFICATION FOR SOLID RUBBERS FOR AUTOMOBILE INDUSTRY

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1991 - 05 - 20, after the draft, finalized by the Drafting Committee on Rubber Components for Automobiles, had been approved by the Chemicals Divisional Committee.

In this specification ten groups of rubber compounds have been specified. This would assist the rubber automobile spare parts manufacturers to select the appropriate rubber compound to manufacture their porducts.

A summary of the physical properties and few typical applications are given in Appendix A.

The requirements given in 5.2, 5.3, 5.4.1, 5.5.1, 5.6.1, 5.7.1 and 5.8.1 of this specification call for agreement between the purchaser and the supplier.

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the result of a test or an analysis, shall be rounded off in accordance with CS 102. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this specification.

In the preperation of this specification the assistance obtained from the publications of the International Organization for Standardization and the British Standards Institution is gratefully acknowledged.

1 SCOPE

1.1 This specification prescribes the requirements and methods of sampling and test for natural and synthetic based solid rubbers generally used in the automobile industry, other than for tyres.

1.2 It does not cover detailed composition of the rubbers.

2 REFERENCES

ISO 815 Vulcanized rubbers - Determination of compression set under constant deflection at normal and high temperatures.
ISO 1817 Rubber vulcanized - Determination of effects of liquids.
ISO 2285 Rubber vulcanized - Determination of tension set at normal and high temperatures.
ISO 8013 Rubber vulcanized - Determination of creep in compression or shear.

BS 903 Methods of testing vulcanized rubber.
Part A 4 : Determination of compression stress-strain.
Part A 8 : Determination of rebound resilience.
Part A 9 : Determination of abrasion resistance.
CS 102 Presentation of numerical values.
SLS 297 Methods of testing vulcanized rubber.
Part 1 : Determination of relative density and density.
Part 2 : Determination of tensile stress-strain properties.
Part 3 : Determination of tear strength.
Part 4 : Determination of hardness.
Part 5 : Accelerated ageing test.
SLS 428 Random sampling methods.

3 GENERAL REQUIREMENTS FOR THE COMPONENTS

3.1 Appearance and finish

3.1.1 The surface of all components shall be smooth and free from irregularities. Unless otherwise specified, the components shall be black.

3.1.2 Components shall be made from compounds so formulated as to be free from bloom.

3.2 Staining

Components shall not cause staining when in contact with body finish or internal trim materials.

4 DESIGNATION

Rubber compounds shall be identified by a " Group number " and a "Type reference" according to the requirements given in 5.

e.g " SLS .... Rubber No. 1 Type A "

In addition to the group number and type reference, wherever applicable, the following additional references should be made by the purchaser.

(i) If it is non-staining properties suffix "P" ; and
(ii) If a specified degree of electrical resistivity is required, the suffix "R".

5 REQUIREMENTS FOR THE COMPOUNDS

5.1 General requirements

The rubber compound shall be free from premature vulcanization prior to forming into the shape of the finished product by moulding or extrusion .

5.2 Density

If required, the density shall be as agreed to between the purchaser and the supplier. The density shall be determined according to the method prescribed in SLS 297 : Part 1.

5.3 Electrical resistivity

If required, the value of electrical resistivity, shall be as agreed to between the purchaser and the supplier.

5.4 Rubber Group No. 1

5.4.1 *Material and composition*

Rubber No. 1 shall normally be high strength natural rubber. Synthetic rubbers may be used as agreed to between the purchaser and the supplier. The composition shall be carefully controlled high grade mix.

5.4.2 *Types*

Rubber No. 1 shall consist of three types designated as A, B and C according to the requirements specified in Table 1.

5.4.3 *Requirements*

5.4.3.1 Rubber No. 1 shall comply with the requirements given in Table 1, when tested according to the relevant methods given in Column 6 of the table.

TABLE 1 - Requirements for Rubber No. 1

Sl. No. (1)	Characteristic (2)	Requirement for Type A (3)	Requirement for Type B (4)	Requirement for Type C (5)	method of test (6)
i)	Hardness, IRHD	60^{+5}_{-4}	50^{+5}_{-4}	40^{+5}_{-0}	SLS 297:Part 4
ii)	Tensile strength, MPa, min.	19	19	19	SLS 297:Part 2
iii)	Elongation at break, %, min.	450	500	550	SLS 297:Part 2
iv)	Compression set, %, max.	20	20	20	Appendix B
v)	Resilience, %, min.	75	80	85	Appendix D
vi)	Abrasion resistance index, min.	70	70	70	Appendix E
vii)	Hardness change after accelerated ageing at 70 °C for 7 days, IRHD.	± 5	± 5	± 5	SLS 297:Part 5

5.4.3.2 The optional requirements common for all types are listed in Table 2.

TABLE 2 - Optional requirements for Rubber No. 1

Sl. No. (1)	Characteristic (2)	Requirement (3)
i)	Outdoor exposure resistance	Shall not show cracks
ii)	Ozone resistance	Shall not show cracks
iii)	Low temperature resistance	Shall not crack at - 40 °C

5.5 **Rubber Group No. 2**

5.5.1 *Material and composition*

Rubber No. 2 shall normally be high strength natural rubber. Synthetic rubbers may be used as agreed to between the purchaser and the supplier. The composition shall be a carefully controlled high grade mix.

5.5.2 *Types*

Rubber No. 2 shall consist of eight types designated as A, B, C, D, E, F, G and H according to the requirements specified in Table 3.

5.5.3 *Requirements*

5.5.3.1 Rubber No. 2 shall comply with the requirements given in Table 3 when tested according to the relevant methods given in Column 11 of the table.

TABLE 3 - Requirements for Rubber No. 2

Sl. No. (1)	Characteristic (2)	Requirement for Type								Method of test (11)
		A (3)	B (4)	C (5)	D (6)	E (7)	F (8)	G (9)	H (10)	
i)	Hardness, IRHD	70^{+5}_{-0}	65^{+4}_{-0}	60^{+4}_{-0}	55^{+4}_{-0}	50^{+4}_{-0}	45^{+4}_{-0}	40^{+4}_{-0}	35^{+4}_{-0}	SLS 297: Part 4
ii)	Tensile strength, MPa, min.	14	14	15	17	17	15	14	12	SLS 297: Part 2
iii)	Elongation at break, %, min.	350	350	400	400	450	450	500	500	SLS 297: Part 2
iv)	Compression set, %, max.	30	30	30	25	25	25	25	25	Appendix B
v)	Resilience, %, min.	65	65	70	75	75	80	80	80	Appendix D
vi)	Shear strength, MPa, min.	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	Appendix F
vii)	Stress at 10 per cent compression, kPa.	655 to 895	515 to 690	445 to 550	378 to 447	310 to 379	261 to 310	227 to 275	186 to 227	Appendix G
viii)	Hardness change after accelerated ageing at 70 °C for 7 days, IRHD.	±5	±5	±5	±5	±5	±5	±5	±5	SLS 297: Part 5

5.5.3.2 The optional requirements common for all types are listed in Table 4.

TABLE 4 - Optional requirements for Rubber No. 2

Sl. No. (1)	Characteristic (2)	Requirement (3))
i)	Outdoor exposure resistance	Shall not show cracks
ii)	Ozone resistance	Shall not show crakcs
iii)	Low temperature resistance	Shall not crack at - 40 ^{o}C

5.6 Rubber Group No. 3

5.6.1 *Material*

Rubber No. 3 shall normally be medium strength natural rubber. Synthetic rubbers may be used as agreed to between the purchaser and the supplier.

5.6.2 *Types*

Rubber No. 3 shall consist of four types designated as A, B, C and D according to the requirements specified in Table 5.

5.6.3 *Requirements*

5.6.3.1 Rubber No. 3 shall comply with the requirements given in Table 5, when tested according to the relevant methods given in Column 7 of the table.

TABLE 5 - Requirements for Rubber No. 3

Sl. No. (1)	Characteristic (2)	Requirement for Type A (3)	B (4)	C (5)	D (6)	Method of test (7)
i)	Hardness, IRHD	$^{+5}_{-4}$ 75	$^{+5}_{-4}$ 65	$^{+5}_{-4}$ 55	$^{+5}_{-5}$ 45	SLS 297:Part 4
ii)	Tensile strength, MPa, min.	10.0	10.0	10.0	10.0	SLS 297:Part 2
iii)	Elongation at break, %, min.	250	300	400	400	SLS 297:Part 2
iv)	Compression set, %, max.	40	40	35	35	Appendix B
v)	Tensile set, %, max.	30	30	30	30	Appendix C
vi)	Hardness change after accelerated ageing at 70 °C, IRHD.	$\pm$5	$\pm$5	$\pm$ 5	$\pm$5	SLS 297:Part 5

5.6.3.2 The optional requirements common for all types are listed in Table 6.

TABLE 6 - Optional requirements for Rubber No. 3

Sl. No. (1)	Characteristic (2)	Requirement (3)
i)	Outdoor exposure resistance	Shall not show cracks
ii)	Ozone resistance	Shall not show cracks

5.7 Rubber Group No. 4

5.7.1 *Material*

Rubber No. 4 shall normally be medium strength natural rubber. Synthetic rubbers may be used as agreed to between the purchaser and the supplier.

5.7.2 *Types*

Rubber No. 4 shall consist of five types designated as A, B, C, D and E according to the requirements specified in Table 7.

5.7.3 *Requirements*

5.7.3.1 Rubber No.4 shall comply with the requirements given in Table 7 when tested according to the relevant methods given in Column 8 of the table.

TABLE 7 - Requirements for Rubber No. 4

Sl. No. (1)	Characteristic (2)	Requirement for Type					Method of test (8)
		A (3)	B (4)	C (5)	D (6)	E (7)	
i)	Hardness, IRHD	75^{+5}_{-4}	65^{+5}_{-4}	55^{+5}_{-4}	45^{+5}_{-4}	35^{+5}_{-0}	SLS 297:Part 4
ii)	Tensile, strength, MPa, min.	7	7	7	7	7	SLS 297:Part 2
iii)	Elongation at break, % max.	300	300	300	400	400	SLS 297:Part 2
iv)	Compression set, %, max.	40	40	35	35	35	Appendix B
v)	Resilience, %, min.	40	40	45	50	60	Appendix D
vi)	Shear strength, MPa, min.	1.4	1.4	1.4	1.4	1.4	Appendix F
vii)	Hardness change after accelerated ageing at 70 °C for 7 days, IRHD.	± 5	± 5	± 5	± 5	± 5	SLS 297:Part 5

5.7.3.2 The optional requirements common for all types are listed in Table 8.

TABLE 8 - Optional requirements for Rubber No. 4

Sl. No. (1)	Characteristic (2)	Requirement (3)
i)	Outdoor exposure resistance	Shall not show cracks
ii)	Ozone resistance	Shall not show cracks
iii)	Low temperature resistance	Shall not crack at - 40 ^{o}C
iv)	Staining test	Maximum degree of staining shall be as agreed to between the purchaser and the supplier

5.8 Rubber Group No. 5

5.8.1 *Material*

Rubber No. 5 shall normally be low strength natural rubber. Synthetic rubbers may be used as agreed to between the purchaser and the supplier.

5.8.2 *Types*

Rubber No. 5 shall consist of three types designated as A, B and C according to the requirements specified in Table 9.

5.8.3 *Requirements*

Rubber No. 5 shall comply with the requirements given in Table 9, when tested according to the relevant methods given in Column 6 of the table.

TABLE 9 - Requirements for Rubber No. 5

Sl. No. (1)	Characteristic (2)	Requirement for Type A (3)	Requirement for Type B (4)	Requirement for Type C (5)	Method of test (6)
i)	Hardness, IRHD	$^{+10}_{-9}$ 70	$^{+10}_{-10}$ 50	$^{+10}_{-9}$ 70	SLS 297:Part 4
ii)	Tensile strength, MPa, min.	5	5	3	SLS 297:Part 2
iii)	Elongation at break, %, min.	200	200	150	SLS 297:Part 2
iv)	Tear strength, N, min.	44.5	44.5	44.5	SLS 297:Part 3
v)	Abrasion resistance index, min.	35	35	35	Appendix E
vi)	Hardness change after accelerated ageing at 70 °C for 7 days, IRHD.	$\pm$5	$\pm$ 5	$\pm$5	SLS 297:Part 5

5.9 Rubber Group No. 6

5.9.1 *Material*

Rubber No. 6 shall be of suitable synthetic rubber of having very good resistance to fuel and lubricating oils.

5.9.2 *Types*

Rubber No. 6 shall consist of five types designated as A, B, C, D, and E according to the requirements specified in Table 10.

5.9.3 *Requirements*

5.9.3.1 Rubber No. 6 shall comply with the requirements given in Table 10, when tested according to the relevant methods given in Column 8 of the table.

TABLE 10 - Requirements for Rubber No. 6

Sl. No. (1)	Characterisitc (2)	Requirement for Type A (3)	B (4)	C (5)	D (6)	E (7)	Method of test (8)
i)	Hardness, IRHD	+5 80 -4	+5 70 -4	+5 60 -4	+5 50 -4	+5 40 -5	SLS 297:Part 4
ii)	Tensile strength, MPa, min.	7	7	7	7	7	SLS 297:Part 2
iii)	Elongation at break, %, min.	100	200	250	350	450	SLS 297:Part 2
iv)	Compresion set, %, max.	30	30	30	35	35	Appendix B
v)	Fuel resistance, volume change, %.						Appendix H
	a) Class 1	0 to + 25	0 to + 25	0 to + 30	0 to + 30	0 to + 30	
	b) Class 2	0 to + 50	0 to + 50	0 to + 50	0 to + 50	0 to + 50	
vi)	Diesel fuel resistance, volume change, %.						Appendix H
	a) Class 1	± 5	± 5	-5 to + 10	-5 to + 10	-5 to +10	
	b) Class 2	- 10 to + 30	- 10 to + 30	- 10 to + 30	- 10 to + 30	- 10 to + 30	
vii)	Oil resistance (see Note), volume change, %.						Appendix H
	a) Class 1 (ASTM 3)	- 5 to + 10	- 5 to + 10	- 5 to + 10	- 5 to + 10	- 5 to + 10	
	b) Class 2 (ASTM 1)	- 5 to + 10	- 5 to + 10	- 10 to + 15	- 10 to + 15	-10 to + 15	
viii)	Hardness change after accelerated ageing at 70 °C for 7 days, IRHD.	-5 + 10	-5 + 10	-5 + 10	-5 + 10	-0 + 10	SLS 297:Part 5

NOTE
Oil resistance may be tested in relevant service oil. The values may be as agreed to between the purchaser and the supplier.

5.9.3.2 The optional requirements common for all types are listed in Table 11.

TABLE 11 - Optional requirements for Rubber No. 6

Sl. No. (1)	Characterisitc (2)	Requirement (3)
i)	Low temperature resistance	Shall not crack at - 40 °C
ii)	Staining	Maximum degree of staining shall be as agreed to between the purchaser and the supplier.

5.10 **Rubber Group No. 7**

5.10.1 *Material*

Rubber No. 7 shall be of synthetic rubber having good resistance to lubricating oil.

5.10.2 *Types*

Rubber No. 7 shall consist of five types designated as A, B, C, D and E according to the requirements specified in Table 12.

5.10.3 *Requirements*

5.10.3.1 Rubber No. 7 shall comply with the requirements given in Table 12, when tested according to the relevant metods given in Column 8 of the table.

TABLE 12 - Requirements for Rubber No. 7

Sl. No. (1)	Characterisitc (2)	Requirement for Type A (3)	B (4)	C (5)	D (6)	E (7)	Method of test (8)
i)	Hardness , IRHD	80 +5 -4	70 +5 -4	60 +5 -4	50 +5 -4	40 +5 -5	SLS 297:Part 4
ii)	Tensile strength, MPa, min.	10	10	10	10	10	SLS 297:Part 2
iii)	Elongation at break, %, min.	150	250	300	350	450	SLS 297:Part 2
iv)	Tension set, %, max.	10	10	10	15	15	Appendix C
v)	Compresion set, % max.	30	30	30	30	30	Appendix B
vi)	Oil resistance (see Note under Table 10), volume change, %						Appendix H
	a)Class 1(ASTM 3)	0 to + 80	0 to + 80	0 to + 80	0 to + 80	0 to + 80	
	b)Class 2(ASTM 1)	- 10 to + 15	- 10 to + 15	- 10 to + 15	- 10 to + 15	- 10 to + 15	
vii)	Hardness change after accelerated ageing at 70 °C for 7 days, IRHD.	+ 10 - 5	+ 10 - 5	+ 10 - 5	+ 10 - 5	+ 10 - 5	SLS 297:Part 5

5.10.3.2 The optional requirements common for all types are listed in Table 13.

TABLE 13 - Optional requirements for Rubber No. 7

Sl. No. (1)	Characteristic (2)	Requirement (3)
i)	Outdoor exposure resistance	Shall not show cracks
ii)	Ozone resistance	Shall not show cracks

5.11 **Rubber Group No. 8**

5.11.1 *Material*

Rubber No. 8 shall be of synthetic rubber having medium resistance to lubricating oil.

5.11.2 *Types*

Rubber No. 8 shall consist of five types designated as A, B, C, D and E according to the requirements specified in Table 14.

5.11.3 *Requirements*

5.11.3.1 Rubber No. 8 shall comply with the requirements given in Table 14, when tested according to the relevant methods given in Column 8 of the table.

TABLE 14 - Requirements for Rubber No. 8

Sl. No. (1)	Characterisitc (2)	Requirement for Type					Method of test (8)
		A (3)	B (4)	C (5)	D (6)	E (7)	
i)	Hardness , IRHD	80 +5 -4	70 +5 -4	60 +5 -4	50 +5 -4	40 +5 -5	SLS 297:Part 4
ii)	Tensile strength, MPa, min.	7	7	7	7	7	SLS 297:Part 2
iii)	Elongation at break, %, min.	150	250	300	350	450	SLS 297:Part 2
iv)	Tension set, %, max.	15	15	20	20	25	Appendix C
v)	Compresion set, % max.	35	35	35	35	30	Appendix B
vi)	Oil resistance (see Note under Table 10), volume change, %						Appendix H
	a)Class 2 (ASTM 1)	- 10 to + 15	- 10 to + 15	- 10 to + 15	- 10 to + 15	- 10 to + 15	
	b)Class 1 (ASTM 3)	0 to + 80	0 to +100	0 to +100	0 to +120	0 to +120	
vii)	Hardness change after accelerated ageing at 70 °C for 7 days, IRHD.	+ 10 - 5	+ 10 - 5	+ 10 - 5	+ 10 - 5	+ 10 - 5	SLS 297:Part 5

5.11.3.2 The optional requirements common for all types are listed in Table 15.

TABLE 15 - Optional requirements for Rubber No. 8

Sl. No. (1)	Characteristic (2)	Requirement (3
i)	Outdoor exposure resistance	Shall not show cracks
ii)	Ozone resistance	Shall not show cracks

5.12 Rubber Group No. 9

5.12.1 *Material*

Rubber No. 9 shall be of high strength synthetic rubber having medium resistance to lubricating oil.

5.12.2 *Types*

Rubber No. 9 shall consist of two types designated as A and B according to the requirements specified in Table 16.

5.12.3 *Requirements*

5.12.3.1 Rubber No. 9 shall comply with the requirements given in Table 16, when tested according to the relevant methods given in Column 5 of the table.

TABLE 16 - Requirements for Rubber No. 9

Sl. No. (1)	Characterisitc (2)	Requirement for Type A (3)	Requirement for Type B (4)	Method of test (5)
i)	Hardness, IRHD	$^{+5}_{60\ -4}$	$^{+5}_{50\ -5}$	SLS 297:Part 4
ii)	Tensile strength, MPa, min.	17	17	SLS 297:Part 2
iii)	Elongation at break, %, min.	400	400	SLS 297:Part 2
iv)	Compression set, %, max.	20	20	Appendix B
v)	Resilience, %, min.	50	60	Appendix D
vi)	Abrasion resistance index, min.	70	70	Appendix E
vii)	Oil resistance (see Note under Table 10) change, %			Appendix H
	a) Class 1 (ASTM 3)	0 to + 100	0 to + 120	
	b) Class 2 (ASTM 1)	- 10 to + 15	- 10to + 15	
viii)	Hardness change after accelerated ageing at 70 ^{o}C for 7 days, IRHD	$^{+10}_{-5}$	$^{+10}_{-5}$	SLS 297:Part 5

5.12.3.2 The optional requirements common for all types are listed in Table 17.

TABLE 17 - Optional requirements for Rubber No. 9

Sl. No. (1)	Characterisitc (2)	Requirement (3)
i)	Ozone resistance	Shall not show cracks

5.13 Rubber Group No. 10

5.13.1 *Material*

Rubber No. 10 shall be of synthetic rubber having very good resistance to all motor vehicle lubricants and servicing at high temperature.

5.13.2 *Types*

Rubber No. 10 shall consist of three types designated as A, B and C according to the requirements specified in Table 18.

5.13.3 *Requirements*

Rubber No. 10 shall comply with the requirements given in Table 18, when tested according to the relevant methods given in Column 6 of the table.

TABLE 18 - Requirements for Rubber No. 10

Sl. No. (1)	Characterisitc (2)	Requirement for Type			Method of test (6)
		A (3)	B (4)	C (5)	
i)	Hardness, IRHD	90^{+3}_{-3}	82^{+5}_{-5}	70^{+5}_{-5}	SLS 297:Part 4
ii)	Oil resistance (see Note under Table 10) volume change, %				Appendix H
	a) Class 2 (ASTM 1)	-6 to +1	-6 to +1	-6 to +1	
iii)	Hardness change after oil resistance test, IRHD	- 2 to + 5	- 2 to + 5	- 2 to + 5	SLS 297:Part 4
iv)	Bond strength	as agreed to between the purchaser and the supplier			Appendix F

6 SAMPLING

6.1 LOT

In any consignment all the rubber compounds of same group and type in the form of sheets or slabs belonging to one batch of manufacture or supply shall constitute a lot.

6.2 Selection of samples

6.2.1 Samples shall be tested from each lot for ascertaining its conformity to the requirements of this specification.

6.2.2 One sheet/ slab or more shall be selected randomly from the lot.In order to ensure randomness of selection tables of random numbers as given in SLS 428 shall be used.

6.3 Number of tests

Samples selected as in 6.2 shall be tested for the requirements given in 5.4.3.1 or 5.5.3.1 or 5.6.3.1 or 5.7.3.1 or 5.8.3 or 5.9.3.1 or 5.10.3.1 or 5.11.3.1 or 5.12.3.1 or 5.13.3 depending on the rubber group.

NOTE

Tests for optional requirements should be carried out only if requested.

7 METHODS OF TEST

Tests shall be carried out as prescribed in ISO 815, ISO 1817, ISO 2285, BS 903 : Part A4, BS 903 : Part A8 and BS 903 : Part A9 and SLS 297 : Part 1, SLS 297 : Part 2, SLS 297 : Part 3, SLS 297 : Part 4 and SLS 297 : Part 5 and Appendices B to H of this specification.

8 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this specification if each sample tested as in 6.3 satisfies the relevant requirements.

APPENDIX A

SUMMARY OF PHYSICAL PROPERTIES AND TYPICAL APPLICATIONS

A.1 RUBBER GROUP NO. 1

A.1.1 *Physical properties*

Generally good mechanical properties particularly very low compression set, outstanding wear resistance and high tensile strength.

A.1.2 *Typical applications*

Shackle, steering, shock absorber and link pin bushes and other mouldings for severe machanical applications where resistance to oil is not significant.

A.2 RUBBER GROUP NO. 2

A.2.1 *Physical properties*

Generally good mechanical properties particularly tensile strength, resilience and low compression set.

A.2.2 *Typical applications*

Mouldings for severe mechanical applications, including bonded components such as engine mounts.

A.3 RUBBER GROUP NO. 3

A.3.1 *Physical properties*

Outstanding resistance to atmospheric pressure together with low compression set and tension set.

A.3.2 *Typical applications*

Glazing strips, door seals, weatherseals and grommets.

A.4 RUBBER GROUP NO. 4

A.4.1 *Physical properties*

Medium mechanical properties with good compression set and good resilience.

A.4.2 *Typical applications*

Buffers, stops, body mounting pads, grommets.

A.5 RUBBER GROUP NO. 5

A.5.1 *Physical properties*

Good tear resistance and abrasion resistance.

A.5.2 *Typical applications*

Pedal pads, floor mats, heel mats.

A.6 RUBBER GROUP NO. 6

A.6.1 *Physical properties*

Very good fuel and lubricating oil resistance and good compression set.

A.6.2 *Typical applications*

Class 1 : For use in contact with petrol, diesel fuel or lubricating oil for example seals.

Class 2 : For use in occasional contact with petrol, diesel fuel and lubricating oil, and/or constant contact with petrol vapour for example washers, grommets.

A.7 RUBBER GROUP NO. 7

A.7.1 *Physical properties*

Good oil resistance, good compression set and tension set toqether with good resistance to heat. Exceptional resistance to weathering.

A.7.2 *Typical applications*

For use in contact with oil and subjected to heat for example pluq covers, grommets and seals.

A.8 RUBBER GROUP NO. 8

A.8.1 *Physical properties*

Medium oil resistance, good tension and compression sets, medium heat resistance. Good resistance to weathering.

A.8.2 *Typical applications*

For use in contact with oil laden atmospheres for example grommets, seals.

A.9 RUBBER GROUP NO. 9

A.9.1 *Physical properties*

High strength allied to low compression set, good abrasion resistance and good resistance to oil.

A.9.2 *Typical applications*

Suspension bushes etc.

A.10 RUBBER GROUP NO. 10

A.10.1 *Typical applications*

For use in "lip" seals.

APPENDIX B

DETERMINATION OF COMPRESSION SET

B.1 PROCEDURE

Determine the compression set as given in ISO 815 using large type test pieces. Condition the test pieces at 27 ± 2 °C. Carry out the determination at 70 ± 1 °C. Compress the test pieces to 25 per cent of the original thickness for a duration of 24 hours. Measure the thickness of test pieces after a recovery period of 30 minutes.

B.2 CALCULATION

$$\text{Compression set, per cent} = \frac{t_0 - t_1}{t_0 - t_s} \times 100$$

where,

t_0 is the initial thickness, in mm, of the test piece;
t_1 is the thickness of the test piece, in mm, after recovery; and
t_s is the height of the sapcer, in mm.

APPENDIX C

DETERMINATION OF TENSION SET

C.1 PROCEDURE

Determine the tension set as given in ISO 2285 using strip test pieces with enlarged ends. Condition the test pieces at 27 ± 2 °C. Apply a strain of 50 per cent of the specified minimum elongation at break to the test pieces for a period of 10 minutes. Measure the reference length after recovery and after relaxation period of 10 minutes.

C.2 CALCULATION

$$\text{Tension set, per cent} = \frac{l_1 - l_0}{l_s - l_0} \times 100$$

where,

l_0 is the original unstrained reference length, in mm;
l_s is the strained reference length, in mm; and
l_1 is the reference length, in mm, after recovery.

APPENDIX D

DETERMINATION OF RESILIENCE

Determine the resilience as given in BS 903 : Part A8, using the Dunlop tripsometer. Carry out the determination at 50 ± 2 °C.

APPENDIX E

DETERMINATION OF ABRASION RESISTANCE

Determine the abrasion resistance as given in BS 903 : Part A9, using the DuPont machine.

APPENDIX F

DETERMINATION OF SHEAR STRENGTH AND BOND STRENGTH

Determine the shear strength and bond strength as given in ISO 8013.

APPENDIX G

DETERMINATION OF COMPRESSION STRESS-STRAIN

Determine the stress at 10 per cent compression as given in BS 903 : Part A4.

APPENDIX H

DETERMINATION OF OIL AND FUEL RESISTANCE

H.1 Determine the oil and fuel resistnace as given in ISO 1817.

H.2 RESISTANCE TO OIL

H.2.1 *Rubber Nos. 6,7,8 and 9*

Use ASTM oil Nos. 1 and 3 and immerse for 70 hours at a temperature of 100 ± 1 °C.

H.2.2 *Rubber No. 10*

Use one of the following test oils at the appropriate temperature, depending upon the application;

a) for engine and gearboxes : ASTM No. 1, immerse for 72 hours at 100 ± 2°C.
b) other applications : Any proprietary E.P. oil, immerse for 72 hours at 120 ± 2 °C.

NOTE
The particular E.P. oil to be used should be as agreed to between the purchaser and the manufacturer.

H.3 RESISTANCE TO PETROL

Use a reference fuel consisting of 70 per cent alkylate iso-octane and 30 per cent toluene . Immerse for 24 hours at 20 ± 1°C.

H.4 RESISTANCE TO DIESEL FUEL

Class 1 : Immerse for 7 days at 70 ± 1 °C.
Class 2 : Immerse for 7 days at 20 ± 1°C.

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