



Physical Testing Standards Table

Tensile Properties		
Tensile Strength/ Extension at Break	Standard	ISO 37, BS903: A2
	Test piece/sample	Type 2 dumbbells are cut from a 2mm thick moulded sheet. They are cut parallel to the grain where this is indicated.
	Test	Minimum 3 test-pieces (an odd number preferred). Normally tested at +23°C, but chamber for -60 to + 100°C available.
	Results	Modulus at 100% and every 100% extension, Tensile Strength, and Elongation at Break. The median result of three test-pieces is indicated.
RELAXED MODULUS	Standard	In house Method. Draft standard for the aborted test BS 903: A41
	Test piece/sample	Cut 'Bongo's' from a 2mm thick moulded sheet.
	Test	Two test-pieces. Tested at +23C.
	Results	Relaxed Modulus at 100% extension (MR100) is reported.
C1C2 Mooney Rivlin constants	Standard	In House
	Test Piece/Sample	Strip approx. 130mm x 3mm, cut from 2mm thick sheet.
	Test	Two test-pieces. Crosshead speed 10mm/min tested at +23°C.
	Results	C1C2 values, r, reported. Mooney Rivlin plot supplied.
Rubber Hardness		
HARDNESS IRHD Method H, L	Standard	ISO 48, BS903: A26
	Test piece/sample	Moulded button, 8mm thick, 25.4mm diameter (minimum) (Dunlop test piece preferred)
	Test	Three 'Macro' Hardness' readings on 1 or 2 test pieces. Tested at +23°C, using H14 or NORMAL, HIGH or LOW gauges.
	Results	The median of 3 readings is indicated
MICRO-HARDNESS IRHD Method M	Standard	ISO 48, BS903: A26
	Test piece/sample	25.4mmx25.4mm cut from 2mm thick (or less) sheet
	Test	Three 'Micro' Hardness' readings on 1 or 2 test pieces. Tested at +23°C
	Results	The median of 3 readings is indicated
HARDNESS SHORE A	Standard	ISO 7619, BS903: A57
	Test piece/sample	Test-piece >6mm thick (Dunlop test-piece preferred)
	Test	Five Shore A readings on 1 or 2 test-pieces. Tested at +23°C
	Results	The median of 5 readings is indicated

Tear and crack growth		
TROUSER TEAR	Standard	ISO 34: BS903: A3 Method A
	Test piece/sample	15mmx100mm strip cut from a 2mm thick moulded sheet.
	Test	Five test-pieces. Tested at +23°C.
	Results	Median and range of Tear Strengths are reported.
ANGLE TEAR	Standard	ISO 34: BS903: A3 Method B (a)
	Test piece/sample	Angle test-piece cut from 2mm thick moulded sheet. No nick.
	Test	Five test-pieces. Tested at +23°C
	Results	Maximum Tear Strength is reported. The Median of five test-pieces is indicated.
CRESCENT TEAR	Standard	ISO 34: BS903: A3, Method C
	Test piece/sample	A Crescent test-piece is cut from a 2mm thick moulded sheet. A razor nick ~ 1mm deep is then inserted.
	Test	Five test-pieces. Tested at +23C
	Results	Maximum Tear Strength is reported. Median of five test-pieces is indicated.
Bond strength and adhesion		
STEEL CORD ADHESION	Standard	ISO 5603, BS903: A56, ASTM D2229
	Test piece/sample	Moulded Standard Test-piece
	Test	Ten cords (1 test-piece sample). Tested at +23°C
	Results	The Peak and average forces of ten cords are indicated.
ADHESION STRENGTH	Standard	ISO 36, BS903: A12 Analysis ISO 6133, BS903: A47
Rubber to Fabric Peel Strength	Test piece/sample	A prepared strip, 25mm wide and of sufficient length to permit a ply separation of at least 100mm.
	Test	Three test pieces. Tested at +23°C.
	Results	Adhesion strength (peel strength) is calculated from the median peak force. A description of the type of failure is also reported.
BOND STRENGTH Rubber to Metal Peel Strength	Standard	ISO 813, BS903: A21 (method B)
	Test piece/sample	A prepared strip of rubber 25mm wide 125mm long and 6mm thick bonded to a 25mm square area of a metal strip 25mm wide, 60mm long and 1.5mm thick.
	Test	Four test-pieces. Tested at +23°C.
	Results	The Adhesion value is calculated from the maximum force. A description of the type of failure is also reported.
Recovery properties		
COMPRESSION SET	Standard	ISO 815, BS903: A6
	Test piece/sample	Moulded button, 6.3mm (6.0mm-6.6mm) thick, 12.5mm diameter, or 12.5mm thick, (12.0-13.0mm)29mm diameter, <80 IRHD.
	Test	Three test-pieces. Conditioned for 24hrs at +70°C under 25% compression (lubricated). Recovery in an unstrained state for 30 minutes at +23°C.
	Results	Compression Set is reported.
TENSION SET	Standard	ISO 2285, BS903: A55
	Test piece/sample	Test-pieces are cut from a 2mm thick moulded sheet
	Test	Three test-pieces. Tested at +23°C. The test-pieces are strained to 100% extension for 22hrs. They are then allowed to relax for 30mins and their residual extension measured.
	Results	The Tension Set is reported.
Stress Relaxation: Tension or compression	Standard	
	Test piece/sample	Depends on test. Button or strip
	Test	Strain sample and monitor load with time

	Results	Load/ log(time) plot with analysis of relaxation rate/ rates
Abrasion		
AKRON ABRASION (Dust applied)	Standard	ISO 4649, BS903: A9 Method B
	Test piece/sample	Moulded disk, 12.5mm thick x 64mm diameter.
	Test	One test-piece. Tested at +23°C. Dust is used to remove debris/stickiness.
	Results	Abrasion Resistance Index is calculated from the relative volume loss against the standard rubber. The absolute values of abrasion loss and density are also reported.
DIN ABRASION	Standard	ISO 4649, BS903: A9 Method A
	Test piece/sample	Moulded disk, 8mm thick x 16mm diameter.
	Test	Three test-pieces. Tested at +23°C
	Results	Weight and Volume Loss of each disk and average indicated, along with density. Index to Test Lab Standard Rubber given, using ISO 4649 Formulation B.2.1
Hysteresis and resilience		
DMTS (Gabo) (Dynamic mechanical Thermal spectrometer) DOUBLE SHEAR	Standard	In House
	Test Piece/Sample	Two moulded pellets (bonded for testing) 2mm thick, 8mm diameter.
	Test	One test-piece: Scragged at 20% strain, 1Hz, Ambient, Temp/Freq sweep -30°C to +60°C (30°C steps), 1Hz, 0.2% strain, Stat/Dyn Load sweep 0.2% - 40% strain, 1Hz, 60°C. Other conditions available.
	Results	Modulus G' and Tan Delta reported. G'' available.
DUNLOP RESILIENCE (Tripsometer)	Standard	ISO 4662, BS903: A8, Method A
	Test piece/sample	Moulded disk, 8mm thick x 44mm diameter.
	Test	Two test-pieces. Tested at +23°C. (Higher °C available.)
	Results	The mean of three resilience values is reported.
LUPKE RESILIENCE	Standard	ISO 4662, BS903: A8, Method B
	Test piece/sample	Moulded disk, 12.5mm thick x 64mm diameter.
	Test	Two test-pieces. Tested at +23°C.
	Results	The mean of three resilience values is reported.
HEAT BUILD-UP Goodrich	Standard	ISO 4666/3, BS 903: A50, ASTM D623, Method A
	Test piece/sample	Moulded cylinder 25.4mm high x 17.5mm diameter.
	Test	Two test-pieces. Tested at +23°C. Stroke=0.225", Static Load of 24lb (equivalent to a stress of 1MPa). Frequency of 30Hz for 30mins.
	Results	Initial static deflection, initial dynamic deflection, final dynamic deflection, permanent set and temperature rise (or time to failure) are reported.

Service life: Fatigue		
TENSILE FATIGUE	Standard	In House
	Test piece/sample	Type 2 Tensile Dumbbell
	Test	Three test pieces. Fatigue at constant Load/ stress or Constant Extension (as specified) Cycle to include full relaxation. Frequency 5 Hz.
	Results	Fatigue life (cycles) reported.
RING FATIGUE	Standard	ISO 6943, BS903: A51
	Test piece/sample	Cut rings 1.5mm thick (+ 0.4mm -0.0mm) from 9"x9" sheet.
	Test	Six test-pieces. 0-100% strain. Tested at +23°C.
	Results	Cycles to failure; Median, Mode and Standard deviation are indicated.
Service life: Resistance to the environment		
OZONE	Standard	ISO 1431-1 (Procedure A), BS903:A43
	Test Piece/Sample	A strip test-piece of width 10mm and thickness 2mm is cut from a moulded sheet.
	Test	Three test-pieces are strained at 20% for 72hrs at +23°C. They are then tested in an ozone concentration of 50pphm at +40°C under 20% strain for 72hrs. The test-piece edges and ends adjacent to the clamps are coated with a protective layer. Other temperatures (down to 5°C) and ozone concentrations may be used
	Results	A daily report on the test-piece condition is given, after x7 magnification visual check.
VOLUME SWELLING	Standard	ISO 1817 Method 8.2, BS903: A16
	Test Piece/Sample	One-inch squares are cut from a 2mm thick moulded sheet.
	Test	Three test-pieces are swollen in standard oils (or other liquids) as specified, for 70hrs at 100°C (or other conditions)
	Results	The mean Volume increase (%) is reported.
AGEING In fan ovens, cell ovens or vacuum ovens.	Standard	ISO 471
	Test Piece/Sample	As Required
	Test	<u>-25°C</u> , <u>0°C</u> , <u>+23°C</u> (50% relative humidity), +40°C, +55°C, <u>+70°C</u> , +85°C, <u>+100°C</u> , <u>+125°C</u> , +150°C Temperatures underlined are normally available. It may be possible to accommodate the need for other temperatures.
	Results	Usually report retention of a physical property after ageing (Tensile strength, Hardness etc)

Low temperature properties		
LOW TEMPERATURE HARDNESS (to -4-°C)	Standard	ISO 3387 in conjunction with ISO 48, BS5294
	Test Piece/Sample	Moulded 'Dunlop disk' 8mm thick x 44mm diameter (minimum). (Lupke test piece preferred)
	Test	One test-piece is conditioned for 45mins at +70°C. After 30mins at +23°C, the test-piece is inserted into a fridge at -25°C, and the hardness measured after 15mins and 1,3,7,14,21 and 28 days.
	Results	Hardness versus time is reported.
LOW TEMPERATURE BRITTLENESS (to -75°C)	Standard	ISO 812, BS903: A25 (ASTM D2137)
	Test Piece/Sample	Test Pieces cut from 2mm sheet
	Test	Ten test pieces required for each temperature evaluation. Either Pass/Fail at specified Temperature or, Temperature Sweep to establish brittleness point.
	Results	Pass/Fail at a temperature, or Brittleness Temperature reported.
Miscellaneous		
DENSITY	Standard	ISO 2781:Method A, BS903:A1
	Test Piece/Sample	As required
	Test	Two test-pieces per mix/cure. Tested at +23°C
	Results	The mean density is reported.
Volume and surface resistivity	Standard	In House
	Test Piece/Sample	Sheet ~ 15x15cm.
	Test	One test-piece. Painted with conductive paint. Up to 250V DC/AC
	Results	Volume or surface resistivity
PRI	Standard	ISO 2007: (PO), ISO 2930: (PRI)
	Test piece/sample	The pellets are cut from crepe 3.2mm - 3.6mm thick, (2x1.6mm - 1.8mm thick from mill rolls) x 13mm diameter.
	Test	Six pellets; three pellets used for P0 and three pellets used for P30 i.e. after 30mins ageing at +140°C. Tested at +100°C.
	Results	The ratio of P0/P30 is indicated.
Condom testing		
AIR BURST Condom	Standard	EN 600, ISO 4074
	Test Piece/Sample	Condom
	Test	Sample size as directed. Condom inflated at +23°C
	Results	Burst Pressure (KPa) and Burst Volume (Litres) reported. Statistics reported.
FREEDOM FROM HOLES Condom	Standard	EN600, ISO 4074 (including electrical leak test)
	Test Piece/Sample	Condom
	Test	Sample size as directed. Electronic method with water-fill test of condoms reported to fail the electrical test (as Standards).
	Results	Number tested, Number failed reported.
Other condom tests	Size	EN 600, ISO 4074
	Tensile properties	EN 600, ISO 4074
	Packaging integrity	EN 600, ISO 4074
	All tests of	EN 600, ISO 4074

Glove testing		
Test to EN 455	Size	
	Tensile properties	
FREEDOM FROM HOLES Glove	Standard	EN600, EN 455-1, EN 374-2
	Test Piece/Sample	Glove. Water fill method.
	Test	Sample size as directed.
	Results	Number tested, Number failed reported.