


# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

 <p>Accredited to ISO/IEC 17025:2005</p>	<h3>Tun Abdul Razak Research Centre</h3> <p>Issue No: 025    Issue date: 07 June 2017</p>	
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<p>Testing performed at the above address only</p>		

### DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
<p>RUBBERS/ELASTOMERS, RUBBER/ELASTOMER PRODUCTS AND MATERIALS IN CONTACT WITH RUBBER</p>	<p><u>Chemical Tests</u></p>	
	<p>Aromaticity of oils extracted from rubbers/rubber compounds</p>	<p>Documented In-House Method 093a using NMR according to ISO 21461:2012</p>
	<p>Ash content</p>	<p>Documented In-House Method 001 based on ISO 247:1990</p>
	<p>Nitrosamine testing of rubber or airborne samples</p>	<p>Documented In-House Method 051 using Gas Chromatography with Nitrogen Chemiluminescence Detection, covering BS EN 12868:1999 and BS ISO 29941:2010</p>
	<p>Acrylonitrile Monomer (ACN or RAM testing)</p>	<p>Documented In-House Method 065a using Gas Chromatography (GC-NPD) based on ASTM D4322-92 (2001)</p>
	<p>Accelerators and accelerator residues in rubber, specifically:</p> <ul style="list-style-type: none"> <li>- dithiocarbamates</li> <li>- thiurams</li> <li>- mercaptobenzothiazole (MBT)</li> <li>- guanidine</li> <li>- dibenzothiazyl disulphide (MBTS)</li> <li>- thioureas</li> </ul>	<p>Documented In-House Method 063 using High Performance Liquid Chromatography (HPLC):</p> <ul style="list-style-type: none"> <li>method 063a</li> <li>method 063b</li> <li>method 063c</li> <li>method 063d</li> <li>method 063e</li> <li>method 063f</li> </ul>



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RUBBERS/ELASTOMERS, RUBBER/ELASTOMER PRODUCTS AND MATERIALS IN CONTACT WITH RUBBER (cont'd)	<p><u>Chemical Tests</u> (cont'd)</p> <p>Qualitative and Quantitative Analysis for rubber identification and content</p> <p>Elemental Analysis:            Aluminium            Antimony            Arsenic            Barium            Boron            Cadmium            Calcium            Chromium            Cobalt            Copper            Iron            Lead            Magnesium            Manganese            Mercury            Nickel            Selenium            Silicon            Sulphur            Tin            Titanium            Vanadium            Zinc</p>	<p>Documented In-House Methods using:</p> <ul style="list-style-type: none"> <li>- Thermogravimetric Analysis (TGA): method 011</li> <li>- Differential Scanning Calorimetry (DSC): method 012a</li> <li>- FT-IR Spectroscopy: Method 031a</li> <li>- Pyrolysis with Infra-Red (PIR) including surface ATR Spectroscopy: method 031b</li> <li>- TG-IR interface Method 031c (IR interfaced to TGA)</li> <li>- Thin Layer Chromatography (TLC): method 061</li> <li>- High Performance Liquid Chromatography (HPLC): method 063</li> </ul> <p>Inductively Coupled plasma with Atomic Emission Spectroscopy (ICP-AES): method 081</p>



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RUBBERS, POLYMERS, PLASTICS, ELASTOMERS	<u>Chemical Tests</u>	Documented In-House Methods using:
RUBBER, POLYMER, PLASTIC, ELASTOMER PRODUCTS	Identification of elements for composition analysis, reverse engineering filler type, or contamination	- Scanning Electron Microscopy (SEM) with Energy Dispersive X-ray Spectrometry (EDS), Line-scans and X-ray Mapping Spectrometry: methods 072b and 072d
MATERIALS IN CONTACT WITH RUBBERS, POLYMERS, PLASTICS, ELASTOMERS	<u>Chemical and Physical Test</u>	Documented In-House Methods using:
	Qualitative scanning electron microscopy (SEM) using magnifications in the range 1.5x to 300,000x	- Scanning Electron Microscopy (SEM): method 072c
	Quantitative measurement of length using magnifications in the range 10x to 30,000x	- Scanning Transmission Electron Microscopy (STEM): method 075
	Sample preparation for scanning electron microscopy (SEM)	- Sample preparation for scanning electron microscopy (SEM); method 072a
	Sample preparation for transmission electron microscopy (TEM), atomic force microscopy (AFM), scanning transmission electron microscopy (STEM), and light microscopy	- Ultramicrotomy and Cryomicrotomy using glass and diamond knives: methods 070a and 070c - Staining with Osmium Tetroxide; method 070g - Preparation of shadowed carbon replicas: method 070k
	Qualitative transmission electron microscopy (TEM) of thin sections and particles using magnifications in the range 3,000x to 750,000x	- Transmission Electron Microscopy (TEM): method 073
	Quantitative measurement of length using magnifications in the range 3,000x to 430,000x	- Production of TEM images for Latex Particle Sizing: method 074



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<p>RUBBERS, POLYMERS, PLASTICS, ELASTOMERS</p> <p>RUBBER, POLYMER, PLASTIC, ELASTOMER PRODUCTS</p> <p>MATERIALS IN CONTACT WITH RUBBERS, POLYMERS, PLASTICS, ELASTOMERS (cont'd)</p>	<p><u>Physical Tests</u></p> <p>Optical Microscopy / Qualitative Analysis</p> <p>Quantitative measurement of length using magnifications in the range: 100x to 625x for phase contrast and 20x to 625x for transmitted, incident, bright field and dark field imaging (using compound optical microscope)</p> <p>4x to 84x using stereo optical microscope</p>	<p>Documented In-House Methods using:</p> <ul style="list-style-type: none"> <li>- Compound optical microscope including phase contrast, transmitted and incident light, bright field and dark field imaging: method 071a</li> <li>- Stereo optical microscope with digital camera: method 071c</li> <li>- Zoom lens with digital camera for low magnification imaging: method 071b</li> </ul>
<p>MEDICAL GLOVES AND NATURAL RUBBER LATEX FILMS</p>	<p>Aqueous extractable proteins</p>	<p>Documented In-house method BT 0002a using the modified Lowry Assay based on ASTM D5712-15</p> <p>Documented In-house method BT 0002e using the modified Lowry Assay based on EN 455-3-2015 (spectrophotometry)</p>
<p>TYRES - COMMERCIAL AND PASSENGER VEHICLES</p>	<p><u>Performance Test</u></p> <p>Endurance 200 - 5000 kgf</p>	<p>Documented In-House Method based on, and meeting the requirements of, ECE 30, 54, 108 and 109 (TTL 002)</p>



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RUBBERS AND ELASTOMERS	<u>Physical Tests</u>  Tensile Properties including determination of tensile strength, elongation at break and modulus  Hardness test : Normal (N), Micro test (M) and Micro test on a curved surface (CM)  Compression Set  Trouser Tear  Angle Tear  Crescent Tear  Ozone Resistance  Heat Resistance/Accelerated Air Ageing	BS ISO 37 (PET Test Method 1)  BS ISO 48 (PET Test Method 2)  BS ISO 815-1 (PET Test Method 3)  BS ISO 34-1 Method A (PET Test Method 4)  BS ISO 34-1 Method B (PET Test Method 5)  BS ISO 34-1 Method C (PET Test Method 6)  BS ISO 1431-1 (Static only) (PET Test Method 7)  BS ISO 188 (PET Test Method 8)
END		