


# Schedule of Accreditation

issued by

## United Kingdom Accreditation Service

21 - 47 High Street, Feltham, Middlesex, TW13 4UN, UK

 <p>Accredited to ISO/IEC 17025:2005</p>	<h3>Tun Abdul Razak Research Centre</h3> <p>Issue No: 018    Issue date: 23 September 2011</p>	
	<p>Brickendonbury Hertford SG13 8NL</p>	<p>Contact: Mr F J Winfield Tel: +44 (0)1992 584966 Fax: +44 (0)1992 554837 E-Mail: fwinfield@tarrc.co.uk Website: www.tarrc.co.uk</p>
<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 21461:2006</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 Thermal Energy Analyser, covering BS EN 12868:1999</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> <p>method 063a method 063b method 063c method 063d method 063e method 063f</p>



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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/ELASTOMERS, RUBBER/ELASTOMER PRODUCTS AND MATERIALS IN CONTACT WITH RUBBER (cont'd)	<p><u>Physical Tests</u></p> <p>Qualitative Analysis, Optical Imaging</p> <p>Quantitative measurement of length using magnifications in the range: 100 to 625 for phase contrast and 20 to 625 for transmitted, incident, bright field and dark field imaging (using compound optical microscope) 4 to 84 using stereo optical microscope</p> <p>Qualitative electron-optical imaging</p> <p>Quantitative measurement of length using magnifications in the range 100 to 10k</p> <p><u>Chemical and Physical Test</u></p> <p>Elemental analysis for filler type or contamination in rubbers</p>	<p>Documented In-House Methods using:</p> <ul style="list-style-type: none"> <li>- Sample Preparation: Microtomy, and Cryomicrotomy using glass knives; methods 070a and 070c</li> <li>- Compound optical microscope including phase contrast, transmitted and incident light, bright field and dark field imaging; method 071a</li> <li>- Zoom lens with digital camera for low magnification imaging; method 071b</li> <li>- Stereo optical microscope with digital camera; method 071c</li> </ul> <p>Documented In-House Methods using:</p> <ul style="list-style-type: none"> <li>- Sample preparation; method 072a</li> <li>- Scanning Electron Microscopy; method 072c</li> <li>- Scanning Transmission Electron Microscopy; method 075</li> </ul> <p>Documented In-House Methods using:</p> <ul style="list-style-type: none"> <li>- Sample preparation; method 072a</li> <li>- Scanning Electron Microscopy with Energy Dispersive X-ray and X-ray Mapping Spectrometry; methods 072b and 072d</li> </ul>



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RUBBERS/ELASTOMERS, RUBBER/ELASTOMER PRODUCTS AND MATERIALS IN CONTACT WITH RUBBER (cont'd)	<u>Chemical and Physical Tests</u>  Qualitative electron imaging of thin sections and particles using magnifications in the range 35 to 750k  Quantitative measurement of length using magnifications in the range 3.8 k to 100 k	Documented In-House Methods using: - Sample Preparation: Ultramicrotomy and Cryomicrotomy using glass and diamond knives; methods 070a and 070c - Sample Preparation: Staining with Osmium Tetroxide; method 070g - Sample Preparation: Preparation of shadowed carbon replicas; method 070k - Transmission Electron microscopy; method 073 - Latex Particle Sizing; method 074
Medical gloves and natural rubber latex films	Aqueous extractable proteins	Documented In-house method BT 0002a using the modified Lowry Assay based on ASTM D5712-10
TYRES - COMMERCIAL AND PASSENGER VEHICLES	<u>Performance Test</u>  Endurance 200 - 5000 kgf	Documented In-House Method based on, and meeting the requirements of, ECE 30, 54, 108 and 109 using 1.707 meter diameter test drums (TTL 002)
	END	