

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

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



0261

Accredited to
ISO/IEC 17025:2017

SPECTRO

a trading name of Palace International Limited

Issue No: 038 Issue date: 21 November 2022

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Testing performed at the above address only

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
PETROLEUM and PETROLEUM PRODUCTS OIL, LUBRICANTS, DEBRIS AND HYDRAULIC FLUID	<u>Chemical and Physical Tests</u>	Flexible scope enabling new versions of existing accredited standard test methods to be introduced in accordance with documented Spectro corporate procedure CP-001 (Management of Change) Documented In-House Methods in the series M 000 as listed below
	Air release value of lubricating and hydraulic oils - Range 0 - 30 mins	M 028 based on IP 313 and ASTM D3427
	Antioxidant content	In house method M039 based on ASTM D6971 by RULER
	Apparent Viscosity (Cold Cranking Simulator) at -10, -15, -20, -25, -30 and -35 °C of Oils and Lubricants	ASTM D5293
	Blotter Spot test	ASTM D7899
	Colour (Lovibond) - Range 0 - 8 Lovibond units	M 009 based on IP 196, ISO 2049 and ASTM 1500
	Conductivity	M 021 based on ASTM D2624 and IP 274
	Debris content extracted from filter elements - Range 0 - 100% wt	M 032 by filtration/SEM
Density and Specific Gravity - Range 0.5 - 1.5 g/ml	M 011 based on ASTM D5002	



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PETROLEUM and PETROLEUM PRODUCTS OIL, LUBRICANTS, DEBRIS AND HYDRAULIC FLUID (cont'd)	<p><u>Chemical and Physical Tests</u> (cont'd)</p> <p>Elemental analysis of dark oils and Aviation oils - The following elements within spectral range 130 to 800 nm Ag, Al, B, Ba, Ca, Cd, Cl, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Si, Sn, Ti, V, W, Zn</p> <p>Elemental analysis of Oils Ag, Al, Ba, B, Ca, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, P, Pb, S, Si, Sn, Ti, V, Zn</p> <p>Elemental Analysis of additive elements in Lubricating Oil Ba, B, Ca, Cu, Mg, Mo, P, S, Zn</p> <p>Evaporation Test (NOACK) of oils and lubricants</p> <p>Ferromagnetic particles in oil - Range 15 - 750 PQ units</p> <p>Flash Point - Range Ambient - 300 °C</p>	<p>Flexible scope enabling new versions of existing accredited standard test methods to be introduced in accordance with documented Spectro corporate procedure CP-001 (Management of Change) Documented In-House Methods in the series M 000 as listed below</p> <p>M 019 based on ASTM D5185 By ICP-AES</p> <p>ASTM D5185 By ICP-AES</p> <p>ASTM D4951 By ICP-AES</p> <p>CEC-L-40-93</p> <p>M 025 by Particle Quantifier</p> <p>M 001 by Go, No-go based on IP 303:Part 1 (obsolete) by Setaflash or based on IP303 / ASTM D7094 Eralytics Automatic Closed cup</p>



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PETROLEUM and PETROLEUM PRODUCTS OIL, LUBRICANTS, DEBRIS AND HYDRAULIC FLUID (cont'd)	<u>Chemical and Physical Tests</u> (cont'd) Flash Point (cont'd) - Range 80 - 300 °C - Range 40 - 360 °C Foaming characteristics of lubricants - Range 0 ml (nil) to <1000 ml HTHS (Dynamic Viscometry) at 100 and 150°C of Oils and Lubricants Pentane - Range 0.01 - 5 % w/w Metallic debris Micro carbon residue - Range 0.10 % - 30.0 % m/m Neutralization number: Acid - Range 0.01 - 20.0 Nitrogen in Oils and Lubricants Nitrogen in Oils and Lubricants TAN Range 0.1 - 20 mg KOH/g	Flexible scope enabling new versions of existing accredited standard test methods to be introduced in accordance with documented Spectro corporate procedure CP-001 (Management of Change) Documented In-House Methods in the series M 000 as listed below M 020 by Cleveland open cup based on ASTM D92 and IP 36 by Cleveland Open Cup M 031 by Pensky Marten closed cup based on IP 34 and ASTM D93 M 027 based on IP 146 and ASTM D892 using Seta Dual-twin foam bath CEC L-36-90 by Ravenfield High Shear Rate Tapered Plug viscometer M 010 by Membrane Filtration based on MM 1068 M 022 by Chemical analysis & SEM M 030 based on ASTM D4530 M 034 by colour titration based on IP 139 and ASTM D974 ASTM D5762 by combustion and chemiluminescence ASTM D5291 by Nitrogen analyser M 007 based on ASTM D664 and IP 177



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PETROLEUM and PETROLEUM PRODUCTS OIL, LUBRICANTS, DEBRIS AND HYDRAULIC FLUID (cont'd)	<u>Chemical and Physical Tests</u> (cont'd) Total Base Number (TBN) - Range 0.1 - 60 mg KOH/g - Range 0.1-60 mg KOH/g - Range 0.1-300 mg KOH/g Oxidation, nitration, sulphates, glycol, water spectral range 7400 - 375 cm ⁻¹ - Glycol POS/NEG - Oxidation 0 - 50 (abs/cm) - Nitration 0 - 50 (abs/cm) - Water 0 - 5 (% by wt) - Soot 0 - 2 (% by wt) Particle examination - qualitative identification of alloy Type Size and number of particles Range 5 - 100 microns Initial pH Range 0-14 pH units Sulphated Ash in Oils and Lubricants Sulphur	Flexible scope enabling new versions of existing accredited standard test methods to be introduced in accordance with documented Spectro corporate procedure CP-001 (Management of Change) Documented In-House Methods in the series M 000 as listed below M 005 based on ASTM D664 and IP 177 M 006 based on IP 276 and ASTM D2896 ASTM D2896by Metrohm titrator M 017 by FTIR M 013 by Scanning Electron Microscope M 033 based on NAS1638, ISO4406, SAE AS4059 M 016 based on ASTM D7946 ASTM D874 ASTM D2622by WDXRF



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PETROLEUM and PETROLEUM PRODUCTS OIL, LUBRICANTS, DEBRIS AND HYDRAULIC FLUID (cont'd)	<u>Chemical and Physical Tests</u> (cont'd)	Flexible scope enabling new versions of existing accredited standard test methods to be introduced in accordance with documented Spectro corporate procedure CP-001 (Management of Change) Documented In-House Methods in the series M 000 as listed below
	Viscosity Range 1-1000 cSt	M 002 based on IP 71, Section 1, by Semi-Automatic Viscometer Method, ASTM D445
	Viscosity at 40°C and 100°C	ASTM D445 By Manual and automated viscometers
	Viscosity Index calculated from viscosity results at 40°C and 100°C	ASTM D2270
	Water Content - Range 0.001 - 10% or 10 - 100,000 ppm	M 023 by automatic Karl Fischer based on ASTM D6304c
	Water contamination, positive or negative - crackle test	M 026 by Seta Flash Go, No-go flashpoint tester
Insulating Liquids	Dielectric Breakdown Voltage	ASTM D1816 using VDE electrodes
Insulating Liquids	Water content	ASTM D1533 by Coulometric Karl Fischer
Electrical Insulating Oils	Dissolved Gases	ASTM D3612 by Gas Chromatography
Automatic Transmission Fluids, Hydraulic Fluids, and Lubricants	Low temperature Viscosity	ASTM D2983 by Rotational Viscometer
END		