



The Quality Center (Thailand) Co., Ltd.

CERTIFICATE OF ACCREDITATION

The Quality Center (Thailand) Co., Ltd. has assessed the Laboratory of:

FOCUSLAB LTD

120/41-42 King Kaew Road 21/2

Rajateva, Bangplee, Samutprakan 10540 Thailand.

has met the requirements set forth in Laboratory's policies and procedures, all requirements ISO /IEC 17025:2005 "General Requirements for the competence of testing and calibration laboratories. **"

The accredited laboratory has demonstrated technical competence to a defined "Scope of Accreditation" and the operation of a laboratory quality management system.



(Mr. Angcapol Chamchawalit)

Managing Director/Auditor



(Mr. Montri Phomettha)

Lab Quality and ISO/IEC 17025-Specialist/Auditor

Initial Accreditation Date: March 1, 2017

Issue Date: March 1, 2017

Expiration Date: March 1, 2020

Certificate No. TQC-17025-001

* See the laboratory's Scope of Accreditation for details of accredited parameter

CERTIFICATE OF ACCREDITATION TO ISO/IEC 17025:2005



FOCUSLAB Ltd.
 120/41-42 King Kaew Road 21/2
 Rajateva, Bangplee, Samutprakan 10540 Thailand
 Tel: +66 (2) 7504187 E-mail: focuslab@focuslab.co.th

In recognition of the successful completion of the TQC evaluation process, accreditation is granted to this laboratory to perform the following tests on petroleum products including lubricating oils and insulating oils:

Issue Date: March 1, 2017

Certificate No. TQC-17025-001

Accreditation valid through: March 1, 2020

FIELD OF TEST	MATERIALS OR PRODUCTS TESTED	SPECIFIC TESTS	STANDARD METHOD OR TECHNIQUE USED	RANGE / DETECTION LIMIT
Chemical	Lubricating Oils	RDE Emission Spectroscopy	ASTM D 6595	Varies by Element
		RFS Rotrode Filter Spectroscopy	ASTM D 6595M	Varies by Element
		Kinematic Viscosity	ASTM D 445	≤ 3000 cSt @ 40 °C ≤ 300 cSt @ 100 °C
		Pore Blockage Particle Count	Pore Blockage Method	NAS Class 00 to Class 12 ISO Class 1 to Class 24
		Optical Particle Count	ISO11500	NAS Class 00 to Class 12 ISO Class 1 to Class 24
		FTIR Oxidation, Nitration, Sulfation, Water, soot Fuel, ZDDP	ASTM D 7414A ASTM D 7415A ASTM D 7624A ASTM E 2412M	Varies by item tested
		Ferrographic Analysis	ASTM D 7690	0 to 1000 um
		Coulometric Karl Fischer Titration	ASTM D 6304	0.0010 - 2.5000 %wt.
		Volumetric Karl Fischer Titration	ASTM D 1744	0.0050 - 0.1000 %wt.
		Total Acid Number	ASTM D 974	≤ 15.0 mgKOH/g
		Total Base Number	ASTM D 4739	≤ 100 mgKOH/g
		Gravimetric Analysis	ASTM D 4898	N/A
		Membrane Patch Colorimetry (MPC)	ASTM D 7843	N/A
		Ruler Phenol, Amine, ZDDP	ASTM D 6810 ASTM D 6971	≤ 100 % remaining
		Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel (RPVOT)	ASTM D 2272	0 to 5400 Mins

(Mr. Angcapol Chamchawalit)
 Managing Director/Auditor

(Mr. Montri Phomettha)
 Lab Quality and ISO/IEC 17025-Specialist

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TQC (Thailand)

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Chemical	Insulating Oils	Dissolved Gases Analysis by GC	ASTM D 3612C	Varies by Gas
		Moisture by Coulometric Karl Fischer Titration	ASTM D 1533	0.0 to 2000.0 ppm
		Dielectric Breakdown Voltage	ASTM D 877A ASTM D 1816 IEC 60156	0.0 to 75.0 kV 0.0 to 75.0 kV 0.0 to 75.0 kV
		Furanic Compounds by HPLC	ASTM D 5837	Varies by Compound
		Corrosive Sulfur	ASTM D 1275B IEC 62535	1A to 4C (Noncorrosive to Corrosive)
		Liquid Power Factor	ASTM D 924	1x10 ⁻⁶ to 4%
		Oxidation Inhibitor	ASTM D 2668	≤ 0.5 %
		Total Acid Number	ASTM D 974	≤ 15.0 mgKOH/g
		ASTM Color	ASTM D 1500	L0.5 to D8.0
		Kinematic Viscosity	ASTM D 445	≤ 3000 cSt @ 40 °C
		Optical Particle Count	ASTM D 6786	NAS Class 00 to Class 12 ISO Class 1 to Class 24
		Interfacial Tension	ASTM D 971	<300 mN/m
		Passivator-Irgamet39 Type	IEC 60666	N/A
		Passivator-BTA Type	IEC 60666	N/A
		Specific Gravity by Hydrometer	ASTM D 1298	0.790 to 0.900 and 0.940 to 1.070
Specific Gravity by Digital Density Meter	ASTM D 4052	0.000-3.000		

(Mr. Angcapol Chamchawalit)
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