



EPG INNOVATION CENTER

**Professional Testing Service
for Quality Products and Processes**



**The Service Center for Testing
Calibration and Research Development**



Vision

A Center for testing, calibration, and research & development of innovative technologies for a sustainable future



Introduction

The EPG Innovation Center Co., Ltd (EIC) is a subsidiary of the Eastern Polymer Group. The Center is located at 111/1 Moo 2 Tumbol Makhmaku, Amphur Nikompattana, Rayong, Thailand.





The EPG Innovation center was originally established to provide research and development services for the companies included in the Eastern Polymer Group. With the latest technology testing equipment, procedures and experienced experts, EIC is now able to provide testing and materials analysis services for products and processes involving rubber, plastic, foods and beverages packaging and automotive parts for both domestic and organizations. EIC also provides services for the calibration of testing equipment. All testing and analysis services are performed according to generally accepted international standards.





Mechanical Properties Testing

Test Items	Capacity	Standards
Tensile strength of plastic, rubber, film, hook, carpet, tape, rigid cellular plastic, etc.	Universal testing machine -Load cell 100 N to 30 kN -Maximum speed 500 mm/min -Extensometer 750 mm -Temperature -40 to 100°C	ISO 37, ISO 527-2, ASTM D638, D412, D6693, D882, D1894, D1623, D3759, JIS A5759, SH-0112, ISO 1798 Type1,1A, ASTM D1623
Compressive strength		ASTM D1056, D1621, D3575
Tear strength		ASTM D624, D1004, D751
Peel adhesion test		ASTM D3330
Flexural test		ISO 75, ASTM D790
Adhesive strength		JIS A5759, FLTM BN 151-05 (method A)
Static and kinetic coefficients of friction		ASTM D1894
Puncture resistance		ASTM D4833
Slip resistance		DVM-0011-BP
Shear strength of single-lap-joint		ASTM D1002
Shear strength of single-lap shear adhesive joints of rigid plastic		ASTM D3163





Test Items	Capacity	Standards
Hardness test	Scale B, C, A, D, F, G,	ASTM E 18, D785
	R, L, M, 15N, 30N, 45N, 15T, 30T, 45T	ASTM D785
	20-90 Shore D (BAREISS, HP-D)	ASTM D2240 , ISO 868
	10-90 Shore A (BAREISS, HP-A)	ASTM D2240, ISO 868
	Rigid part	ASTM D2583
Compression set	Rubber, closed cell foam	ASTM D395, D1667
Izod-Notched impact test	Maximum impact energy 30 kg-cm (2.95 J)	ASTM D256, ISO 180
Heat deflection temperature of plastic (HDT)	Temperature 20 - 200°C	ASTM D648
Vicat softening temperature of plastic (VST)		ASTM D1525





Physical and Optical Properties Testing

Test Items	Capacity	Standards
Fourier transform infrared spectroscopy (FT-IR)	Specimen form: powder, solid, liquid wavenumber 4000 -400 cm^{-1}	ASTM E1252, ASTM D2702
Weight	Maximum 3200.00 g	Customer method
Density, SG	Temperature 23°C, density 0.500 to 1.500 g/cm^3	ASTM D792
Moisture content	Temperature 25 - 160°C , Time 0 - 99 min	ASTM D6980
Particle size and specific surface area	Particle size 0.1-340 μm , medium: water or ethanol	-
Optical microscope	Maximum 200x	Customer method
Surface resistivity	10 to $>10^{12}$	ASTM D257
Water resistance		FLTM BI104-01
Water absorption	Thickness 12.5 mm	ASTM D1056, ASTM D2842, ASTM C209, EN 1609, EN13472
Water Vapor Transmission	Sheet	ASTM E96
Water Vapor Permeability	Sheet	DIN EN12086
	Tube	DIN EN13469
	Dried paint film	NES M0141





Test Items	Capacity	Standards
Color test	400 - 700 nm	ASTM E1164
Adhesion test (cross cut)	Grid width 1 mm, Number of grid: 10x10 grids	ISO2409, ASTM D3359-02 Method B, Based on FLTM BI 106-01, TSM5601G ES-X63131, TSH1503G
Scratch resistance (Plastic)	Load 50 - 2000 g	Based on GME 60248
Scratch resistance (Painted materials)		
Gloss/ Matte test	Angle 20°, 60°, 85° 0-150 GU	ASTM D523, FLTM BI 110-01, ES-X63131
Color observation	D65, A, TL84, UV	ASTM D1729
Color discrimination evaluation (100 Hue)	Person visual check	ASTM E1499, AATCC Evaluation procedure 9
Color fading	Gray scale chart	ISO 105-A02/ AATCC procedure 1
Coating surface thickness	0 - 1500 μm	Based on Ford BI161-01, ASTM B659
Thickness (Ultrasonic gauge)		Based on EIC WL-019





Chemical / Water / Waste water analysis

Test Items	Standards
* BOD, mg/l	AWWA APHA 5210 B
*COD, mg/l	AWWA APHA 5220 B, 5220 C
* Grease and oil	AWWA APHA 5520 B
Chloride, mg/l as Cl ⁻	AWWA APHA 4500-Cl ⁻ B
* Dissolved solid	AWWA APHA 2540 C
* Suspended solid	AWWA APHA 2540 D
* pH	AWWA APHA 4500-H ⁺ B
Total Kjeldahl Nitrogen (TKN)	AWWA APHA 4500-N _{org} B
Total solid	AWWA APHA 2540 B
Migration	พ.ร.บ. 656-2556
Chemical resistance test	Based on ASTM D543
Leachable chloride	Based on ASTM C871
Resistance soap and water spotting	Based on FLTM B1113-01, NES M0160 -94

Remark * สารมลพิษที่อนุญาตให้วิเคราะห์ในน้ำเสีย ห้องปฏิบัติการวิเคราะห์เอกชน
ทะเบียนเลขที่ ๖-230 (กรมโรงงานอุตสาหกรรม)





Thermal and Humidity Resistance

Test Items	Capacity	Standards
Temperature & humidity resistance		
Walk-in chamber	Interior dimension: 2600 x 3000 x 2800 mm Temperature: -40 to 100°C Relative humidity: 15-95 %RH	TSH0502G, TSM0502G Method A-B, WSS- M98P13-C, WSS- M98P13-E, WSS-M15P4-
Environmental stress chamber	Interior dimension: 1000 x 1000 x 1000 mm Temperature: -75 to 180°C Relative humidity: 10-98 %RH	
Thermal cycle chamber	Interior dimension: 500 x 600 x 700 mm Temperature: -20 to 130°C Relative humidity: 20-98 %RH	F section 3.3, NES M0132 2007, NES-X83244, WSS- M8P11-B section 3.8.5, WSS-M8P16-B Section
Deep low temperature chamber	Interior dimension: 500 x 600 x 700 mm Temperature: -80 to 130°C Cooling rate: from 20 to -80°C less than 80 min (without load) Heating rate: from 20 to 130°C less than 60 min (without load)	3.6.5 and Based on customer method
Temperature stability of plastic	Hot air oven: Temperature 25 - 200°C	Based on GMI 60307
Heat resistance		Based on DVM-0004-RG
Thermal and humid aging	Rigid cellular plastic	ASTM D2126
Flexibility, Service temperature		ASTM C534





Environmental Simulation

Test Items	Capacity	Standards
Global laboratory accelerated cyclic corrosion test	Chamber size: 91 x 190 x 64 cm	Ford CETP 00.00-L-467; TOYOTA TSH1555G
Accelerated weathering test using a controlled irradiance Xenon-arc apparatus	Dimension L x W x H: 1.27 x 1.02 x 1.98 m	SAE J1960, ISO4892-2, ISO105-B02, ASTM G155, ASTM D3565, SAE J2527, AATCC TM16-3, SAE J1885, SAE J2412, FLTM BO116-01
QUV accelerated weathering	UV lamp: UVA-340/UVB-313 Irradiance 0.00 - 1.55 W/m ²	ASTM G 154 , ASTM D4329, ASTM D7238, ISO 11507





Test Items	Capacity	Standards
Ozone resistance	Temperature: -20 to 100°C Ozone concentration: 30-250 ppm	ASTM D1171, ASTM D1149, ISO 1431-1
Salt spray test	Time: 0 - 999 hr Atomization and quantity of fog: 1-2 ml/80cm ² /hr Air saturated temperature: 47°C	ASTM B117 JIS Z 2371 TJM-003, TSH1552G
Fogging characteristic	Temperature 45 - 200°C Bath diameter: 60 x 42.5 x 59 cm	SAE J1756





Fire Testing

EPG Innovation Center Co., Ltd. provides a wide range of fire testing services such as flammability test, limit oxygen index, smoke density for plastic and rubber products. The test methods are according to international standards.

Flammability

- UL 94 (V, HB, 5VA, 5 VB, HF1, HF2, HBF)
- EN ISO 11925-2
- FM VSS 302
- DIN 4102 B2

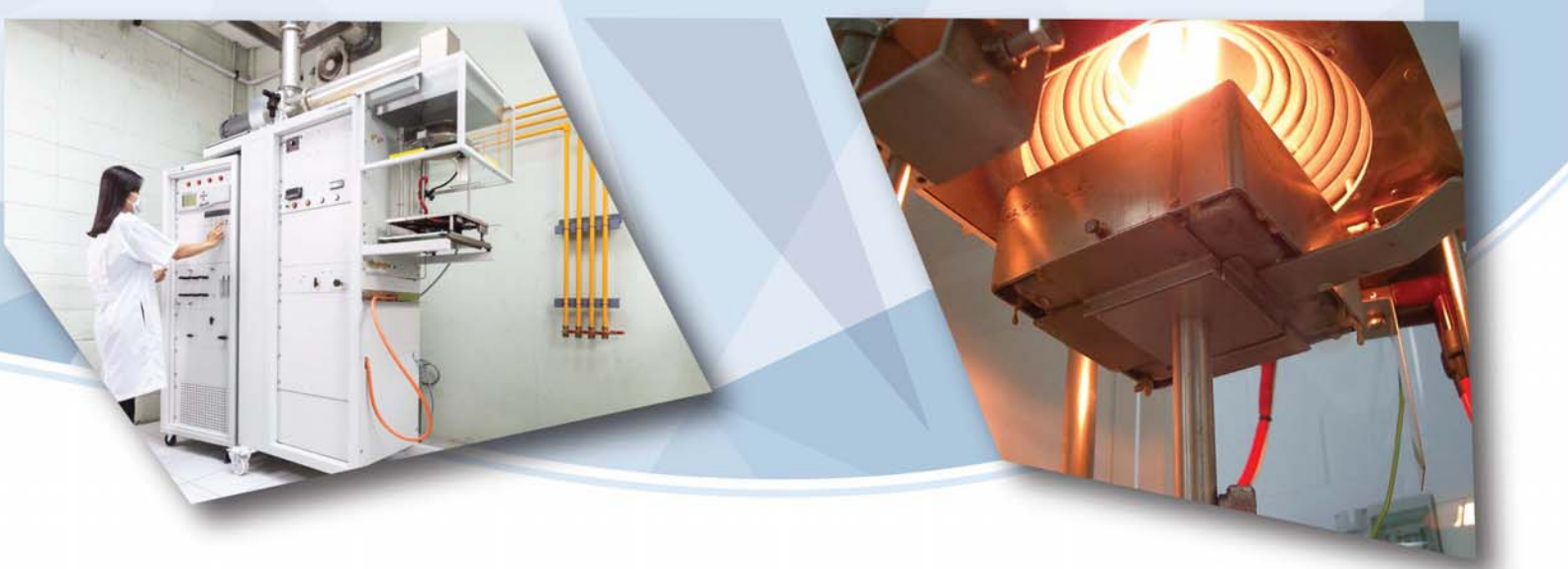
Smoke Density

- GB/T 8627-1999
- ASTM E662

Oxygen Index

- EN ISO 4589-1
- EN ISO 4589-2
- BS 2872-1
- GB/T2406





We also have the reliable testing instruments such as Cone calorimeter, derived from Fire Testing Technology (FTT) in UK which the largest and leading manufacturer of Cone calorimeter. The Cone calorimeter is the most significant bench scale instrument in the field of fire testing. Directly measured properties include:

- * Rate of heat release
- * Time to ignition
- * Critical ignition flux
- * Mass loss rates
- * Smoke release rates
- * Effective heat of combustion
- * Rates of release of toxic gas (e.g. carbon oxides)

Cone Calorimeter

- ASTM E1354
- ISO 5660



Thermal Analysis

Thermal Conductivity (Heat Flow Meter)

This instrument works according to well-established standards: ISO 8301, ASTM C518, EN12667 and EN 13939. It comes with a traceable calibration standard. Heat flow meter systems can be employed for the measurement of thermal conductivity and/or thermal resistance of insulation material.

(Ref. www.netzsch-thermal-analysis.com)

Test Items	Capacity	Standards
Thermal conductivity	Equipment: Heat flow meter HFM 436/3/1 E Lambda Mean temperature: -10 to 70°C Thermal conductivity: 0.005-0.5 W/m-K Specimen: Sheet 300 x 300 mm or loose fill materials Thickness: 5-100 mm	ASTM C518, ISO8301, DIN EN 12667 DIN EN 13939





Differential Scanning Calorimetry (DSC)

A technique in which a test substance and a benchmark reference material are subjected various levels of energy under a controlled temperature program while the effects of these various energy levels on both the substance and reference material are measured and compared.

(Ref. www.netzsch-thermal-analysis.com)

Test Items	Capacity	Standards
Differential Scanning Calorimetry (DSC)	Equipment: Netzsch 200 F3 Temperature: -100 to 400°C - Glass transition temperature (T _g) - Melting temperature (T _m) - Crystallization temperature (T _c) - Oxidative Inductive time (OIT)	ISO 11357 (part 2 - 3), ASTM E1356 (T _g), ASTM D3418, ASTM D3895 (OIT), ASTM E1858 Method A (OIT)

Thermogravimetry Analysis (TGA)

A technique in which the mass of a sample material, subjected to a controlled temperature program is monitored as a function of temperature or time.

(Ref. www.netzsch-thermal-analysis.com)

Test Items	Capacity	Standards
Thermogravimetry Analysis (TGA)	Equipment: Netzsch 209 F3 Temperature: Room temperature to 1000°C	ISO 11358, ASTM E1131, ASTM D6370, ASTM D6382



Rheological Properties Testing

Test Items	Capacity	Standards
Melt flow rate / Melt volume rate	Temperature: 80-350°C Weight: 225 g - 21.6 kg MFI: 0.50 - 900 g/10 min	ISO 1133, ASTM D1238
Moving die rheometer (MDR), Torque -foam rheometer	Temperature: not over 270°C	ASTM D5289, ISO 6502
Viscosity (Brookfield Viscometer)	Spindle No.1-4 Temperature 25 °C Speed 0.3-60 rpm Range 1-20000 centipoises	ASTM D2196 method A



Application Testing

Test items	Capacity	Standards
Taber Abrasion test	Calibrate Wheel: CS-10 and H-18, Speed: 60 or 72 cycle/min, Load: 500, 1000 g	SAE J1530, FLTM BN108 - 02, FLTM BN 108-04, SAE J365, SAE J948
Multi-Finger Scratch and Mar test	Scratch pin: diameter 1 mm or 7 mm Max speed: 100 mm/s Load: 2, 3, 5, 7,10,15 N	FLTM BO 162-01, FLTM BN108-13
Crock/Scuff test	Effective load of 900 g on the scuff head Stroke : 50, 75 and 100 mm	FLTM BN 108-10, FLTM BI161-01, FLTM BN 107-01
Open - Close test	Test cycle up to customer request	Customer method
Strength simulation	1000 kg,	Customer method
Falling ball impact test	weight 66 g, Ø 25 mm, weight 226 g, Ø 40 mm, weight 532 g, Ø 50 mm,	NES M0134, TSM0502GOR-0020
Rubber ball impact resistance	Rubber ball 4.5 kg, diameter 127 mm, 60 Durometer A	WSS-M15P4-F
Dupont Impact test	300, 500, 1000, 2000 g	JIS K5400, JIS K5600-5-3, ASTM D2794-93
Drum drop test	Load 200 kg	DVM-0005-PK
Rigidity and durability test load	Maximum load 2000 N	Customer method
Vibration simulation	Frequency 3 Hz, vertical, 10-20 mm displacement	Customer method
Cleanability of exterior grain surfaces		DVM-0013-OR
Soiling and cleanability-interior trim material		DVM-0012-OR
Odour test	Equipment set for odour test	FLTM BN112-08, FLTM BO131-01, TSM0505G
Chip resistance	Multitest Gravelometer -G699 Gravel for SAE type -G-9652-X Split shot (chilled iron grit) for VDA type tests -G-9653-X Crushed Granite #6 -G-9654-X Crushed Granite #7	FLTM BI 157-06, DVM-0039 PA, DVM-0040PA, SAE J400, ASTM D3170, DIN EN ISO 20567-1, MS82-3101, TSM 0502G, NES M0141, MN 601H
Coordinate Measurement Machine (CMM) and Laser Scanner	CimCore INFINITE 2.0 7 axes - Measuring range: 2.8 meter - Probe diameter: 3 and 6 mm - Preceptron Laser V5 - Laser accuracy: 24 µm	Customer method



Research and Development Services

EPG Innovation Center Co., Ltd provides research and development support services to companies included in the Eastern Polymer Group for rubber, plastic, food and beverages packaging and automotive parts. We also provide research to compare the materials from various sources.





EIC has the capabilities to perform product trial runs at both laboratory and production scales and has a wide variety of high technology equipment including twin screw extruders, single screw extruders, co-extrusion machines, internal mixers, kneaders, two roll mills, rubber extruders, thermoforming, compression molding, and injection molding machinery. EIC is uniquely positioned to provide timely and cost effective formulation research and development services for a wide array of customer needs and requirements.





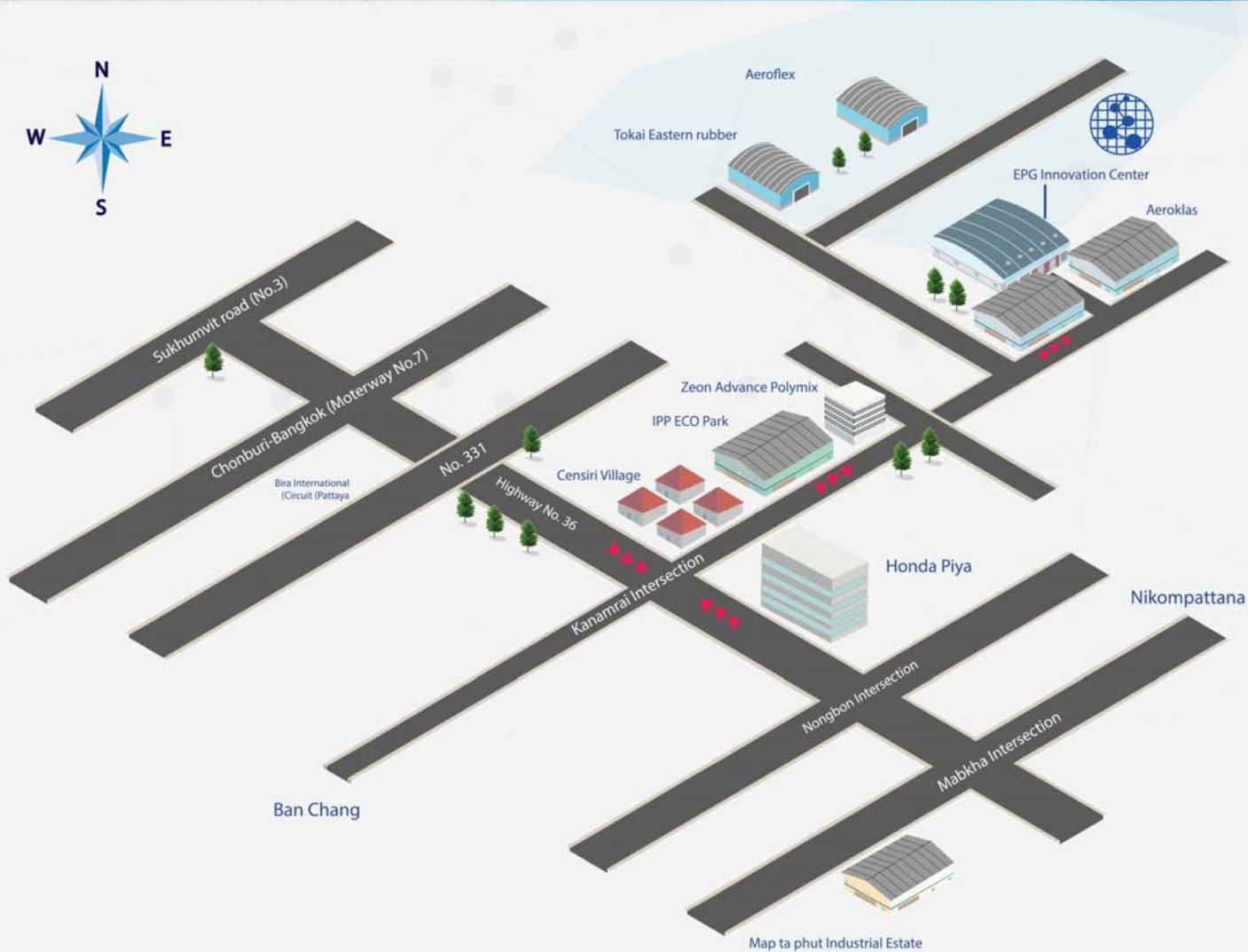
Calibration Services

	Test Items	Capacity	Standards
Dimension	External micrometer	0-25 mm	Based on JIS B 7502:1994
	Vernier caliper	0-300 mm	Based on JIS B 7507:1993
	Metal tape/ Steel tape	Up to 5 m	Based on JIS B 7512:1993
	Metal ruler	Up to 2 m	Based on JIS B 7516:2005
Temperature	Chamber/ Oven (size 1 m ³)	-20 to 250°C	G-20





Success through Innovation
Technology & Environment in Harmony
Advanced Technology for Better Future



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