Structural Epoxy

Note: The information in this document is subject to change without notice

PENCHEM TECHNOLOGIES

- Product Introduction

PENCHEM Technologies Introduction

- Founded in 1999, PENCHEM TECHNOLOGIES is No. 1 Fiber Optic and Electronics Adhesive manufacturer in Malaysia and South East Asia
- Started as a formulator and manufacturer of high performance adhesives
- Developed a wide range of products for Fiber Optic and General Electronic applications (>600 products)
- PENCHEM TECHNOLOGIES has a network of distributors and customer base in 21 countries including China, US, Europe, India, Taiwan, Russia, Australia and South East Asia.

PENCHEM Technologies Introduction

- Operation capacity:
  > 40 tonnes/year, ~7millions syringes/year
- Customer base: > 100 accounts including MNC and SME
- Customer ranges: Fiber Optic, LED, Automotive, Semiconductor, Electronics, and Medical
- Invested >8 millions in testing equipment to support thermal, optical, physical, thermal, mechanical, chemical and reliability analysis

Environmental Management System: *ISO14001:2015*
Quality Management System: *ISO9001:2015 & IATF 16949:2016*


Certificate

Standard: ISO 14001:2015

Certificate Holder: PENCHEM
Penchem Technologies Sdn. Bhd.
1015, Jalan Perindustrian Bukit Minyak 7,
Kawasan Perindustrian Bukit Minyak,
14100 Penang, Malaysia

Scope: Design, Manufacturing and Supply of High Performance Adhesives

Proof has been furnished by means of an audit that the requirements of ISO 14001:2015 are met.

Validity: The certificate is valid from 2018-05-10 until 2019-04-09.
First certification 2011

2018-04-23


Certificate

Standard: ISO 9001:2015

Certificate Holder: Penchem Technologies Sdn. Bhd.
1015, Jalan Perindustrian Bukit Minyak 7,
Kawasan Perindustrian Bukit Minyak,
14100 Penang,
Malaysia

Scope: Design and Manufacture of High Performance Adhesives

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2018-04-03 until 2021-04-02.
First certification 2011

2018-05-14


Certificate

Standard: IATF 16949:2016

Certificate Holder: Penchem Technologies Sdn. Bhd.
1015, Jalan Perindustrian Bukit Minyak 7,
Kawasan Perindustrian Bukit Minyak,
14100 Penang, Malaysia

Scope: Design and Manufacture of High Performance Adhesives

Proof has been furnished by means of an audit that the requirements of IATF 16949:2016 are met.

Issue date/Expiry date: The certificate is valid from 2018-04-03 until 2021-04-02.

Release date: 2018-04-03

Penchem's Product Portfolio & Markets

Potting & Conformal Coating 1999

Silver DA & SMT Epoxies 2001

COB & Relay Sealant 2003

LED Epoxies & UV Adhesives 2006

Active Alignment Adhesives & Thermal Materials 2009

Silicone LED Adhesives 2013

Food Grade & Medical Adhesives 2015

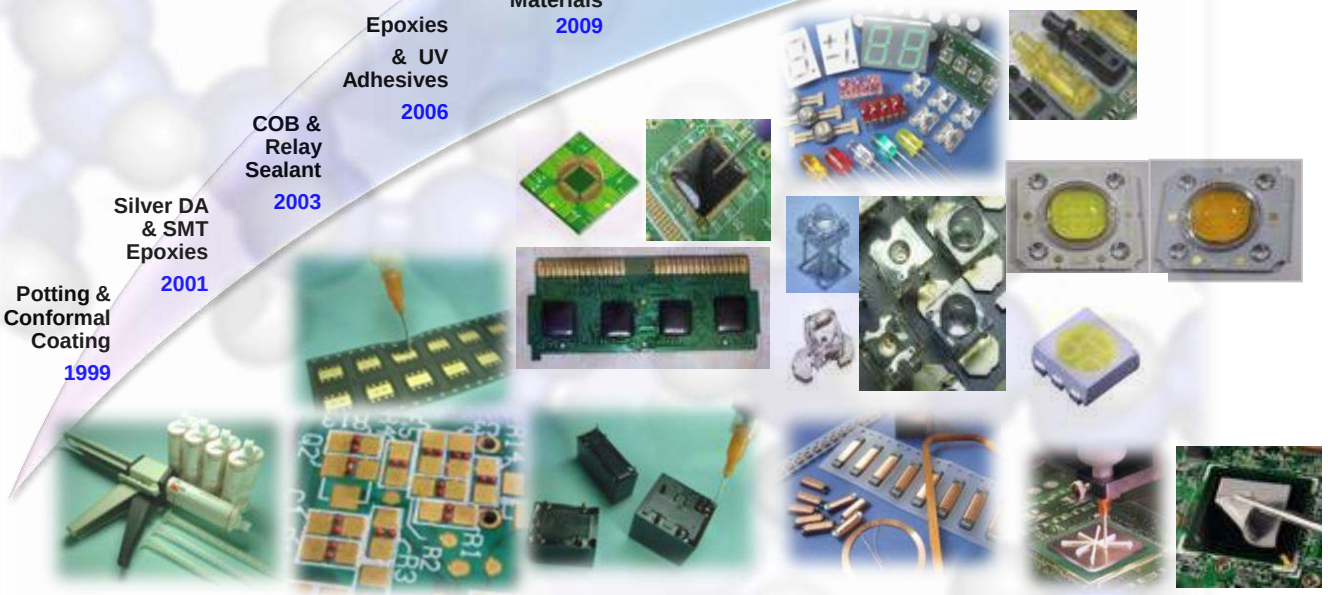
Marine Composites 2017

EMI Gaskat & Conductive Ink 2018

5G-6G Adhesives & High Thermally Conductive Material 2019

Silicone Molding Compound & Bio-based Leather 2020

UV Pressure Sensitive Adhesive & Silver Sintering Adhesive 2021



Markets

Electronics
Semiconductor
Automotive
Aerospace
LEDs
Photonic
Optoelectronics
Marine
Green Tech
Nano Tech

PENCHEM Analytical Capability & Services

Thermal, Optical and Physical Analysis	Electrical, Reliability & Curing Analysis	Chemical and Molecular Analysis
TGA	Resistivity Meter	Pyr-GC-MS
TMA	Hot Plate	GPC
DMA	Humidity Chamber	MICRO-FTIR
DSC/UV-DSC	Digital Programmable Oven	NMR
Tensile Tester	Digital Oven	
Hardness Tester	Solder Reflow Chamber	
Viscometer	Light Integrating Sphere	
Refractor Meter	UV Spot, UV LED, UV Conveyer	
Colour Assessment Chamber		
Digital Balance		
Flow Tester		
Density Meter		
LP and HP Microscopes		
Thermal Conductivity Meter		

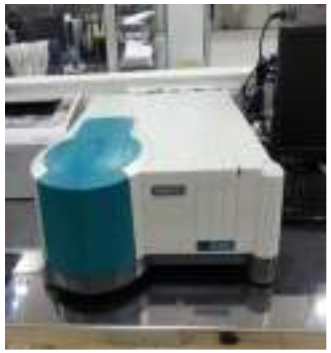
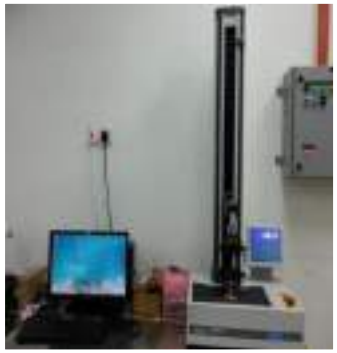
>> We provide services on Material Analysis, Failure Analysis and Reliability Analysis <<

PENCHEM Analytical Capability & Services

			
TGA thermal gravimetric analysis	TMA Thermomechanical Analysis	DMA Dynamic Mechanical Analysis	DSC Differential Scanning Calorimetry

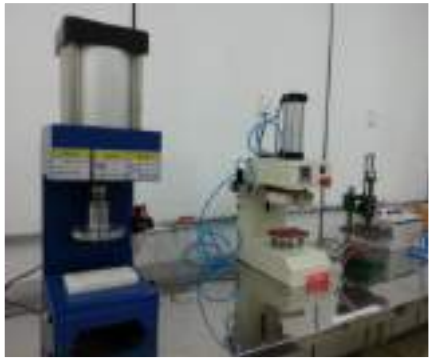
				
Thermal Conductivity Meter	Resistivity Meter	Hardness Tester (Shore A/ D/ 00)	Density meter	Humidity Chamber

PENCHEM Analytical Capability & Services

				
GPC / SEC	GC-MS + Pyrolyzer	Micro-FTIR (ATR / KBr method)	Ultraviolet-Visible Spectrometer (UV/Vis)	Light integrating sphere
				
NMR Nuclear Magnetic Resonance spectroscopy	Tensile machine	Refractometer	Viscometer	Low/High Resolution Optical microscope

PENCHEM Analytical Capability & Services

UV Chamber – Developing UV curable compounds and UV aging test



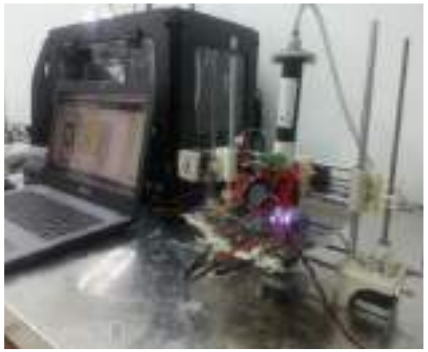
Molding machine – Developing of Silicone Molding Compound

Die Attach machine – to support the development of LED encapsulant

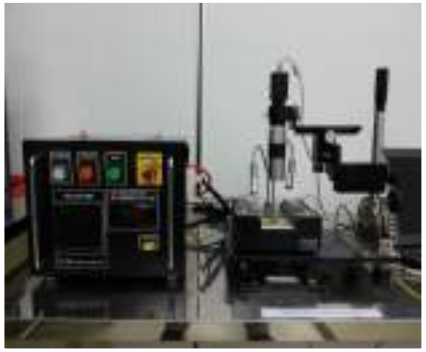
Wire Bonding machine – to support the development of LED encapsulant

R&D – Chemical Reactors

R&D – Fume Hood for Synthesis of chemical compounds



R&D – 3-D Printer (to support the development of UV ink and compound for 3-D printer)



Micro-Reflow Simulation Oven

PENCHEM TECHNOLOGIES

- Product Spectrum

Penchem structural epoxy designed with very good water resistance and give excellent mechanical and thermal properties. They are established and enhanced in adhesion and durability. This system offer low viscosity and wets the glass fiber network perfectly. Ideally suited to general purpose applications as well as medium to large structural applications such as laminations and infusion for quality boats. Penchem offers wide range of structural epoxy products with different hardener to achieve low viscosity and varies of gel times in order to fulfill the needs on manufacture few items in a wide range of working environment. Penchem has created products that suitable for all 'under the bag' infusion processes with outstanding performance such as excellent fiber wetting and low mixed viscosity.





Product Selection Guide

Product Code	Chemistry	Area of Application			Special Features	
		Laminating	Infusion	Bonding	Viscosity, cps	Gel Time, hrs
GL301	Epoxy	•••	••		•••	0.5
GL302	Epoxy	•••	••		•••	2
GL304	Epoxy	•••	••		••	4
GL305	Epoxy			•••	•••	-
GL306	Epoxy	•••	••		••	6
GL307	Epoxy	•	•••		•	-
GL311-1	Epoxy	•	•••		•••	1
GL312	Epoxy	•	•••		••	4

•	Low / slow
••	Moderate / standard
•••	High / Fast

Product Spectrum (Product that is hot sell)

Parameter		Unit	GL304		GL311-1		GL307		GL305	
Cure Profile		-	30ºC/24hrs 80ºC/2hrs		30ºC/24hrs 80ºC/5hrs		30ºC/24hrs		25°C/24 hrs	
Test Profile		°C/hr	30°C/24hr + 140°C/3hr	30°C/ 28days	30°C/24hr + 140°C/3hr	30°C/ 28days	30°C/5Days		25°C/5Days	
Mixing Ratio		A:B	3	1	4	1	3	1	8	1
Color & Appearance		-	Clear	Clear	Clear	Clear	Clear	Clear	White Paste	Translucent White Paste
Pot Life		min	**45min**		**30mins**		**60mins**		**15mins**	
Gel Time		hr	4		1		-		-	
Viscosity	Part A	cps	11,000		7300		6000		14063	
	Part B	cps	15		35		120		393	
	Mix	cps	800		1400		525		13050	
Density		g/cm^3	1.106		1.161		-		1.291	
Hardness		Shore D	83		83		74		80	
Tensile Strength		Mpa	56		65		75		38	
Young Modulus		Mpa	2,600		2,600		3000		4142	
Strain to Failure (% of Elongation)		%	8.3		2.6		3.5		1.22	
Flexural Strength		Mpa	87	95	-		-		-	
Wet Retention, %		%	1.6	1.4	-		-		-	
Water Boil		%	1.2	0.8	0.3		-		0.46	
Application		-	Laminating Boat		-Vacuum Infusion work -Leveling the boat hull		Laminating Boat		Bonding boat part equivalent to koissan glue	

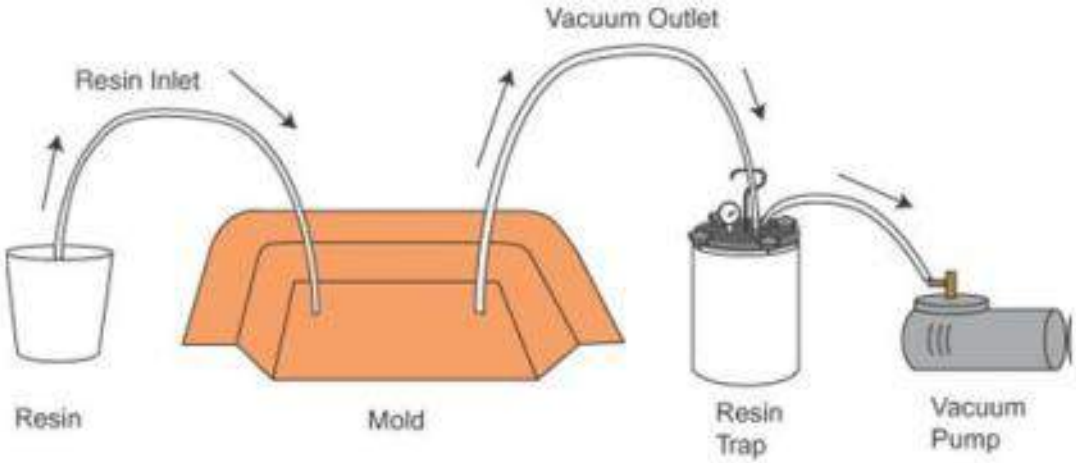
Product Spectrum

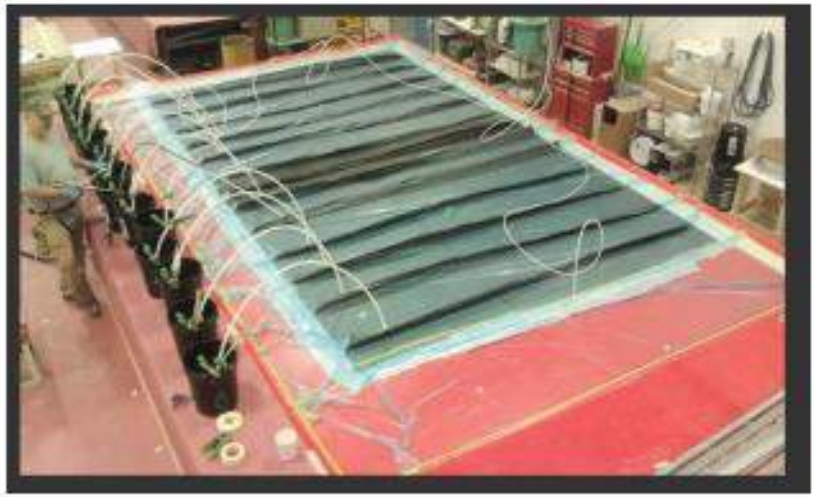
Parameter		Unit	GL301		GL302		GL306		GL312	
Cure Profile		-	30ºC/24hrs 80ºC/2hrs		30ºC/24hrs 80ºC/2hrs		30ºC/24hrs 80ºC/5hrs		30ºC/24hrs 80ºC/5hrs	
Test Profile		°C/hr	30°C/24hr + 140°C/3hr	30°C/ 28days	30°C/24hr + 140°C/3hr	30°C/ 28days	30°C/24hr + 140°C/3hr	30°C/ 28days	30°C/24hr + 140°C/3hr	30°C/ 28days
Mixing Ratio		A:B	3:1		3:1		3:1		100:30	
Color & Appearance		-	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Pot Life 100%		hr	<30min	<30min	30min	30min	1hrs 15min	1hrs 15min	1hr	1hr
Gel Time		hr	<30min	<30min	2	2	6	6	4	4
Viscosity	Part A	cps	11,000	11,000	11,000	11,000	11,000	11,000	7300	7300
	Part B	cps	10	10	19	19	12	12	35	35
	Mix	cps	800	800	1,230	1,230	626	626	850	850
Density		g/cm^3	1.159	1.164	1.151	1.169	1.159	1.161	1.161	1.161
Hardness		Shore D	84	81	83	84	83	83	82	82
Tensile Strength		Mpa	52	55.6	60.9	64	53.8	60.8	62	62
Young Modulus		Mpa	2,857	3,164	3,305	3,232	2,940	3,235	2,600	2,600
Strain to Failure (% of Elongation)		%	4.9	2.7	8.3	5.1	9.7	2.5	2.8	2.8
Flexural Strength		Mpa	103	84	76	-	64	91	-	-
Wet Retention, %		%	2.1	2.3	1.6	3.7	1.9	0.9	-	-
Liquid Exotherm		J/g	453.2	453.2	450.2	450.2	476.5	476.5	382.6	382.6
Peak Exotherm		°C	96	9	106	106	476	476	-	-
Onset Exotherm		°C	52	52	79	79	74	74	-	-
Glass Transition,Tg		°C	84	57	76	55	80	45	-	-
Residue Exotherm		J/g	14.87	22.72	11.64	53.91	7	34.33	55	55
% of Cure		%	97	95	97	88	99	93	-	-
Water Boil		%	1.3	1.3	1.1	1	1	0.7	0.7	-

PENCHEM TECHNOLOGIES

- Application Process

Vacuum Infusion Process





Lamination Process

Repairing or Fairing

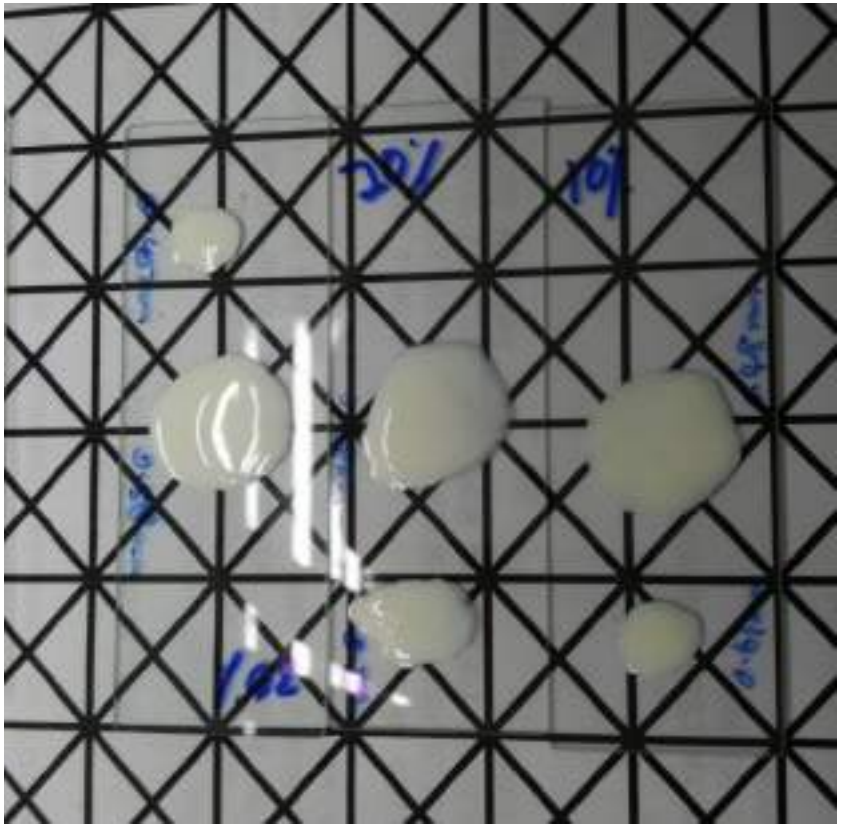
Fairing a surface removes the highs and lows so that the surface is level.

- Filles holes and lows area
- Reshaping voids

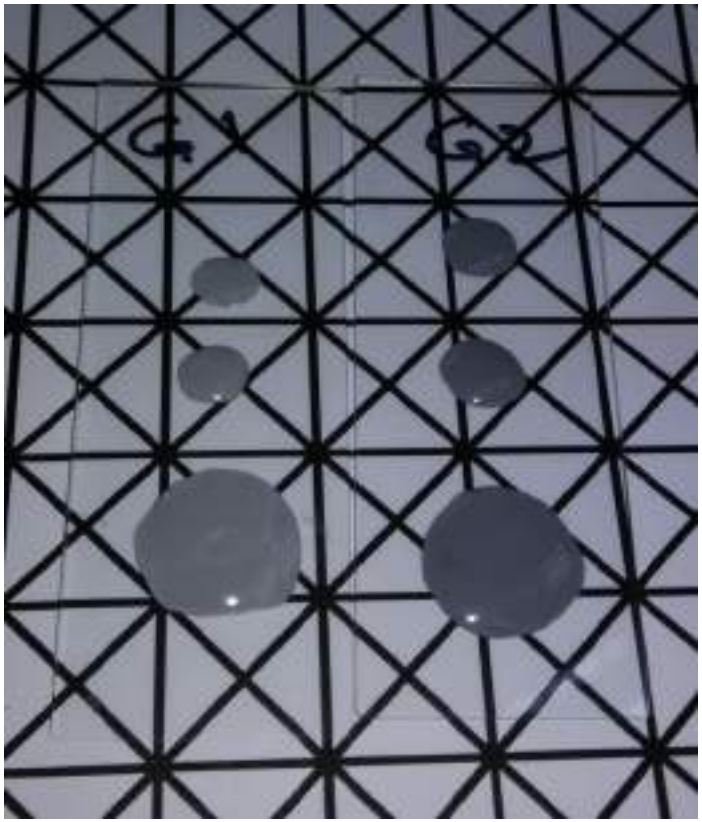
Parts Joining

Epoxy Gel Coat

White Gel Goat



Grey Gel Goat



Guideline:
10% - 20% white pigment, SP93 to be mix into GL304/GL311-1

THANK YOU!

For more information, please contact our technical and commercial team, who will be always pleased to help.

Penchem Technologies Sdn Bhd
1015, Jalan Perindustrian Bukit Minyak 7,
Kawasan Perindustrian Bukit Minyak,
Mk.13, 14100 Penang, Malaysia.
T: +604-501 5973, 74, 75, 76, 77, 78
E: enquiry@penchem.com
W: www.penchem.com