DETA GEL

Thermoset Resin Quality Control through Gel Detection

General description

DETA GEL is a quality control instrument for measuring gel time and resin peak temperature under the controlled and real process environment of the pultrusion industry. The system is based on temperature measurements in a supplied controlled test tube holder or across the length of a pultrusion die. The DETA GEL can process these temperature measurements and determine the resin gel time according to predefined settings and also the point of maximum temperature in the holder (bath) or in the die. The resin holder (bath) is controlled via a temperature controller which is in turn commanded by the DETA GEL system. Specific criteria on the resin reactivity/mixing proportions are set and the system makes a full check for the resin mix pass.

DETA GEL is user friendly, versatile and highly accurate, acting as a gel tester and providing information for the optimum resin cure reaction in pultrusion.

Components

The DETA GEL system comprises of:

- Temperature measurement system with stand alone connection to computer
- Temperature controlled test tube holder
- Main console housing the test tube holder and the temperature controller.
- Portable computer with serial communication
- DETA GEL software installed and configured for driving the temperature controller and performing data acquisition
- DETA GEL Report Creator: a stand alone, post processing software for creating technical reports and printing test results

System Operation

The DETA-GEL™ software allows the operator to design, apply and control the test conditions, to supervise in real-time the resin cure (in the resin bath or in the die) and to produce technical reports of the test results. The measurement and automation features of the software allow the operator to modify all operational parameters by using controls in the front panel.

DETA GEL system in operation at gel detection mode

The DETA GEL system is configured to operate either in gel detection mode (for resin quality control) or die profiling mode (for process development). In gel detection mode the system quantifies and confirms the reactivity of resin supplies and formulations used in production. In die profiling mode the system records the thermal profile of resin as it advances within the die. In either case the system compares the obtained results with previously set limits and declares a test 'pass or fail' condition.

Post-processing of the test results is made by the dedicated DETA GEL Report Creator software.

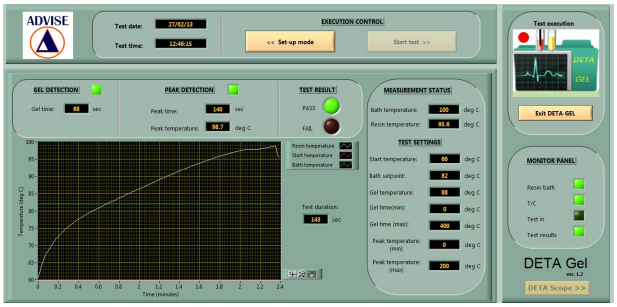
Professional report of test settings, data plot and checked outcome are created for printing or filing to materials and tests database.

Software

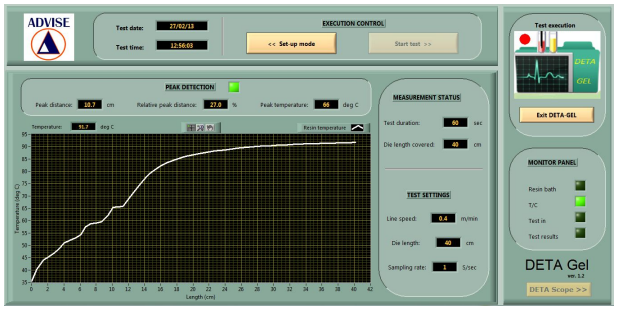
The DETA GEL software consists of four main phases:

1. The "Test type selection" phase, which determines the mode of test to be performed. Two modes are available:
   a. Gel detection
   b. Die profiling
2. The "Test set-up" phase, which allows the operator to define the parameters set for the execution of the test
3. The "Test execution" phase, which performs the data acquisition, data processing/control, test result assessment, data plotting functions and data storage operations of the system.
4. The "Recovery" phase, which prepares the system for a new test or closes the application.

The DETA GEL software modules (data acquisition and post-processing) have unlimited software license.



DETA GEL software on gel detection mode



DETA GEL software on die profiling mode

DETA GEL specifications

The system core specifications are listed below:

Test tube, Resin bath and Die profiling	
Feature	**Specification**
Bath thermocouple	Type J, mineral insulated, fast response
Bath temperature range	Ambient to 200°C
Die thermocouple	Type J, fast response, welded tip
Resin bath size	18 mm dia. x 60 mm height

Temperature measurement	
Feature	**Specification**
Thermocouple types supported	J, K, N, S, T
Temperature measurement sampling rate	1-3 samples/sec (configurable)
Temperature measurement accuracy	0.2°C nominal
Ramp rate range	0.5°C/min to 15°C/min
Temperature measurement range	-20°C to 350°C

Enclosure	
Feature	**Specification**
Temperature controller	OMRON E5CN with RS485 interface
Thermocouple connector	Compensated, mini type, in-line
Temperature DAQ I/O connector	USB 2.0 socket
Data connector	RS232 9-pin socket
Power requirements	320W/240V

DETA GEL enclosure front panel