

Technical Data Sheet

EPIKOTE™ Resin MGS PR685

Application

PR685 is a process resin. It is designed to support the process of manufacturing fibre reinforced plastics, no matter whether it will use a hand laminating, a resin infusion or a RTM process or their derivatives. With PR685, any fabric material can be placed on any surface, be it vertical, horizontal or a surface with a strong three dimensional extent.

Because PR685 consists of a very high viscous Resin component only, it will dissolve in Hexion's Infusion or RTM matrix materials. In opposition to other binder products, it will therefore not represent voids or foreign matter in a fibre reinforced plastic material but rather dissolve in Hexion's resins and hardeners. This will allow the usage of PR685 in structurally highly loaded FRPs. A comparison between various binders including this material showed that the impact of PR685 on mechanical properties such as ILSS or bending failure is not detectable, when used according to this data sheet.

PR685 will not influence the mixing ratio of Hexion's Infusion or RTM materials when used according to this data sheet. It is developed as a very high viscous resin which does not require a hardening component. Therefore, it will not cure when used. Instead, it will dissipate into the fabric over a timeframe of approximately two weeks (norm climate) by the capillary mechanism. Hence, when using PR685, make sure the fabric lay-up is completed including vacuum bagging/closing of the moulds within your usual process duration.

PR685 is available as spray. This solution can be applied for automation purposes. For usage additional hardware will be required. For contact details of such hardware manufacturers, please contact Hexion Stuttgart GmbH in Esslingen, Germany.

Benefits

- Solvent/carrier free epoxy resin
- Provides excellent tack
- Bonds to different type of substrates like metal, glass, carbon, other synthetic lamination materials, GFRP/CFRP tools or mould surfaces
- Allows removal of top layer for repositioning
- Soluble in the Epoxy matrix
- Participates in the final curing/cross linking
- Does not represent voids/foreign matter in the composite
- Does not weaken the composite structure

Specifications

Property	Value	Unit
Density	1.16	g/cm ³
Epoxy Group Content	3800 - 4250	mmol/kg
Viscosity 100°C	2000 - 3200	mPa.s
Viscosity RT	>> 30.000	mPa.s

Measuring conditions: Room Temperature

Characteristics

Approval	Germanischer Lloyd (pending)
Application	Rotor blades for wind turbines, boat and ship building, sports and recreation equipment, tooling and moulding. Infusion and RTM processes. Automation.
Operational temperature	Room Temperature
Processing	Available as spray.
Features	Fixing Glass, Carbon and other Fabric on (vertical) surfaces as seen with moulds and tools.
Storage	Shelf life of 24 months in originally sealed containers

TG influence

The influence of PR685 on TG properties has been investigated in three different ways using RIMR135 and RIMH1366 as matrix system.

The TG given in the graphs below is the mean value of three TG, measurements at each of the four following states

7hrs at 60°C	Potential TG at 60°C
7hrs at 70°C	Potential TG at 70°C

These four curing conditions have been applied to two different methods of adding PR685 to the resin/hardener mixture: Firstly, PR685 has been added to the resin-hardener-mixture keeping its datasheet mixing ratio of 100:30. This is the case on the shop floor in a production facility. The mixing ratio used was e. g. 100:30:2, 100:30:4 etc. (RIMR135;RIMH1366;PR685). Secondly, PR685 was added to the resin-hardener-mixture, replacing RIMR135 as in 98:30:2 or 96:30:4 etc. (RIMR135;RIMH1366;PR685) to check whether or not the effects seen in the first investigation result from mixing ratio or from the participation of PR685 in the crosslinking process. Results: given the scale of the ordinate, the influence of PR685 is very small up to a mixing ratio of 100:30:6. If any effect can be seen, it is rather an increase of TG. ;

Case one: 100:30:2, 100:30:4 etc:

EPIKOTE Resin MGS PR685

<https://hexioninternet-hexioninternet-slave.azurewebsites.net/en-US/product/epikote-resin-mgs-pr685-988>

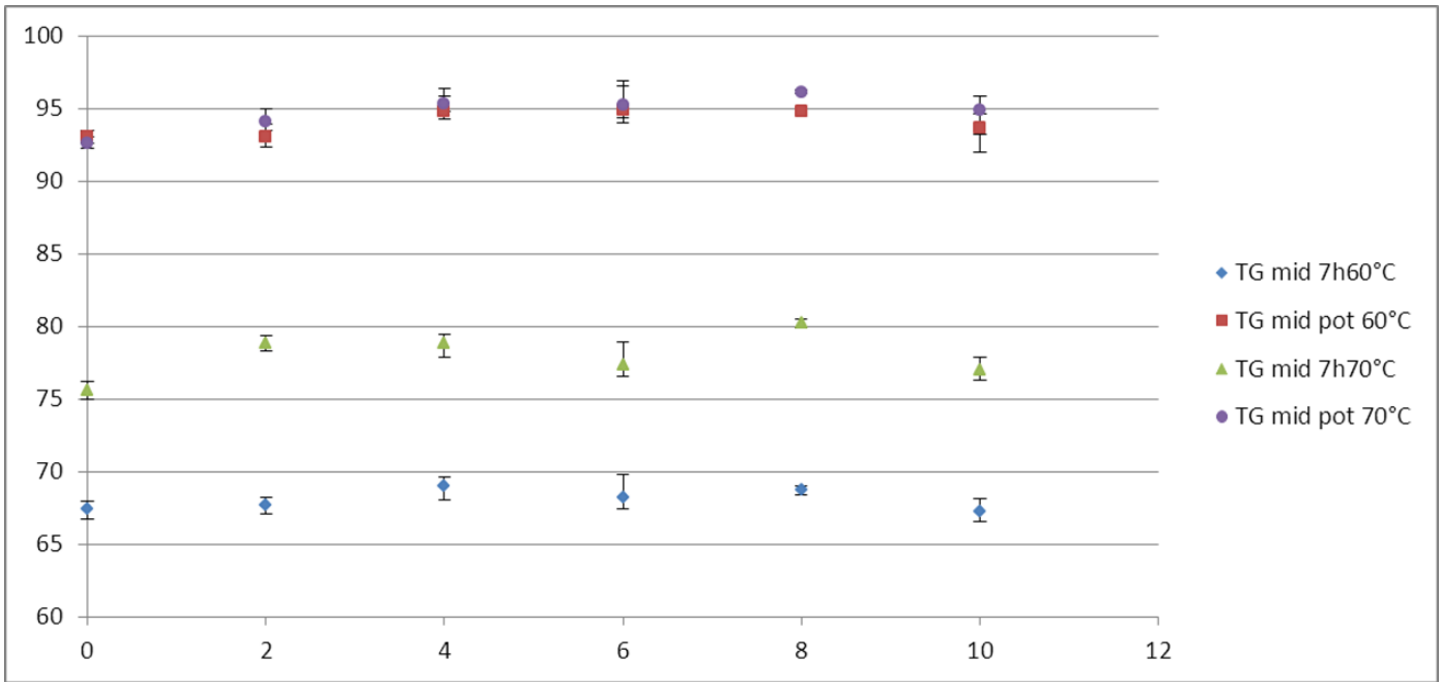
Generated: October 23, 2021

Issue Date:

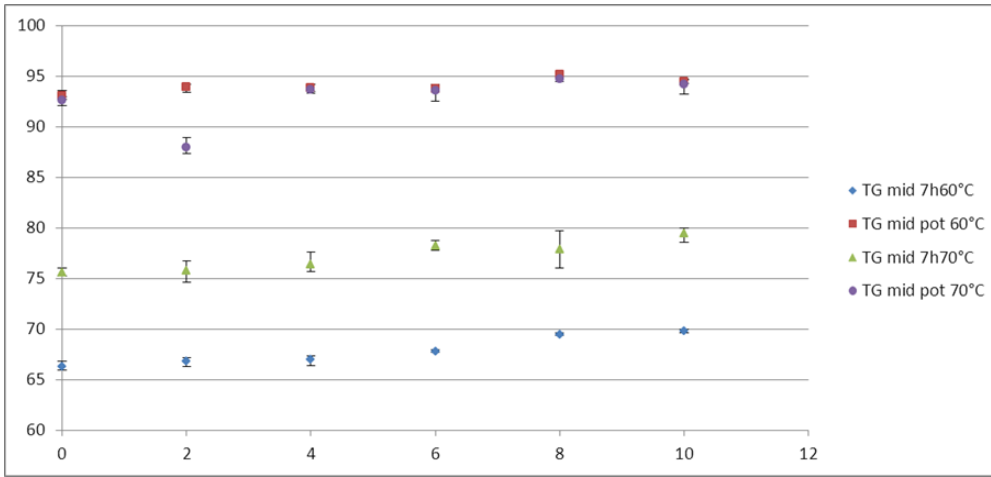
Revision: 12/31/1899 11:59:50 PM

© and ™ Licensed trademarks of Hexion Inc.

The information provided herein was believed by Hexion Inc. ("Hexion") to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. All products supplied by Hexion are subject to Hexion's terms and conditions of sale. **HEXION MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HEXION**, except that the product shall conform to Hexion's specifications. Nothing contained herein constitutes an offer for the sale of any product.



Case two: stoichiometric mixing ratio, adjusted hardener content as in 98:30:2, 96:30:4 etc:



Mechanical Data

Interlaminar shear stress according to DIN EN ISO 14130. A panel containing PR685 has been compared with a reference panel without PR685.

Panel layup: four layers of Hexagon L600-E10, symmetrical lay-up. PR 685 was applied as a 20µm thick film on the whole panel area between layers 2 and 3. Resin system was RIMR135/RIMH137, curing of these panels was 5hrs at 70°C.

Looking at the standard deviation and the characteristic value, no negative influence of PR685 can be seen.

Single values for panel without PR 685 (reference):

RIMR135 / RIMH137 with 4 layers Hexagon L600-E10 without PR685	width mean value	thickness mean value	apparent interlaminar shear strength	failure mode
Specimen No.	b [mm]	h [mm]	t [MPa]	
F-14-170_ILSS_01	10,15	197	57,7	shear
F-14-170_ILSS_02	10,15	1,97	56,7	shear
F-14-170_ILSS_03	10,19	1,96	56,6	shear
F-14-170_ILSS_04	10,09	1,97	56,3	shear
F-14-170_ILSS_05	10,17	1,97	55,1	shear
F-14-170_ILSS_06	10,14	1,97	57,3	shear
F-14-170_ILSS_07	10,25	1,97	56,6	shear
F-14-170_ILSS_08	10,18	1,97	59,3	shear
F-14-170_ILSS_09	10,12	1,97	57,0	shear
F-14-170_ILSS_10	10,05	1,97	57,0	shear
mean value				57,0
standard deviation				1,1
characteristic value				54,6

Single values for panel containing PR 685:

RIMR135 / RIMH137 with 4 layers Hexagon L600-E10 without PR685	width mean value	thickness mean value	apparent interlaminar shear strength	failure mode
Specimen No.	b [mm]	h [mm]	t [MPa]	
F-14-170_ILSS_01	10,13	197	56,5	shear
F-14-170_ILSS_02	10,16	1,97	56,8	shear
F-14-170_ILSS_04	10,16	1,97	55,7	shear
F-14-170_ILSS_05	10,17	1,97	56,6	shear
F-14-170_ILSS_07	10,15	1,97	55,7	shear
F-14-170_ILSS_08	10,17	1,97	56,0	shear
F-14-170_ILSS_09	10,19	1,98	56,2	shear
F-14-170_ILSS_10	10,18	1,98	56,9	shear
F-14-170_ILSS_11	10,18	1,97	55,3	shear
F-14-170_ILSS_12	10,13	1,99	56,6	shear
mean value				56,2
standard deviation				0,5
characteristic value				55,1

Apparent interlaminar shear strength - displacement chart, F-14-170_ILSS, DIN EN ISO 14130, fabric direction: 0°

EPIKOTE Resin MGS PR685

<https://hexioninternet-hexioninternet-slave.azurewebsites.net/en-US/product/epikote-resin-mgs-pr685-988>

Generated: October 23, 2021

Issue Date:

Revision: 12/31/1899 11:59:50 PM

® and ™ Licensed trademarks of Hexion Inc.

The information provided herein was believed by Hexion Inc. ("Hexion") to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. All products supplied by Hexion are subject to Hexion's terms and conditions of sale. **HEXION MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HEXION**, except that the product shall conform to Hexion's specifications. Nothing contained herein constitutes an offer for the sale of any product.

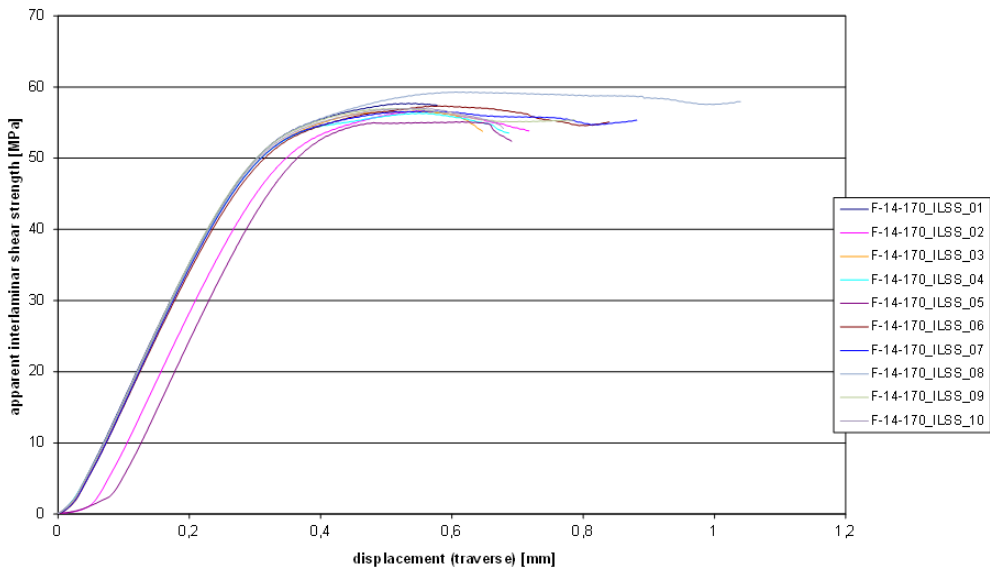


Figure 1: ILSS without PR 685
 Apparent interlaminar shear strength - displacement chart, F-14-170_ILSS, DIN EN ISO 14130, fabric direction: 0°

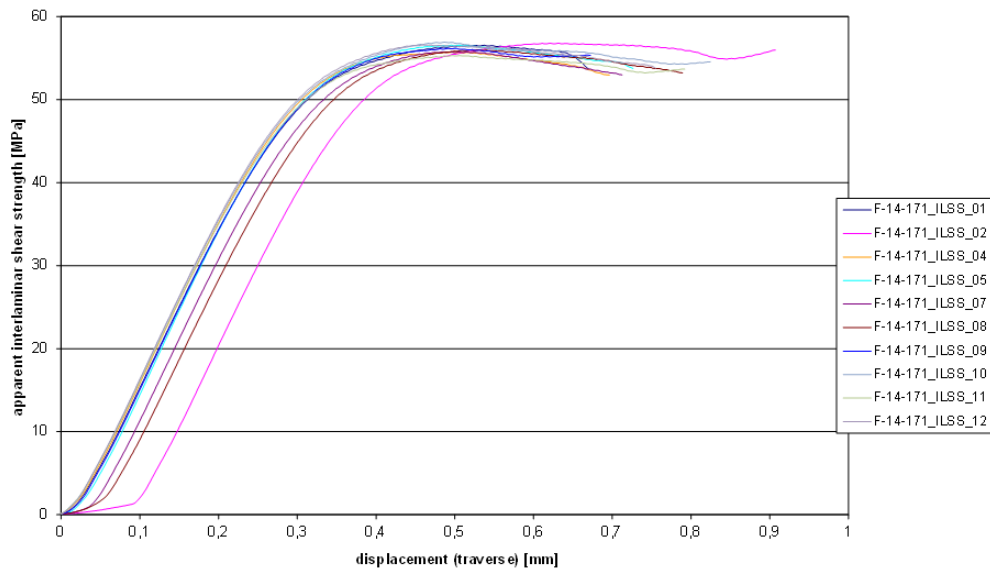


Figure 2: ILSS with PR 685

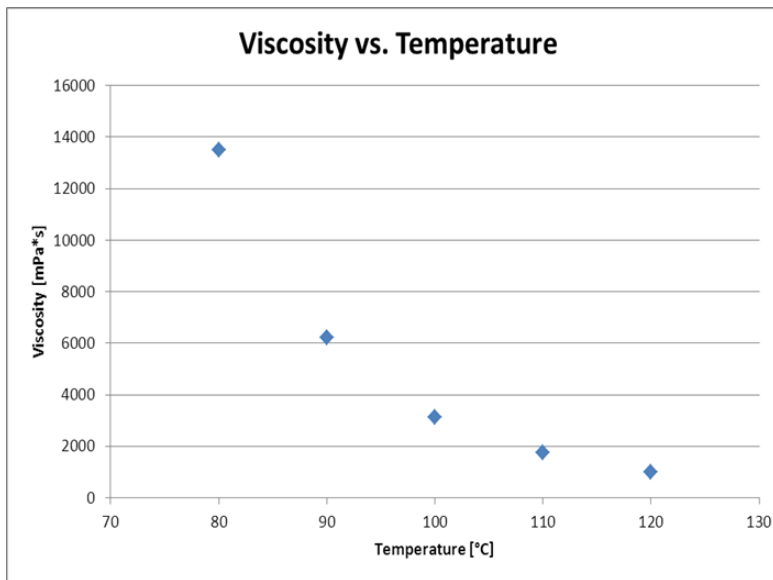
Mixing Ratio

A mixing ratio does not exist for this product as such, as PR685 is pure resin. It is designed in a way that it will not change the mixing ratio of Hexion resin and hardener when used according to this datasheet.

Please refer to the T_0 section of this document to find information regarding the influence of PR685 on T_g properties. It has been proven that the T_g pot, midpoint of RIMR135/RIMH1366 remains uninfluenced up to a mixing ratio of 100:30:10 (RIMR135:RIMH1366:PR685). However, it is recommended to use less than 100:30:2.

Depending on your fibre volume fraction and the aerial weight of your fabrics, this mixing ratio can be transformed into a grammage (gsm, g/m²) which will be appropriate for your production process. A mixing ratio of 100:30:10 means that approx. 7% of the matrix material consists of PR685 in a FRP. A mixing ratio of 100:30:2 means that approx. 1.5% of the matrix material consists of PR685.

Viscosity vs. Temperature



Measuring conditions: Anton Paar MCR 303, Plate-Plate configuration (50mm), shear rate 50/s, gap 0,5 mm

Transport and Storage Conditions

PR685 will be shipped as briquettes in appropriate containers. In this case, storage and transporting conditions are easier to control since gravity does not influence the storage as much as with the film as long as the containers are kept in their correct position – lid top.

Hexion will provide appropriate transporting conditions.