

resoltech HTG-160

Hardener HTG-165

High T_g Structural Infusion Epoxy System



- $T_g > 140\text{ °C}$
- Low viscosity and excellent wetting properties
- High thermomechanical performances

INTRODUCTION

RESOLTECH **HTG-160 / HTG-165** resin is very high T_g resin system specially formulated for the manufacture of **tooling and large structural composites** parts requiring T_g 's and service temperature up to 140 °C.

Due to its **low viscosity, high wetting properties and excellent air release**, it is suitable for the manufacture of structures and composite parts by **infusion, injection moulding**. HTG-160 / HTG-165 system contains no CMR components or VOC to reduce user exposure.

The stable low viscosity vs temperature makes of the HTG-160 a prime choice for infusion process. However, this system is not recommended for wet lay up or filament winding because the hardener HTG-165 is sensitive to moisture. For these applications, HTGL-160 / HTGL-166 is recommended.

This system gives high inter-laminar properties thanks to its **exceptional wetting properties** even on aramid reinforcements.

Laminates **can be released from the moulds** after a low temperature cure cycle (8h @ 40 °C) enabling to use of low T_g plug material. Final thermo-mechanical properties will be obtained after **a post curing cycle** defined according later in this technical data sheet.

MIXING RATIO

The mixing ratio must be accurately followed. It is not possible to change the ratio, it would result in lower mechanical properties.
The mixture should be thoroughly stirred to ensure full homogeneity.

| System | HTG-160 / HTG-165 |
|------------------------|-------------------|
| Mixing ratio by weight | 100 / 18.5 |

APPLICATION

- It is recommended to use products at a temperature close to 18-25 °C in order to facilitate the mixing and the reinforcements impregnation.
- Lower temperatures will increase the viscosity of the mixture and the gel time, but the resin will not crystallize at low temperatures.
- On the contrary, a higher temperature will reduce the viscosity of the mixture as well as the pot life.
- **Hardener HTG-165 is sensitive to moisture, use quickly after opening.**

PHYSICAL CHARACTERISTICS

1 Visual aspect

HTG-160 :

Opalescent yellow liquid

HTG-165 :

Neutral transparent liquid

Mix :

Opalescent yellow liquid

2 Density

| References | HTG-160 | HTG-165 |
|----------------------|---------|---------|
| Density at 23 °C | 1.10 | 0.94 |
| Mix density at 23 °C | - | 1.07 |

ISO 1675, ± 0.05 tolerance

3 Viscosity

| References | HTG-160 | HTG-165 |
|--------------------------------|---------|---------|
| Viscosity at 23 °C (mPa.s) | 1250 | 8 |
| Mix viscosity at 23 °C (mPa.s) | - | 266 |

ISO 12058.2, ± 15% tolerance

REACTIVITIES

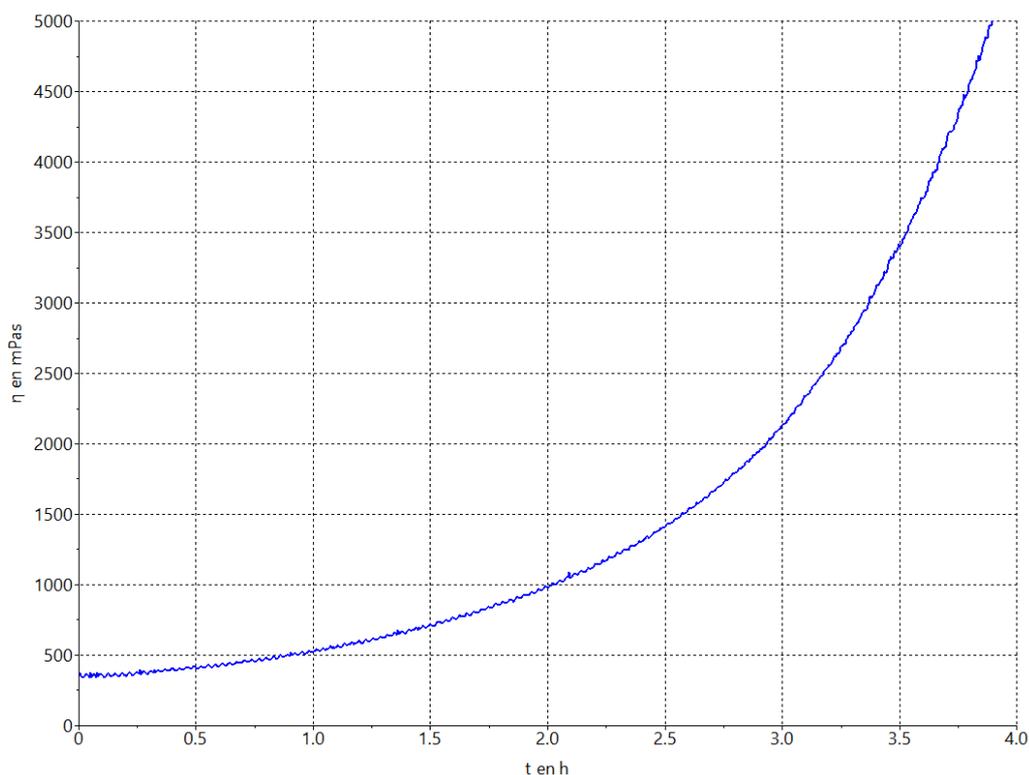
| Système | HTG-160 / HTG-165 |
|--|-------------------|
| Gel time on 70 mL at 23 °C* (4cm high) | 3h15min |
| Temperature at exothermic peak on 70 mL at 23 °C | 141 °C |
| Time at exothermic peak on 70 mL at 23 °C | 3h18min |
| Gel time on 500 g at 23 °C* (4cm high) | 1h55min |
| Temperature at exothermic peak on 500 g at 23 °C | >250 °C |
| Gel time on 2 mm film at 23 °C* | 6h |
| Gel time on 1 mm film at 23 °C** | 9h14min |

* Gel time measurements realized with Rheotech*

** Gel time on film measurement realized on rheometer : gap 1 mm, shear rate = 1 s⁻¹, ø = 35 mm

1 Viscosity evolution

HTG-160 mixed viscosity evolution at 23 °C



Viscosity measurements realized on rheometer : gap 1 mm, shear rate = 1 s⁻¹, ø = 35 mm

RETICULATION & POST-CURING

In order to obtain the maximum thermo-mechanical properties, it is necessary to respect the recommended curing cycle. The table below shows the glass transition temperatures (DMA & DSC) according to different curing cycles.

| System | | HTG-160 / HTG-165 | |
|-------------------|-----------------|-------------------|--|
| Post-curing cycle | | 8h at 40 °C | 8h at 40 °C + 3h at 90 °C + 3h at 120 °C + 3h at 150 °C + 1h at 200 °C |
| DMA | T _{Gb} | 49 °C | 123 °C |
| | T _{Gm} | 57 °C | 143 °C |
| | T _{Ge} | 65 °C | 155 °C |
| | T _{GM} | 56 °C | 138 °C |
| DSC | T _G | 63 °C | 146 °C |

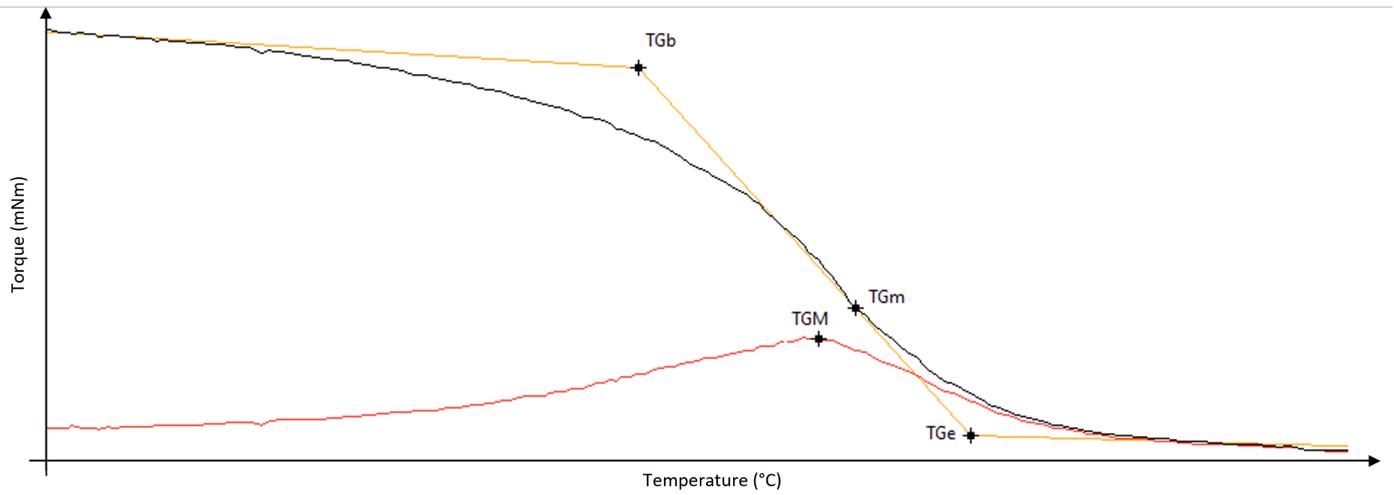
T_G measured by DMA, 3°C/min

T_G measured by DSC, 10°C/min, inflexion point

Post-curing cycles previously presented were chosen in order to reach the maximum potential of each systems. Depending on parts size, oven performance and hardener used, shorter post-curing cycles could lead to fully cured parts.

Please contact our laboratory service for any help on post-curing cycles.

1 DMA T_G



MECHANICAL PROPERTIES

| System | | HTG-160 / HTG-165 |
|---|---|---|
| 8h à 40 °C | FLEXION Modulus Maximum strength Elongation at max strength Elongation at break | 3.49 GPa 75.8 MPa 2.3 % 2.3 % |
| 8h à 40 °C + 3h à 90 °C + 3h à 120 °C + 3h à 150 °C + 1h à 200 °C | FLEXION Modulus Maximum strength Elongation at max strength Elongation at break | 3.13 GPa 126.8 MPa 5.7 % 5.7 % |

Flexion properties on pure resin according to ISO 178

PACKAGING

- Plastic jerrycan kit of 1kg + 0.185kg
- Plastic jerrycan kit of 5kg + 0.925kg
- Plastic drum kit of 27kg + 5kg
- Metal drum kit of 200kg + 2 x 18.5kg
- IBC kit of 1027kg + 195kg

TRANSPORT & STORAGE

Keep containers sealed and away from heat and cold preferably between 10 °C and 30 °C in a well ventilated area. Our products are guaranteed in their original packaging (check expiry date on the label).

HEALTH & SAFETY

Skin contact must be avoided by wearing protective nitrile gloves & overalls or other protective clothing.

Eye protection should be worn to avoid risk of resin, hardener, solvent or dust entering the eyes. If this occurs flush the eye with water for 15 minutes, holding the eyelid open, and seek medical attention.

Ensure adequate ventilation in work areas. Respiratory protection should be worn with ABEKP coded filters.

Resoltech issues full Material Safety Data Sheet for all hazardous products. Please ensure that you have the correct MSDS to hand for the materials you are using before commencing work.



The data provided in this document is the result of tests and is believed to be accurate. We do not accept any responsibility over the mishandling of these products and our liability is limited strictly to the value of the products we manufacture and supply.



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