

... Pores made to measure - for improving slip pressure diecasting productivity in the ceramics industry

1 What is GIL-RESIN® TE+

Under the name **GIL-RESIN® TE+**, the company SRL Dental GmbH has developed a system that provides significant improvements in the slip pressure diecasting production process.

GIL-RESIN® TE+ is a multi-component casting resin system for manufacturing porous pressure diecasting moulds. It has been specially developed with the aim of significantly improving the filtration properties of the slip compared to the conventional method with gypsum plaster. The system is ideal for applications involving sanitary and tableware products (8 - 30 bar).

GIL-RESIN® TE+ features:

- ✓ *Small pore diameter*
 - *reduced pore clogging*
- ✓ *High strength*
 - *high duplicate moulding rate*
- ✓ *Minimal deformation*
 - *less deformation in the working mould of the pressure diecasting system*
- ✓ *Minimal shrinking*

Advantages of using **GIL-RESIN® TE+** :

- ✓ *Lower material inventory therefore also lower storage and transport costs.*
 - ➔ **A small contribution to protecting the world's climate**
- ✓ *Reduced plastic mould production therefore also lower mould costs*
- ✓ *Reduced production downtimes thanks to reduced mould change requirements*

2 Delivery and Storage

In compliance with transport safety requirements, the liquid resin component of **GIL-RESIN® TE+** is delivered as a hazardous substance separated from the other components. Depending on the ordered quantity, the component is supplied in 25 kg or 175 kg drums. The other components are delivered on a separate pallet with the active powder and granulate each packed in 25 kg sacks.

The individual components in their original packaging can be stored for at least 12 months at temperatures < 30 °C. The organic liquid is temperature-sensitive, a storage temperature of max. 25 °C should therefore not be regularly exceeded. Once opened, sacks should be used up as fast as possible.

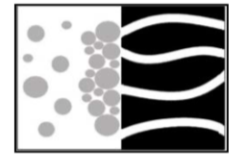
2.1 Shelf Life

AP-E/P, GP+	12 month
Monomermix T	6 month

3 Requirements

3.1 Preparation Room

The preparation room should be laid out in such a way that the casting process can be started 40 to 60 seconds at the latest after adding the mixes I + II (see 5.1 and 5.2).



3.2 Temperature Conditioning

3.2.1 Individual Components

To ensure optimum processing, the components should be at a temperature of 16 - 20 °C. The temperature of the casemould should not exceed 25 °C.

3.2.2 Room Temperature

The room temperature should be at 19 to 20 °C during processing.

3.3 Stirrer

To ensure rapid homogenisation of both individual mixes (see 5.3), a powerful stirrer is required for preparing **GIL-RESIN® TE+**. A

3-paddle stirrer with a diameter from 300 to 500 mm (depending on the material quantity) is recommended for a total quantity of 300 kg. The rotary speed of the stirrer should be approx. 400 to 700 rpm (depending on the type of stirrer). The vessel used for stirring the components should have a maximum diameter of 800 mm and a height of 1000 mm and should be slightly tapered at the base.

3.4 Equipment for Casting Process

Ideally, materials should be made from PP or stainless steel. Two stirring containers (vessels) are required. One container is needed for the preparation of mix I. The capacity of the vessel should be 65 % of the preparation volume and equipped with a nozzle (or base valve). This facilitates the rapid transfer to the second container where mix II is prepared. The container for mix II must be capable of accepting the entire mixture + 20 % of the preparation volume (see Section 5).

If there are holes at the rear of the plastic mould for draining the slip water, it is recommended to use 8 mm diameter plug-in rods spaced at 20 - 30 mm from each other and the casemould surface. It is recommended to use threaded rods with a PP coating for this purpose. A manually-guided routing machine on the flat milled rear of

the plastic mould is suitable for cutting the connecting channels.

A rinsing station where, after being made, the mould can be alternately rinsed with compressed air and water (for approx. 8 h) is of great importance for ensuring the quality of the **GIL-RESIN® TE+** mould. The rinsing process cleans the pore passages of additives and residue from the polymerisation process.

3.5 Safety Measures

The workstation must be adequately ventilated. The use of an extractor system and respirator masks (filter type ABEK) is recommended when working with the organic liquid that is an irritant for eyes, respiratory organs and skin. Suitable protective clothing, safety goggles and safety gloves should also be worn. Avoid contact with the skin. The organic liquid is highly inflammable.

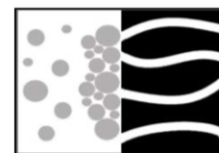
4 Calculating Required Quantities of GIL-RESIN® TE+

The total quantity of **GIL-RESIN® TE+** required for the casting is determined by way of calculation or gauging the capacity of the mould with water. The density of **GIL-RESIN® TE+** is required for this purpose:

$$\begin{array}{l} \text{Density of} \\ \text{GIL-RESIN®} \\ \text{TE+} \end{array} = 1.11 \text{ kg/dm}^3$$

The total quantity is then calculated using the parameters volume and density as follows:

$$\begin{array}{l} \text{Total quantity of} \\ \text{GIL-RESIN®} \\ \text{TE+} \end{array} = \text{Volume} \times 1.11$$



Having established the volume and total quantity of **GIL-RESIN® TE+**, the weighed quantity of the individual components can then be determined:

$$\text{Quantity of each individual component} = \frac{\text{Factor [f]} \times \text{total quantity GIL-RESIN® TE+ [kg]}}{\text{Factor [f]}}$$

4.1 Application Example

- Volume: 225 litres (gauged capacity)
- Total quantity of **GIL-RESIN® TE+**:
225 x 1.11 = 249.75 kg \triangleq 250 kg
- Quantity calculation for individual components with a total **GIL-RESIN® TE+** quantity of 250 kg:

Description	Factor [f]	Qty. [kg] (250 x f)
Tap water	0,2450	61,250
LT (wetting agent)	0,0024	0,600
AP-E/P	0,3325	83,125
Defoamer	0,0001	0,025
Monomermix T	0,2000	50,000
GP+ (granulate)	0,2200	55,000

The calculated quantities of individual components are weighed and processed as described in the processing instructions. It is recommended to use 2 scales for weighing, i.e. one for rough weighing (accuracy: 0.1 kg) and one for precision weighing (accuracy: 0.001 kg).

5 Processing Instructions

Before weighing out the individual components, the drums should be checked and the components conditioned (see 3.2). Liquid components must be thoroughly mixed in the drum before use.

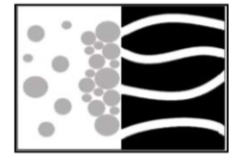
Two mixes (I + II) are made with the individual components, which are finally mixed together. After following the stirring instructions for the specified time, the **GIL-RESIN® TE+** is poured into the prepared casemould (previously treated with release or parting agent). In most cases, the casemould is designed as a facility made from epoxy resin. After removing the encasing, the moulds should be kept moist in order to reduce as far as possible stress in the mould caused by the mould partially drying out.

5.1 Mix I

- Add water to container 1 and mix in the LT, AP-E and defoamer components.
- To ensure complete wetting of the powder components, wait at least 30 minutes before continuing with step 5.3. It is recommended to stir well during this time to avoid sedimentation.

5.2 Mix II

- During the waiting period required for mix I, weigh the GP+ and Monomermix T components separately. The Monomermix T is weighed shortly before mixing the two mixes together (see 5.3) in the separate casting vessel for filling the casemould system.
- GP+ is added to the Monomermix T in the casting container while constantly stirring slowly (low setting). Then continue stirring for max. 2.5 minutes.



5.3 Casting mixture

Immediately after stirring mix II for 2.5 minutes (after adding GP+ to the Monomermix T), mix I is added quickly and without interruption to mix II. Then mix thoroughly for a further 40 to 60 seconds with the stirrer set to high speed.

→ Note: Quickly go over to the casting process to ensure sufficient processing time after stirring.

→ Note: To obtain good results, the stirring time should be followed precisely. Otherwise defects may occur.

5.4 Casting Process

Pour the casting mixture into the casemould slowly and without interruption to avoid air inclusions. Then immediately fit the lid of the casemould (with rods if applicable).

5.5 Removing from Mould/Treatment

If rods are used to speed up the formation of clay body, after the temperature has risen to 30 °C, turn them a little by hand and remove the rods completely at a temperature of 35 °C (start of hardening/curing process). After waiting for approx. 60 minutes and after the maximum reaction temperature has dropped, the encasing of the casemould can be removed and, after waiting a further 10 minutes, the rear of the **GIL-RESIN® TE+** mould is ground flat and the casting can be removed from the casemould.

→ Note: The maximum reaction temperature is approx. 60 - 65 °C depending on the processing temperature and ambient temperature.

As a post-treatment process, it is recommended to store the moulds in a water bath (~15 °C - 30 °C) for approx. 12 hours to achieve optimum fit accuracy. If no water bath is available, the moulds should be at least kept moist wrapped in film.

→ Note: The final strength is achieved after approx. 12 hours.

5.6 Cleaning the Working Equipment

After the casting process, it is recommended to wait approx. 10 to 15 minutes before cleaning the stirrer. **GIL-RESIN® TE+** residue can be easily removed after the initial hardening phase.

5.7 Storing Moulds

Moulds that are not in use should be stored moist together with a corresponding preservative.

The above information is given to our best knowledge and after thorough examination based on the present state of the art. Deviations may be possible as experience has shown that operational conditions differ. Changes may be made in line with further development and the latest findings. Please contact us, we will be happy to inform you.