



RODIN®
3D Resin

A Pac-Dent Brand

CASTABLE

For Lost-Wax Casting Devices



Instruction For Use

Rodin Castable
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Revision 090426

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CASTABLE

1. DEVICE DESCRIPTION

Rodin Castable Resin is a light-curable, 3D-printing resin designed for the fabrication of sacrificial patterns used in the production of dental prosthetic restorations through the lost-casting process. The resin is intended to produce highly accurate, dimensionally stable printed patterns that are subsequently invested and burned out during the casting procedure. The printed resin pattern is not intended for permanent intraoral use and is completely eliminated during the casting process prior to fabrication of the final restoration. Rodin Castable Resin is designed to provide reliable printability, dimensional accuracy, and clean burnout characteristics to support the production of cast dental prosthetic components.

2. MATERIAL COMPOSITION

Rodin Castable resin is comprised of:

- Methyl methacrylate resin
- Photoinitiator
- Photoinhibitor
- Pigment

3. INTENDED CUSTOMER

The product is exclusively intended for use by trained professional dentists or dental lab technicians. Sales are restricted to:

- Dental supply dealers
- Teaching institutions
- Government dental facilities

4. INTENDED USE

Rodin Castable resin use is specific for fabrication of 3D printed lost cast waxing technique patterns, not for direct human use. Rodin resin requires a computer-aided design and manufacturing (CAD/CAM) system which includes the following components not part of the device: oral casting impression, digital restorative file created from a scanned impression system, stereolithographic additive printer, and curing light equipment. For use in tandem with validated 3D printers and post-curing devices listed below while following manufacturer's suggested instructions.

5. VALIDATED EQUIPMENT

5.1. Validated 3D Printers

Please click on the link below for up-to-date information on validated 3D printers.

<https://rodin-3d.com/validated-equipment-settings/>

5.2. Validated Light-Curing Devices

For optimal post-curing of 3D printed dental restorations, use only validated light-curing devices and settings. The most current list of validated equipment and corresponding cure parameters is available at:

<https://www.rodin-3d.com/3d-printers/light-curing-devices>

6. POST-PROCESSING

Unpolymerized resin does not burn out well. It is unlikely that the pattern is better than 90% polymerized upon removal from the build platform. Also, as with most resins, the RODIN resins are sensitive to oxygen in the air making it likely that the pattern has an uncured coating on the outer surface. It is critically important that the pattern be fully cured in preparation for investing.

6.1. Cleaning

6.1.1 Cleaning Recommendations: Rodin® Universal Resin Cleaner

1. Remove Excess Resin: Wipe away or blow off excess residual resin from the printed object using compressed air or a paper towel.
2. Run Prewash Cycle 3 Minutes: Place the object in an ultrasonic, vortex, or oscillating bath filled with Rodin® Universal Resin Cleaner. Run the prewash cycle for 3 minutes.
3. Scrub Surface (Optional): After the prewash, dip a clean brush into a fresh batch of Rodin® Universal Resin Cleaner and thoroughly scrub the entire surface of the object.
4. Run Secondary Wash Cycle 3 Minutes: Transfer the object to an ultrasonic, vortex, or oscillating bath filled with fresh Rodin® Universal Resin Cleaner. Run this secondary cycle for 3 minutes.
5. Dry the Object: Blow off any remaining wash solution using compressed air until the object is completely dry.
6. Inspect for a Matte Finish: Crucial before post-curing. Examine the object closely for any shiny spots.
 - If shiny areas are present: Residual resin remains. Repeat the secondary wash (Step 4) and drying process (Step 5).
 - If the surface is completely matte: The object is clean and ready for characterization or post-curing procedures.

6.1.2 Cleaning Recommendations: Isopropyl Alcohol (IPA)

Never submerge printed objects in Isopropyl Alcohol for a combined total of more than 10 minutes. Prolonged exposure to IPA will break down the resin, causing degradation to the mechanical properties and structural integrity of the final printed part.

1. Remove Excess Resin: Wipe away or blow off excess residual resin from the printed object using compressed air or a paper towel.
2. Run Prewash Cycle 3-4 Minutes: Place the object in an ultrasonic, vortex, or oscillating bath filled with IPA. Run the prewash cycle for 3 to 4 minutes.
3. Scrub Surface (Optional): After the prewash, dip a clean brush into fresh IPA and thoroughly scrub the entire surface of the object. Do not leave the part soaking in a bath during this step.
4. Run Secondary Wash Cycle 3-4 Minutes: Transfer the object to an ultrasonic, vortex, or oscillating bath filled with fresh IPA. Run this secondary cycle for 3 to 4 minutes.
5. Dry the Object: Immediately after removing the part from the secondary wash, blow off all remaining solvent using compressed air until the object is completely dry.
6. Inspect for a Matte Finish: Crucial before post-curing. Examine the object closely for any shiny spots.
 - If shiny areas are present: Residual resin remains. Do not run another full wash cycle. Spot-clean the shiny areas manually with a brush dipped in fresh IPA, then dry immediately with compressed air.
 - If the surface is completely matte: The object is clean and ready for characterization or post-curing procedures.

6.2. Post-Curing

1. Shut off oxygen during post-curing. This may be achieved by placing the printed part in water, coating it with mineral oil, or using a shield-gas environment (e.g., nitrogen or argon)
2. Post-cure using a validated light-curing device and the applicable curing parameters specified in Section 5.2. The light source should provide even, diffuse,

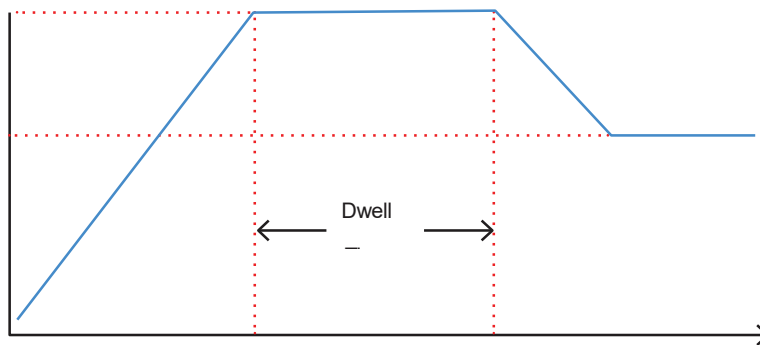
and multidirectional exposure. Uneven light distribution may result in non-uniform polymerization, stress, and warpage of the pattern.

7. INVESTMENT CASTING

Prepare the investment material according to the investment manufacturer's instructions using distilled water and the specified powder-to-liquid ratio. Hand mix for a minimum of 1 minute, then vacuum mix using equipment capable of achieving adequate vacuum to remove entrapped air. Do not apply surfactants or wetting agents to the printed pattern, as this may adversely affect investment integrity and increase the risk of surface defects. Place the pattern in a flask lined with a suitable asbestos-free ceramic liner. After investing, apply a second vacuum with gentle vibration to facilitate air removal. Slowly release the vacuum after bubbling subsides and allow the investment to set completely before proceeding to burnout.

8. BURNOUT

In all investment types, we strongly advise to observe the full bench-set time recommended by the manufacturer. Having said that we recommend after bench set is completed that burnout commence at the peak temperature recommended for that investment by the manufacturer. Typically, 700C for gypsum, 850C or more for most phosphate investments. The dwell at peak should be as follows:



Time

T1: Peak Burnout Temperature T2: Casting Temperature

Dwell Time: 1 hour with additional 30 minutes per 100g of investment

This means that for a 200-gram flask the total time would be 2 hours (1 hr base time plus 30 min x 2 for the investment weight). This is to allow full heat soaking to occur to the center of the ring. Because this is not a wax product the concern for explosive outgassing of liquid wax is not there. Also, because there is no liquid wax to flow out

we recommend to keep the flask horizontal in the center of the furnace rather than vertical. This promotes even heating and allows maximum oxygen exchange to fully gasify the pattern. Slow burnouts with low oxygen can create secondary products that may not fully or predictably gasify.

9. CASTING

Knowing and understanding the correct casting temperature of the flask and alloy is critical for best results. The flask should be allowed to stabilize at this desired temperature for several minutes before being removed from the furnace.

Gypsum investments should be cast using vacuum or pressure vacuum. “Broken-arm” centrifugal casters are typically too forceful even with light winding. The impact of the liquid metal can easily shear off small details causing large porosities and, of course, fewer small details. Care should also be taken with the gauge and location of the sprue channel as well. Overly generous sprues will allow a large volume of metal though and impart considerable force as the metal courses through the void--even with vacuum casting.

10. IN SUMMARY

- Clean the parts well
- Cure them fully
- Be mindful of investment preparation
- Burnout at peak temperature for the investment used
- Hold at the casting temperature of the alloy before removing from furnace
- Cast using the appropriate method for the investment used.

11. STORAGE CONDITIONS AND SHELF LIFE

- Store in the original tightly closed container in a cool, dry, and well-ventilated place.
- Recommended storage temperature: 4°C to 25°C (40°F to 75°F).
- Protect from direct sunlight, UV light, curing light sources, excessive heat, moisture, contamination, and ignition sources.
- Do not freeze.
- Keep the container upright and tightly closed when not in use.
- Refer to product labeling for the expiration date. Do not use after expiration.

12. DISPOSAL RECOMMENDATIONS

12.1. Classification of Waste

Dispose of resin and resin-contaminated materials in accordance with applicable federal, state, and local regulations. Uncured resin should be treated as chemical waste and must not be discharged into drains, sinks, or the environment.

12.2. Disposal of Liquid Resin

Do not dispose of uncured liquid resin directly into the trash or down the drain. Unused or waste resin should be fully cured using an appropriate UV light source before disposal, where permitted by applicable regulations.

12.3. Solid Resin Waste

Ensure printed models, failed prints, supports, and other resin waste are fully cured before disposal. Fully cured resin waste may be disposed of as solid waste in accordance with applicable local regulations.

12.4. Personal Protective Equipment (PPE) and Cleaning Materials

Dispose of gloves and other PPE contaminated with uncured resin in accordance with applicable waste-disposal requirements. Paper towels, cloths, and other cleaning materials contaminated with uncured resin should be fully cured before disposal, where appropriate.

13. LEGAL DISCLAIMER

Pac-Dent Inc. Release of Liability

Pac-Dent Inc. (“the Company”) expressly disclaims any and all liability associated with the improper use of its products, including but not limited to its range of 3D printing resins, tools, and equipment intended for dental applications. The end user (“User”) acknowledges and agrees that strict adherence to the instructional guidance provided by the Company is essential for the correct function and performance of the medical device (“Product”).

The User understands that deviation from the provided instructional guidance, or the use of invalidated or unauthorized equipment in conjunction with the Product, may result in alterations to the function and performance of the Product. The Company shall not be held responsible or liable for any such alterations or any consequences thereof.

By using the Product, the User agrees to indemnify, defend, and hold harmless Pac-Dent Inc., its officers, directors, employees, agents, affiliates, successors, and assigns from and against any and all losses, claims, damages, expenses (including reasonable attorneys’ fees), or liabilities of any kind arising out of, related to, or in connection with the User’s deviation from the provided instructional guidance or use of invalidated equipment.

This release of liability is binding upon the User, and, as applicable, the User's heirs, executors, administrators, legal representatives, and assigns. It is the User's responsibility to ensure comprehension and observance of this disclaimer and all accompanying instructional materials provided by the Company.

THE COMPANY'S LIABILITY UNDER THIS DISCLAIMER, IF ANY, SHALL BE LIMITED TO THE PURCHASE PRICE PAID BY THE USER FOR THE PRODUCT. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR INDIRECT DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE PRODUCT.

The User's acceptance of the Product constitutes acceptance of these terms and an agreement to be bound hereby.

14. MANUFACTURER INFORMATION



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