R3™ PHOTORESIST R4™ PHOTORESIST R5™ PHOTORESIST

R-Series Photoresist Films make decorative sandcarving simple, productive and enjoyable. R3, R4, and R5 photoresist films are engineered for professional sandcarving applications in which quick-processing and high production are critical. R3, R4, and R5 promote efficient mask production by eliminating the time-consuming and messy application of adhesive. R-Series films offer:

- Self-adhesive *(no glue required)*
- Easy handling - *not tacky until after washout*
- Repositionable
- Dries fast
- Easy carrier release
- Easy clean-up
- Excellent imaging
- Fast exposure
- Superior durability

R-Series Photoresist Films: R3, R4, & R5 *offer thicknesses in 3, 4, or 5 mil respectively and all are available in roll and sheet formats.*

STORAGE

- Store packaged film in a cool, dry area.
- Do not refrigerate.
- Shelf life is indefinite. IKONICS Imaging warrants this product free from defects for 12 months.
- Store processed masks on silicone-coated release paper for later use. Masks may be stored for up to one month.

SAFETY CONSIDERATIONS

REFER TO SDS for safety information. Wear eye and hand protection.

MATERIALS NEEDED

Required	Recommended
Phototool	Wire Wheel
Exposure Device	Smart Jig
R-Series photoresist film/masks	Squeegee
Washout Equipment	Dust-free Cloth
Blast Equipment	Glass Cleaner
Substrates	

LIGHT SENSITIVE PRODUCT

R-Series films are a light sensitive product, until fully developed *(after step 3)*. R-Series films have some tolerance to white light, however, they should be used in yellow or safe light conditions for optimum results. Safe light sources include general purpose gold or yellow fluorescent or incandescent lights, red ortho-safe lights, or yellow *bug lights*. If safe light sources are unavailable, white LED room lights are preferable over white incandescent or fluorescent lighting during processing.
Warning: *Exposure to direct or indirect sunlight will partially or completely expose R-Series films.*

STEP ONE: CREATE ARTWORK/PHOTOTOOL

Artwork should be created as a dense black image, with crisp, clean line edges. The highest quality and best value phototools are created by inkjet printing artwork onto specially coated inkjet film. AccuBlack® Inkjet film is recommended.

Alternative Technologies for phototool creation:

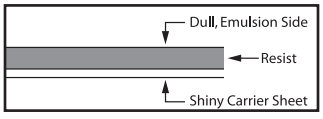
- Both stat cameras and image setters offer high quality at a premium price.
- Paper positive media like laser printed vellums or Positive FX Drafting Film can be less expensive but offer marginal performance.

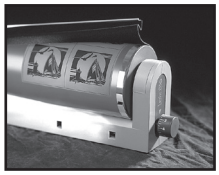
NOTE: R-Series Films use a photopositive process, meaning the black portions of the phototool will ultimately be engraved. **"Black = Blast"**

For further information and basic instruction on artwork setup and advanced decorative techniques such as back blasting, stage carving, color-filling, and more, visit us online at https://ikonicsimaging.com/artwork-s3-faq or scan the code below.

STEP TWO: EXPOSE

1. Position phototool and R-Series film in exposure unit. Place the printed side of the phototool against the dull emulsion side of the R-Series film in the exposure unit, so that the phototool is between the light source and the R-Series film. ***HINT:*** *R-Series' emulsion side is duller in appearance than its shiny carrier sheet side.*





2. An ultraviolet (UV) exposure unit with a vacuum frame should be used to assure firm contact between the artwork and the R-Series film during exposure. For information on UV Exposure units such as the Quick Image Exposure unit, please contact IKONICS Imaging.

3. Be sure to have a non-reflective black backing opposite your UV light source to avoid possible reflection causing overexposure.

4. Expose using the suggested times listed.

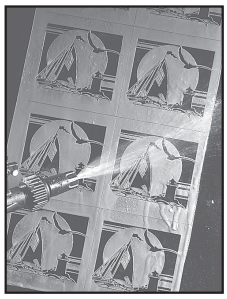
NOTE: *The effects of improper exposure will be seen during image development (step 3). Overexposure prevents the image from washing out completely. Underexposure causes the entire stencil to wash out prematurely.*

SUGGESTED LIGHT SOURCES & EXPOSURE TIMES

Light Source	Distance	Exposure Time
5 KW Metal Halide	40 in/100cm	10-15 sec
26-1KS (1KW)	18 in/45cm	10-20 units
Letralite	n/a	40-60 sec
QuickImage	n/a	7-14 sec R3/R4
		7-20 sec R5

NOTE: *Exposure times are suggested only as a guide. All exposure times are approximations and will vary based on type of UV light source used, age of light source, and local voltage ranges. Exposure times can also vary based on the type of phototool used. Contact IKONICS Imaging for additional exposure information.*

STEP THREE: **IMAGE DEVELOPMENT**



1. Position the exposed film in an upright vertical position. Secure the film with a clip so that the emulsion (dull) side can be spayed without letting the force of the water dislodge the film from its vertical position.

2. Use heated water with pressurized spray. Indeed, the warmer the water the faster the washout time. Water temperatures should not exceed 120°F (38° C). R-Series films are often developed with the TriggerJet® Washout Nozzle which works best with heated water and the flat spray attachment (50-80 psi / 3.5-5.5 bar). Unheated water works well with pressure washers that can deliver 400-1200 psi (28-83 bar).

3. Spray with slow, even passes over the entirety of the film until the image area becomes transparent. A gentle, steady sweeping motion from about 8–12 inches (20–30 cm) away is recommended for very fine detail and halftones. ***Caution:*** *Directing spray to one isolated spot may delaminate cured emulsion from the carrier sheet.*

NOTE: *The entire surface area of the film must be washed to ensure adequate adhesion.*

SUGGESTED WASHOUT GUIDELINES	
TRIGGERJET	
3-5 mil	1-2 min
PRESSURE WASHER	
A pressure washer will reduce washout time to under 1 min in most cases.	
AQUABLAST® WASHOUT UNIT	
3-5 mil	45 sec - 90 sec

NOTE:
Washout times will be influenced by:
- *amount of detail in the artwork (high detail = longer)*
- *amount of stencil being developed*
- *water temperature and pressure used.*

Do not *wash R-Series Films under running water from a faucet.*

STEP FOUR: **DRYING**

1. Use a window squeegee or blow dryer to remove excess water from the film thereby accelerating drying.

2. Let film dry for 30-60 minutes at room temperature.
   - High humidity will extend the drying time.
   - When film returns to its original uniform color, it is dry.

If available, a drying chamber with heated circulating air will significantly reduce the drying time. At temperatures of 100-160°F (49°- 71°C), drying will take approximately 10-35 minutes. Drying will vary with humidity and air circulation. Film should return to room temperature before proceeding to the next step.

STEP FIVE: **MASK APPLICATION**

Now that the photoresist film has been transformed into a stencil mask in steps 1-4, it can be applied to the substrate.

1. Apply mask to the substrate with light pressure in the desired location. If repositioning is required, simply remove the mask and realign.

2.Once the mask is properly positioned, apply firm pressure to the back of the masking material using a plastic burnisher. This ensures firm contact of the mask to the substrate.

3. The shiny carrier sheet will still be covering the film. Remove the carrier by flicking a corner with your fingernail or an X-ACTO® knife. After removing the carrier, press down on the image area with your thumb to ensure firm contact. Pay special attention to anchor fine details and small lettering.

NOTE: *Avoid wrinkles or large air pockets. Air pockets under the film may reduce adhesion, resulting in blow-offs during blasting. If unable to remove air bubble by repositioning, simply pop the bubble with a pin and tape over the pinhole to avoid blast through.*

A good transfer may still result if very small bubbles under the film surface. Tiny bubbles typically do not compromise the integrity of the film during blasting.

After removing the carrier sheet, bubbles can be eliminated, and adhesion can be ensured by rolling a wire wheel back and forth over the film's surface.

NOTE: *Used alone, R-Series films are not suitable films for use with acrylic substrates. The peel after sandblasting is difficult, and becomes more difficult if the film and substrate are soaked in water. Please contact your IKONICS Imaging representative for further details.*

STEP SIX: **BLASTING**

1. Hold the blast gun 6-8 inches (15–20 cm) away from the object at an angle perpendicular to its surface.

2.Recommended maximum pressure for a pressure-pot sandblast system is 40 psi (2.75 bar). A siphon (or suction) sandblast system should not exceed 80 psi (5.5 bar).

3. Grit size should be 150 or finer depending on the image detail. Recommended abrasive media is either pure aluminum oxide or silicon carbide. All manufacturer safety precautions should be closely followed.

4. Recommended blasting temperature is 68°F (20°C) or higher. Blasting in lower temperatures may result in loss of adhesion or blow-offs.

STEP SEVEN: **MASK REMOVAL**

Peel the masking material from the substrate or soak the object in water for 10-15 minutes. Fine pieces of masking material can be removed by rolling them off with your fingertips. *CAUTION: be careful not to scratch the substrate.*