



## Product Data Sheet

Date: 06/21/06  
Supersedes: NEW  
**PRODUCT #: N2550**

# ***D-4000 LIQUID DEVELOPER***

Aqueous Developer Concentrate

**DESCRIPTION:** A one-part concentrate (40% potassium carbonate) formulated to develop fully aqueous Riston<sup>®</sup> photopolymer films. **D-4000** is economical to use and easy to handle, eliminating the need to weigh and dissolve powdered materials. It is formulated to give optimum results with DuPont<sup>™</sup> Riston<sup>®</sup> films and FoamFREE<sup>™</sup> defoamers in conveyORIZED spray developer equipment.

**BENEFITS:**

- **Easy to use liquid**
- **Consistent purity and concentration**
- **Can be used in bleed and feed or monitored replenishment**

**SPECIFICATIONS:**

<b>Density:</b>	1.41 gm/ml
<b>Flash Point:</b>	None
<b>Shelf life:</b>	Indefinite

**INSTRUCTIONS:**

**D-4000** should be diluted to 1.1 – 2.1% by volume to get 0.6-1.2% by weight carbonate concentration. Follow the photoresist manufacturer's recommendation for carbonate concentration of the developer solution and temperature, normally 80° - 90° F. Analyze new solution for concentration according to analysis on reverse side.

Replenishment can be controlled by pH or by panel count. The set point for pH replenishment is typically between pH 10.6-10.7, or as specified by the photoresist manufacturer. Monitor the break point, and adjust the conveyor speed to permit clean development at approximately 50% of the distance through the developing chamber. If the break point is past 50% of the chamber, reduce conveyor speed or raise the pH set point of controller, or increase the volume of replenishment solution added.

Add 5-10 ml of **FoamFREE<sup>™</sup>** per gallon of developer solution at makeup and again as needed.

Thorough rinsing is essential to the quality of the developed circuit. A warm water rinse will help remove developer and resist residues. The length of the rinse chamber should be at least half as long as the developing chamber to allow for sufficient rinsing. Follow the photoresist manufacturer's recommendations for using hard or acidified rinse water.

### **Developer Makeup**

For 0.85% potassium carbonate:	Volume of <b>D- 4000</b> = Sump Size (gal.) X 0.015
For 1.0% potassium carbonate:	Volume of <b>D-4000</b> = Sump Size (gal.) X 0.018

**CAUTIONS:** Use good chemical handling practices when handling this product. In case of contact with eyes, flush immediately with water and obtain medical attention. In case of contact with skin, wash with soap and water. Refer to Material Safety Data Sheet for further information.

**DISPOSAL:** Lower pH using sulfuric acid. Filter off liquid and neutralize with caustic. Discard precipitate in landfill.

**ANALYSIS:**

### **Aqueous Developer Analysis**

<b>Equipment required:</b>	10 ml pipette	0.1N hydrochloric acid
	50 ml burette	Methyl Orange indicator
	400 ml beaker	pH meter (optional)

**Procedure:**

1. Pipette a 10 ml sample of developer solution into a 400 ml beaker, and add 150 ml distilled water.
2. Add 1 ml of Methyl Orange indicator.
3. Titrate with 0.1N hydrochloric acid to a pink-orange end point. The end point is reached when one drop of titrant no longer contributes any pink coloration.

**OR**

Titrate with 0.1N hydrochloric acid using a pH meter to a pH of 4.0.

**Calculation:**  $\text{mls of HCl} \times \text{N of HCl} \times 0.69 = \text{wt \% potassium carbonate}$

\*This analysis is valid for new working solutions only.

This product should be used only for its intended purpose. The information stated above is based on our laboratory tests and experience, and is accurate to the best of our knowledge. Since actual use is beyond our control, the recommendations or suggestions are made without warranty, expressed or implied.