



# MICROPOSIT™ MF™-312 DEVELOPER

For Developer Applications

## DESCRIPTION

Microposit MF-312 Developer is a metal-ion-free surfactant-containing developer designed to provide high throughput and wide processing latitude for g-Line applications in a variety of processes.

It has been optimized for wafer fabrication and other microelectronic applications for which high speed and resolution are required.

## ADVANTAGES

### Automation

- Immersion
- Inline track
- Batch spray

### High process reliability

- Tight product specifications
- Stringent quality control
- Complete systems functional testing

### Excellent resolution

- High differential solubility
- Excellent development tolerance
- No swelling of photoresist

### Reduced device contamination

- Metal-ion-free formulation

### High inspection yields

- Clean, residue-free development
- Wide process latitude

### Cost efficient

- Excellent exposure throughput

## INSTRUCTIONS FOR USE

### Bath Make-up

Dilute Microposit MF-312 Developer for use as follows:

Microposit MF-312 Developer	1 part by volume
Deionized water	1 part by volume

Mix thoroughly. Proper dilution can be verified by analysis for normality.

Production line downtime and potential dilution errors can be avoided by using Microposit MF-312 Developer CD-27 or Microposit MF-312 Developer CD-30.

CD-27 is recommended for immersion developing.

CD-30 is recommended for batch spray systems.

CD-27 and 30 are recommended for inline track systems.

These ready-to-use solutions are available.

### Temperature

Operate Microposit MF-312 Developer bath between 15–20°C, with the temperature controlled  $\pm 1^\circ\text{C}$ . Optimum results are obtained at the lower end of this range.

Unlike comparative ionic and other metal ion-free developers, Microposit MF-312 Developer has an increased dissolution rate on exposed photoresist at lower temperatures. Microposit MF-312 Developer is particularly well-suited for spray developing because the spray action causes a temperature drop in the developer solution. For this reason developer temperature should be monitored at the wafer surface.

### Time

Immersion: 40–60 seconds

Spin/spray: Varies with equipment; consult your Rohm and Haas Electronic Materials Technical Sales Representative

Longer development times permit the use of shorter exposure times. Shorter development times minimize developer attack on the unexposed photoresist. The range recommended is optimum. We recommend keeping the development time constant and adjusting the exposure time as necessary to meet critical dimension requirements.

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### Agitation

- Immersion: Mild, consistent agitation is recommended
- Spin/spray: Contact your Rohm and Haas Technical Sales Representative

### Rinse

- Immersion: Cascade rinse with deionized water to resistivity specification immediately after developing
- Spin/spray: Overlap deionized water rinse with developer cycle to prevent developer drying on substrate surface; backside rinsing of substrates is less critical than with conventional ionic developers since Microposit MF-312 Developer is metal ion-free

### Bath Control

- Immersion: For maximum process control, replace bath with fresh developer solution at least once per shift; keep bath covered when not in use
- Spin/spray: Not applicable
- Batch spray: As recommended by equipment manufacturer

### Determination of Total Alkaline Normality

Principle—The normality is determined by direct potentiometric acid-base titration.

#### I. Reagents and Apparatus

- Hydrochloric acid (HCl), 1N, standardized to  $\pm 0.001$
- Autotitrator (e.g. MertoHM Potentiograph or Titroprocessor) with 20.0 ml volume burette
- pH electrode or combination pH electrode
- Magnetic stir plate

#### II. Procedure (to be run in duplicate)

- Pipette 50.0 ml of sample into a 250 ml beaker, add a magnetic stir bar and dilute to approximately 150 ml with deionized water.
- Calibrate autotitrator with fresh pH buffer solutions (pH 4.0, 7.0, 10.0).
- Place electrode and titrant dispenser into sample solution on magnetic stir plate. Stir rapidly without loss of solution.
- Titrate sample with standardized 1N HCl to approximately 2.0 ml past inflection point.
- Determine inflection point and calculate the volume of HCl to inflection in milliliters (ml).

#### III. Calculation

$$\text{Normality} = \frac{\text{ml of HCl} \times \text{N of HCl}}{\text{Sample aliquot (50 ml)}}$$

**Note:** Reproducibility is dependent on accuracy from both operator and instrument. Analysis should be repeated until a constant value for inflection is assured.

#### IV. Results

The Normality of a freshly made-up Microposit MF-312 Developer bath using the standard 1:1 dilution should be  $0.27 \pm 0.02\text{N}$ .

**Note:** Microposit MF-312 Developer CD solutions are delivered  $\pm 0.01\text{N}$ .

## MICROPOSIT MF-312 DEVELOPER

### EQUIPMENT

Use polypropylene, 316 stainless steel, polytetrafluoroethylene, or equivalent materials.

### PROPERTIES AS DELIVERED

Microposit MF-312 Developer is manufactured to the highest quality standards and is subjected to state of the art testing for physical, chemical and functional properties to assure the user maximum lot-to-lot reproducibility.

Microposit MF-312 Developer is supplied with a tighter normality specification, and is available in ready-to-use custom solutions.

Microposit MF-312 Developer is filtered to 0.2  $\mu\text{m}$  absolute directly into clean containers.

Certificates of Analysis will be supplied with each shipment upon request. Quality Assurance Material Specifications and Analytical Testing Procedures may be obtained upon request from your Rohm and Haas Electronic Materials Technical Sales Representative.

### PRODUCT DATA (TYPICAL PROPERTIES)

Specific Gravity @ 20/20°C:	0.995– 1.006
Appearance:	Water-white to light yellow solution
Turbidity:	3 NTUs maximum
Total Alkaline Normality:	0.53–0.55
Sodium Content:	0.5 ppm maximum

Custom solutions of Microposit MF-312 Developer have similar specifications corresponding to the developer concentrations, with a normality specification range of  $\pm 0.01$ .

### HANDLING PRECAUTIONS

Before using this product, consult the Material Safety Data Sheet for details on product hazards, recommended handling precautions and product storage.

**CAUTION!** Keep combustible and/or flammable products and their vapors away from heat, sparks, flames and other sources of ignition including static discharge. Processing or operating at temperatures near or above product flashpoint may pose a fire hazard. Use appropriate grounding and bonding techniques to manage static discharge hazards.

### STORAGE

Store products in tightly closed original containers at temperatures recommended on the product label.

### DISPOSAL CONSIDERATIONS

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

## MICROPOSIT MF-312 DEVELOPER



### ELECTRONIC MATERIALS



**Circuit Board Technologies**



**CMP Technologies**



**Flat Panel Display Technologies**



**Microelectronic Technologies**



**Packaging and Finishing Technologies**

For locations and information please visit [www.rohmhaas.com](http://www.rohmhaas.com)

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