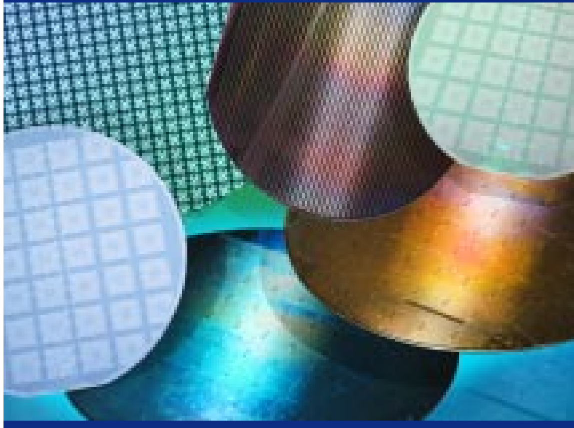
DATA SHEET



Clariant

# AZ® 300 MIF Developer

## Description

AZ® 300 MIF positive photoresist developer is a high purity formulation of the industry standard 2.38 weight % tetramethyl ammonium hydroxide (TMAH) and 0.261 *N* metal-ion-free developer. It is formulated to meet the microlithographic and process requirements for sub-0.5 µm technology. AZ 300 MIF developer is a non-surfactated material for use in spray and spray-puddle proceses.

## Processing

Developers typically have a limited range of useful dilutions. Highly concentrated dilutions have high sensitivity and allow faster photospeeds, but they are limited by high dark film losses and reduced contrast. The more dilute concentrations enable high contrast and provide greater selectivity between the exposed and unexposed resist. These require longer development times or increased exposure energy. They also have greater sensitivity to the effects of standing waves from monochromatic exposure.

Metal-ion-free developers are much more sensitive to changes in normality and processing temperatures than are inorganic developers. The use of pre-diluted MIF developers is strongly recommended for production processes. Normality control for these products is exceedingly tight, and the processing temperature should be controlled to ± 1°C.

| Features | Benefits |
|---|---|
| Excellent resolution and processing latitude | Wide processing latitude, high contrast, superior production throughput for sub-0.5 µm technology |
| Consistency | Excellent batch-to-batch consistency from tight production specification control |

## Specifications

| | | |
|---|---|---|
| Normality | | 0.2610 ± 0.0001 |
| Carbonate (ppm) | | 30 max. |
| Chloride (ppb) | | 30 max. |
| Liquid Particle Count (#/ml > 0.5 µm) | | 20 max. |
| Liquid Particle Count (#/ml > 0.2 µm) | | 200 max. |
| Trace Metals (ppb) | Al | 1.0 max. |
| | Cd | 1.0 max. |
| | Ca | 2.0 max. |
| | Cu | 1.0 max. |
| | Fe | 1.0 max. |
| | Pb | 1.0 max. |
| | Li | 1.0 max. |
| | Mg | 1.0 max. |
| | Mn | 1.0 max. |
| | Ni | 1.0 max. |
| | K | 1.0 max. |
| | Ag | 1.0 max. |
| | Na | 2.0 max. |
| | Zn | 1.0 max. |
| Shelf Life | 18 months | |

Specifications are subject to revision. Contact your AZ account manager for additional information.

## Processing *(continued)*

- These developers are suitable for a 60 to 120 second batch immersion development at 20 to 25°C. Longer development times are recommended for dyed photoresists. Mild agitation of the wafers or flow of the developer should be used to ensure uniform development.
- In-line development applications require short development times due to equipment throughput constraints. A wide variety of spray, stream, and puddle combinations can be used. Typical processes follow.

## Typical Develop Process

| **Spray-Puddle** | |
|---|---|
| Wet Wafer in Water Spray | 0.5 sec, 100 - 200 rpm |
| Spray Developer | 3 sec, 300 rpm |
| Stop Wafer and Continue Spray to Set up Puddle | 2 sec, 0 rpm |
| Puddle Develop | 47 sec, 0 rpm |
| Stream on Rinse | 15 sec, 300 rpm |
| Spin Dry | 15 sec, 4000 rpm |

| **Spray Only** | |
|---|---|
| Wet Wafer in Water Spray | 0 - 5 sec, 100 - 200 rpm |
| Spray Developer | 30 - 40 sec, 100 - 200 rpm |
| Overlap Rinse and Developer Sprays | 0 - 5 sec, 100 - 200 rpm |
| Stream on Rinse | 5 - 10 sec, 100 - 200 rpm |
| Spin Dry | 5 - 10 sec, 4000 rpm |

Temperature monitoring is particularly important in spray development. The combined effects of small changes in feed pressure, spray pattern, humidity, and ventilation can lead to large temperature variations at the photoresist surface and give measurable variations in critical dimensions.

**Note:** Contaminating inorganic developer baths or lines with tetramethyl ammonium hydroxide (TMAH) based metal-ion-free developers, even at the parts-per-million level, seriously affects the photospeed of the inorganic developer process. Use caution when changing developing equipment from a metal-ion-free to an inorganic process.

Developer bath life is dependent on the amount of carbon dioxide absorbed from the air and on the amount of dissolved photoresist. Replenish the developer periodically, perhaps once a shift or when developer activity is reduced.

## Equipment Compatibility

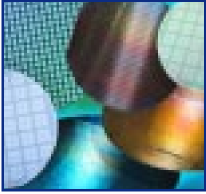
AZ® 300 MIF developer is compatible with all commercially available wafer and photomask processing equipment. Recommended materials of construction include stainless steel, PTFE, polypropylene, and high density polyethylene.

## Storage

Keep in sealed original containers. Protect from sunlight. Store in a cool, dry place. Empty container may contain harmful residue.

## Handling Precautions/First Aid

Refer to the current Material Safety Data Sheet (MSDS) for detailed information prior to handling.



# AZ® 300 MIF Developer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