

# AZ<sup>®</sup> Organic Developers

## Description

AZ<sup>®</sup> metal-ion-free developers are tetramethylammonium hydroxide (TMAH) solutions that are compatible with either batch or in-line development processes. The developers are pre-diluted and are suitable for use with a number of AZ<sup>®</sup> photoresists. The developers can also contain surfactants to aid in surface wetting. These developers are high purity materials filtered to 0.1  $\mu\text{m}$  and produced with tightly controlled normality to ensure process reproducibility.

## Key Characteristics

- AZ<sup>®</sup> 600 and 700 series developers are high purity, high performance formulations of industry standard 0.261N developer. The series contains a surfactant to aid in surface wetting and provides superior production throughput for sub-0.5  $\mu\text{m}$  technology.
- AZ<sup>®</sup> 900 series developers are high performance formulations of industry standard 0.261N developer. The series contains a surfactant to aid in surface wetting and is excellent for contact hole applications.
- AZ<sup>®</sup> 300 and 400 series developers are high purity, high performance formulations with varying normalities to meet any process requirements. Some products contain surfactants.

## Features

- Excellent resolution and processing latitude
- Excellent batch-to-batch consistency from tight production control specifications
- Available in a variety of concentrations
- Available in a variety of surfactant types and loading to provide ultimate process capability

## Processing

Developers typically have a limited range of useful dilutions. Highly concentrated dilutions have high sensitivity and allow faster photo-speeds, 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 metal-ion-free developers is strongly recommended for production processes. Normality control for these products is exceedingly tight, and the processing temperature should be controlled to  $\pm 1^\circ\text{C}$ .

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.



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## Typical Develop Process

### Spray-Puddle

Wet Wafer in Water Spray	0 - 5 sec, 100 - 200 rpm
Spray Developer	5 - 15 sec, 100 - 200 rpm
Stop Wafer and Continue Spray to Set up Puddle	0 - 2 sec, 0 rpm
Puddle Develop	10 - 30 sec, 0 rpm
Stream on Rinse	5 - 10 sec, 100 rpm
Spin Dry	5 - 10 sec, 4000 rpm

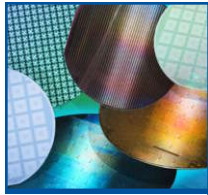
### Spray Only

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 tetramethylammonium 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.

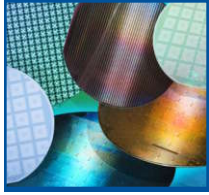


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## Specifications

Developer:	AZ <sup>®</sup> 626 MIF	AZ <sup>®</sup> 726 MIF	AZ <sup>®</sup> 917 MIF	AZ <sup>®</sup> 25% Aqueous TMAH	AZ <sup>®</sup> 422 MIF
Normality (N)	0.2610 ± 0.0005	0.2610 ± 0.0005	0.2610 ± 0.0005		0.215 ± 0.004
TMAH (%)				25.00 ± 0.10	
Carbonate (ppm)	80 max.	80 max.	80 max.	60 max.	
Chloride (ppb)	100 max.	100 max.	100 max.	100 max.	
LPC at 0.2 μm (#/ml)	50 max.	50 max.	50 max.		
LPC at 0.5 μm (#/ml)	200 max.	200 max.	200 max.	100 max.	100 max.
Trace Metals (ppb)					
Al	2.0 max.	2.0 max.	5.0 max.	2.0 max.	
Cd	2.0 max.	2.0 max.	5.0 max.		
Ca	2.0 max.	2.0 max.	5.0 max.	2.0 max.	
Cr				2.0 max.	
Cu	2.0 max.	2.0 max.	5.0 max.	2.0 max.	
Fe	2.0 max.	2.0 max.	5.0 max.	2.0 max.	100 max.
Pb	2.0 max.	2.0 max.	5.0 max.	2.0 max.	
Li	2.0 max.	2.0 max.	5.0 max.		
Mg	2.0 max.	2.0 max.	5.0 max.	2.0 max.	
Mn	2.0 max.	2.0 max.	5.0 max.	2.0 max.	
Ni	2.0 max.	2.0 max.	5.0 max.	2.0 max.	
K	2.0 max.	2.0 max.	20.0 max.	2.0 max.	100 max.
Ag	2.0 max.	2.0 max.	5.0 max.	2.0 max.	
Na	2.0 max.	2.0 max.	5.0 max.	2.0 max.	100 max.
Zn	2.0 max.	2.0 max.	5.0 max.	2.0 max.	
Shelf Life	18 months	18 months	18 months	18 months	18 months

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



# AZ<sup>®</sup> Organic Developers

## Equipment Compatibility

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All AZ<sup>®</sup> metal-ion-free developers are compatible with all commercially available wafer and photomask processing equipment. Recommended materials of construction include stainless steel, PTFE, polypropylene, and high density polyethylene.

## Storage

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

## Handling Precautions/First Aid

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



**AZ Electronic Materials**

[www.az-em.com](http://www.az-em.com)

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