

Technical datasheet

AZ[®] Inorganic Developers

Sodium and Potassium Based Photoresist Developers

APPLICATION

AZ[®] inorganic developers are high contrast, ultra-high purity Sodium and Potassium based photoresist developers formulated for a wide range of lithography applications.

- Available buffered versions provide pH stability for extended bath life in batch applications
- Industry leading normality control
- Wide range of normalities available including concentrates for blending custom dilutions
- High purity, low particulate formulations
- Multiple bulk and non-bulk packaging options

PROCESSING

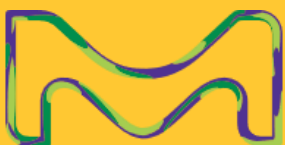
General Processing Guidelines

AZ inorganic developers should be used at room temperature in puddle, spray, or batch immersion processing mode. Variations in develop time, developer temperature, and substrate temperature will result in inconsistent develop uniformity and will affect process repeatability/reproducibility. It is important to monitor and control these variables.

When processed in batch immersion mode, developer bath life will be limited by the volume of dissolved photoresist in solution and by carbonate uptake from the fab environment. Bath change out frequency should be specified by the number of substrates processed and by elapsed time since the last bath change. The maximum number of substrates that may be processed through a given bath will depend upon the photoresist thickness, the % of substrate surface covered, and the volume of the developer tank.

When not in use, developer tanks should be covered to minimize evaporation and the rate of carbonate uptake. Inert gas blankets (dry N₂ for example) may also be used to isolate developer tanks from the fab environment. In general, immersion tanks should be changed at least every 24 hours (or sooner if the maximum number of substrates processed is reached).

Always quench and rinse inorganic developers using DI water.



PROCESSING

Bath Agitation

Mild agitation of immersion developer tanks may improve wafer-to-wafer develop uniformity and photo speed when batch processing substrates.

Spray Developing

Due to their low foaming propensity, AZ inorganic developers are especially well suited for spray processing. Agitation, develop uniformity, and constant refresh provided by spraying can significantly improve CD uniformity and develop time in thick DNQ type photoresists typically used in MEMs or plating applications. Spray may also be combined with puddling on develop track equipment to reduce chemical usage.

INORGANIC DEVELOPERS APPLICATIONS GUIDE

AZ Developer

AZ Developer is a buffered sodium based developer that provides extended bath life in batch immersion applications and very high contrast when used with AZ 1500, AZ 3300, and many other positive tone DNQ type photoresists. AZ Developer is available as a concentrate for custom diluting with DI water or pre-diluted 1:1 for use directly from the bottle. Unlike organic developers and most other inorganic developers, AZ Developer will not etch Aluminum substrates.

AZ 400K Developer

AZ 400K Developers are buffered potassium based developers that provide extended bath life in batch immersion applications and low foaming with no nozzle residue accumulation in spray develop processes. AZ 400K Developers are available in multiple dilutions for balancing contrast and develop rate across a wide range of photoresist thicknesses. Available dilutions include:

AZ 400K 1:4

A high contrast, medium photo-speed dilution recommended for AZ P4000 and AZ 10XT film thicknesses of 7.0 μ m and below. Compatible with most DNQ type photoresists.

AZ 400K 1:3

A reduced contrast, high photo-speed dilution recommended for AZ P4000, AZ 10XT, or AZ 50XT photoresist films above 7.0 μ m thick. Compatible with most thick DNQ type photoresists.

AZ 400K Developer Concentrate

For fine tuning of process control via blending of custom dilutions. On site dilution also minimizes chemical cost in bulk or lab scale processing environments.



INORGANIC DEVELOPERS APPLICATIONS GUIDE

AZ 421K Developer

AZ 421K Developer is a high speed unbuffered potassium based developer recommended for ultra thick DNQ photoresist films when reduced develop time and chemical usage are desirable. AZ 421K provides very good contrast and throughput for thick AZ P4000, AZ 10XT, or AZ 50XT photoresist films (above 10 μ m) and may also be diluted for custom develop rates on thinner photoresist films. AZ 421K is compatible with most thick DNQ type photoresists.

AZ 340 Developer

AZ 340 Developer is a high normality sodium based developer concentrate for use in on-site custom dilution applications. This developer concentrate is buffered for extended bath life and stable develop rates in batch processes. Dilute using 1 part AZ 340 to 4 parts DI water for high contrast processing. Developer normality (and develop rate) may be increased as required by increasing the AZ 340 to water ratio. Note: this developer concentrate was formerly "AZ 351 Developer".

CAUTIONARY PROCESSING NOTE:

Cross contaminating inorganic developer baths or dispense lines with tetramethylammonium hydroxide (TMAH) based metal ion free developers, even at parts per million levels, will seriously degrade or completely neutralize the dissolution performance of the inorganic developer. Use extreme caution when converting developer equipment or vessels from a TMAH based developer to an inorganic process and always keep the developer types segregated when both are present in same processing environment.



PRODUCTS AND SPECIFICATIONS FOR AZ DEVELOPER SERIES

	AZ Developer (conc.)	AZ Developer 1:1
Normality (R1)	0.460 ±0.010	0.230 ±0.005
Normality (R2)	0.600 ±0.005	0.3000 ±0.0025
Buffered	Yes	Yes
Shelf Life	18 Months	18 Months

PRODUCTS AND SPECIFICATIONS FOR AZ 400K SERIES

	AZ 400K (conc.)	AZ 400K 1:3	AZ 400K 1:4
Normality (R1)	0.482 ±0.005	0.120 ±0.001	0.0960 ±0.0005
Normality (R2)	1.390 ±0.005	0.348 ±0.001	0.2780 ±0.0005
Buffered	Yes	Yes	Yes
Shelf Life	18 Months	18 Months	18 Months

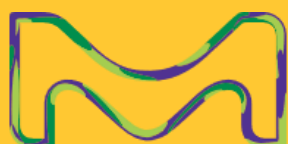
PRODUCTS AND SPECIFICATIONS FOR AZ 421K AND 340 DEVELOPERS

	421K Developer	AZ 340 Developer
Normality (R1)	0.210 ±0.001	0.480 ±0.005
Normality (R2)	NA	1.390 ±0.007
Buffered	No	Yes
Shelf Life	18 Months	18 Months

PACKAGES AND PART NUMBERS

Description	Package	Part Number
AZ DEVELOPER (5L)	4x5 Liter HDPE Bottles	10054224960
AZ DEVELOPER 1:1 (5L)	4x5 Liter HDPE Bottles	16522224960
AZ DEVELOPER 1:1 (55g)	55 Gallon HDPE Drum (single use*)	16522223179
AZ 400K Conc. (Gallon)	4x1 Gallon HDPE Bottle	18443223163
AZ 400K Conc. (55g)	55 Gallon HDPE Drum (single use*)	18443223179
AZ 400K 1:3 (Gallon)	4x1 Gallon HDPE Bottle	18443323163
AZ 400K 1:3 (55g)	55 Gallon HDPE Drum (single use*)	18443323179
AZ 400K 1:4 (Gallon)	4x1 Gallon HDPE Bottle	10063823163
AZ 400K 1:4 (55g)	55 Gallon HDPE Drum (single use*)	10063823179
AZ 421K (Gallon)	4x1 Gallon HDPE Bottle	18443623163
AZ 421K (55g)	55 Gallon HDPE Drum (single use*)	18443623174
AZ 340 DEVELOPER (5L)	4x5 Liter HDPE Bottles	10054324960

* Contact your product representative for information on returnable and bulk container options.



MATERIALS COMPATIBILITY AND HANDLING

Sodium and potassium containing photoresist developers are compatible with all standard semiconductor processing equipment designed to handle high pH aqueous solutions. Recommended wetted materials of construction include stainless steel, glass, quartz, PTFE, PFA, polypropylene, and HDPE.

Recommended personal protective gear during handling includes eye protection, apron, caustic resistant gloves. Refer to the current version of the SDS for information on exposure hazards.

DISPOSAL

AZ Inorganic Developers are compatible with typical facility acid/base drain lines and materials. For disposal other than via facility solvent drains, refer to the current product SDS and to local regulations.

www.merckgroup.com

Disclaimer

Products are warranted to meet the specifications set forth on their label/packaging and/or certificate of analysis at the time of shipment or for the expressly stated duration. MERCK MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE REGARDING OUR PRODUCTS OR ANY INFORMATION PROVIDED IN CONNECTION THEREWITH. Customer is responsible for and must independently determine suitability of Merck's products for customer's products, intended use and processes, including the non-infringement of any third parties' intellectual property rights. Merck shall not in any event be liable for incidental, consequential, indirect, exemplary or special damages of any kind resulting from any use or failure of the products: All sales are subject to Merck's complete Terms and Conditions of Sale. Prices are subject to change without notice. Merck reserves the right to discontinue products without prior notice.

The information on our trademarks is available in the Trademarks section on www.merckgroup.com. Detailed information on our trademarks is also available via publicly accessible resources. All other trademarks are the property of their respective owners.

© 2021 Merck KGaA, Darmstadt, Germany and/or its affiliates.

