Nisene Technology Group

formerly B&I International

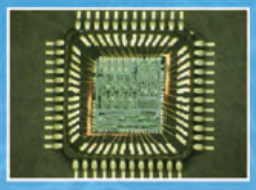
WORLD LEADERS FOR OVER 30 YEARS

JetEtch Pro

QUALITY

RELIABILITY

INNOVATION



SUPPORT

Thousands of Systems in Use Worldwide

Nisene Technology Group

More than 30 years ago, Nisene Technology Group, previously known as B & G International, revolutionized failure analysis with the introduction of the first automated acid decapsulator, the JetEtch. This pioneering project was developed in partnership with Dr. Ben Wensink, the inventor and patent holder for the process of automated acid decapsulation.

As IC packages increased in complexity and variety over the years, the JetEtch evolved to meet the changes at every step of the way with innovative decapsulator designs. Nisene Technology Group decapsulators have always met the challenging requirements of the day for applications in many industries, including semiconductor failure analysis and integrated circuit verification.

Nisene decapsulators can be found in the labs of the world's leading semiconductor manufacturers — from Intel to AMD and Micron to Xilinx — as well as in most government-run failure analysis campuses, where IC functionality and performance is imperative and decapsulation technology is of paramount interest, such as the Department of Defense, Lockheed, and Sandia. We've also established a rapport with all of the largest chip distributors, including Smith & Associates, SMT Corporation, and North Shore Components. Nisene has a strong presence worldwide as well, with Europe and Asia being among our most valued and well-supported distribution markets. Multinational corporations such as Sony, NXP, Samsung, Infineon Technologies, and ST Microelectronics are just a few examples of global companies using our equipment.

Building on this rich history, Nisene Technology Group is proud to introduce our latest revolutionary automated acid decapsulator — the JetEtch Pro Decapsulation System.

Our new JetEtch Pro and JetEtch Pro CuPROTECT exemplify our ongoing commitment to providing technically superior products for the semiconductor failure analysis and integrated circuit distribution industries. They continue Nisene Technology Group's tradition of providing innovative, high-quality products to address the needs of industry professionals, both now and into the future.

A Revolution in Automated Acid Decapsulation

JetEtch Pro Highlights

Leading the Industry in Safety

- **Unique Waste Diversion System** — Waste acid is disposed into separate bottles via a unique diversion system that minimizes user interaction with acids.
- **Robust Cover Arm Assembly** — The automatic, pneumatically controlled cover assembly ensures that the process chamber remains hermetically sealed for the entire etch cycle. This is far superior to less sophisticated, manually operated lid covers, which can be opened at any time during the etch process, exposing the user to dangerous hot etchant.

Faster Etch Processing Times

- Large inner-diameter tubing increases acid flow, for faster etches.
- New pump design offers a greater range of flow rates.

Flexible Etch Head Designs

- **Fixed Etch Head** — Made of silicon carbide, our unique Etch Head assembly ensures faster etch times, greater resistance to acids, and less maintenance.
- **Removable Etch Head Configuration** — We offer an optional, removable Etch Head configuration that enables the use of several different inserts, ensuring that even the most challenging packages can be opened.

Superior Pump Longevity

- Our patented micrometering pump is the gold standard in acid delivery and longevity. It is backed by a five-year, no-questions-asked guarantee.

The Most Effective Software on the Market

- The JetEtch Pro can permanently store up to 100 etch programs for fast recall.
- The software is also able to mix up to 13 different acid ratios, with no direct operator contact.
- Combined with a choice of nitric *or* sulfuric acid post-decapsulation rinse, etch intervals in one-second increments from 1 second to 1800 seconds, and a temperature range from 20°C to 250°C — the number of decapsulation programs available is in the millions.

The progress toward more complex package designs — combined with the rapid evolution of copper technology and novel alloy materials for wires and bonding — places greater demands on decapsulators today. To meet these challenges, Nisene Technology Group is proud to introduce our latest innovation for automated acid decapsulation: the JetEtch Pro.

The JetEtch Pro has a smaller, more compact design than earlier DCap d2-i and JetEtch models, while the hardware, operating system and software have been completely redesigned to bring you the most flexible and sophisticated decapsulator ever developed.

The JetEtch Pro is easy to operate. Intuitive software directs the operator step-by-step through the simple programming sequence. Once set, the software enables an entire etching program to be completed with only two keystrokes.

In addition, the JetEtch Pro delivers unsurpassed results by providing unique and precise software control of all aspects of the decapsulation process.

Flexibility, Ease of Use, and Control

Sophisticated Software

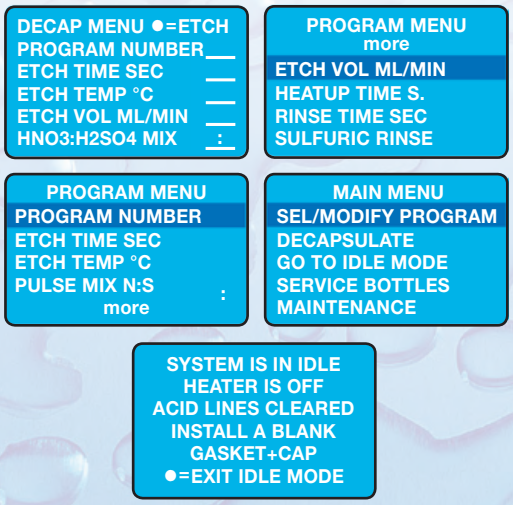
The JetEtch Pro is fully programmable and capable of storing up to 100 etch programs for different package types. Each of these programs is hard-written into the EEPROM's nonvolatile memory, meaning that once the programs are saved, they are permanent and cannot be erased. Because all software is compiled in C, the JetEtch Pro offers unrivaled accuracy and performance.

The software provides 13 possible mixed-acid ratios and three user-selectable post-etch rinse options. To allow maximum process control and flexibility, the etch time is adjustable in one-second increments, from as short as one second to as long as 1800 seconds.

To support the highest possible throughput and efficiency, heat-up time is completely optional in the JetEtch Pro. Instead of waiting 60 seconds or more for a part to heat up, the etch cycle can start as soon as the process cover is closed, saving valuable time in many applications.

Software functionality can be extended to allow interface to a PC (Windows 98, 2000, XP). This option allows data logging of all decapsulator functions.

The bright, six-line, alphanumeric display ensures excellent visibility under all fume-hood illumination conditions. The display's combination of blue backlit LCD screen with white text has proven to be easiest to read and legible in the widest variety of conditions.

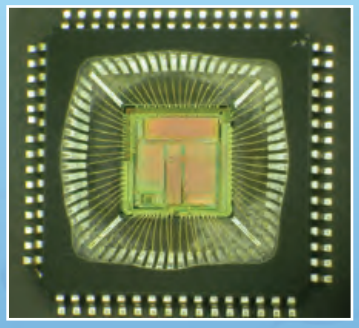


Just a few of the JetEtch Pro operation screens

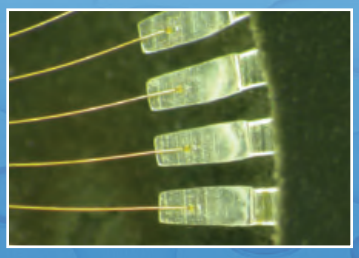
Precise Temperature Control

Even a small change in etch temperature can mean the difference between a controlled etch process and a disruption of critical structures. The JetEtch Pro maintains a stable temperature within ±1°C of the programmed temperature in any circumstance, regardless of the package dimensions or the acid volume selected. The advanced software ensures the JetEtch Pro will never allow a user to begin an etch cycle if the system has not reached the proper temperature. This safety feature is unique in the industry.

Extreme temperature stability is achieved with full proportional-integral-derivative (PID) implementation, including autocalibration subroutines that are built in. The software also includes secondary over-temperature control to prevent system overheating, in compliance with SEMI S-2 standards.



64-lead TQFP sample showing complete second bond exposure with aluminum stitch bonds



64-lead TQFP sample: aluminum second bonds shown at higher magnification

Process conditions:

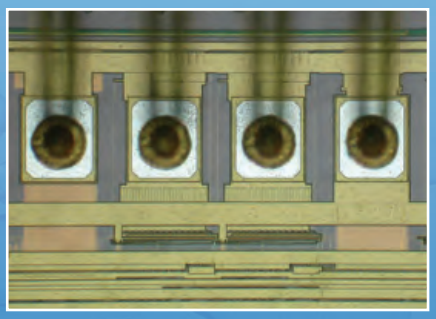
- 5:1 (nitric:sulfuric) mixed acid at 67°C for 40 seconds
- 18-second post-decapsulation nitric rinse cycle
- A Monolithic Gasket is recommended for this application

Excellent Results with Single-Acid Etchants

Sulfuric Acid

The JetEtch can be operated using either concentrated or fuming sulfuric acid. Fuming sulfuric acid is concentrated acid into which SO_3 (oleum) has been dissolved, typically to a concentration of 20 or 30%. At temperatures above 150°C, when oleum vapor is evolved from solution, plastic encapsulants are rapidly removed with minimal metal etching.

Large BGA package after decapsulation with high-temperature sulfuric acid



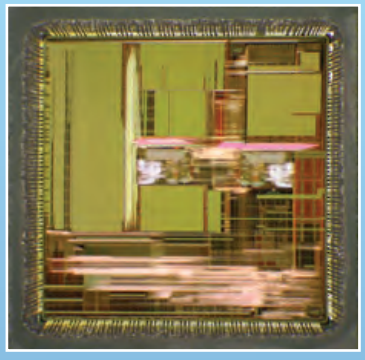
High-magnification on bond pads of the same BGA sample

Sulfuric Acid Process

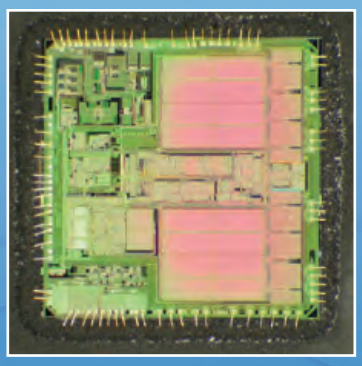
- Process Conditions:
- Fuming sulfuric acid at 250°C for 75 seconds
- 5-second post-decapsulation rinse cycle
- A standard Alignment Plate and Definition Gasket are recommended for this application

Nitric Acid

Fuming nitric acid is a complex solution containing a number of reactive ions and compounds, with dinitrogen trioxide (N_2O_3) and the NO_3 anion being the most prevalent. At temperatures up to 90°C, nitric acid can be used to etch many of today's packages.



Chip-scale package etched with nitric acid only



Chip-scale package etched with nitric acid only

Nitric Acid Process

Process conditions:

- Fuming nitric acid at 85°C for 42 seconds
- 15-second post-decapsulation rinse cycle
- A Monolithic Gasket is recommended for this application

Unparalleled Mixed-Acid Etchant Capabilities

Mixed Acid

Package design rules frequently require the use of mixed etchants. A single acid may not produce the best decapsulation results. Today's packages, particularly those constructed with copper bus structures and bond wires, require exact mix ratios for precise and reproducible package opening, not only to preserve structural components but also to maintain electrical functionality. Green packaging materials also require special consideration as to the optimum etchant mixtures to be used.

The JetEtch Pro provides comprehensive capabilities for mixed-acid etchants. The system's unique software and hardware enable a user to program a wide variety of etch parameters using any combination of ratios from 1:0 to 1:6, in both nitric-to-sulfuric and sulfuric-to-nitric concentrations. The temperature is regulated to prevent any mixed-acid etchant from exceeding 100°C, to ensure that the nitric acid will not steam or boil.

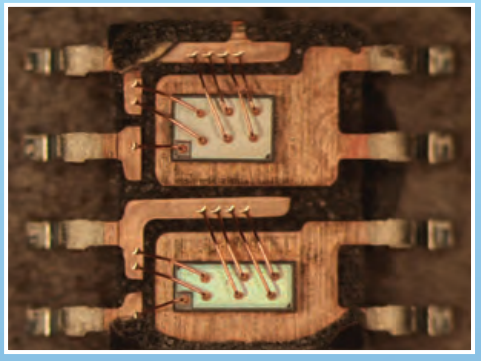
The JetEtch Pro dual-acid system offers the widest range of on-demand mix ratios in the industry. The user simply inputs the desired mix ratio. The correct volumes of each acid are mixed in real time and then automatically passed to the Etch Head through the Heat Exchanger.

The chart below shows the complete breakdown of mixed acid ratios.

Fuming Nitric Acid	Fuming Sulfuric Acid	Fuming Sulfuric Acid	Fuming Nitric Acid
1 part (100%)	0 parts (0%)	1 part (100%)	0 parts (0%)
6 parts (86%)	1 part (14%)	6 parts (86%)	1 part (14%)
5 parts (83%)	1 part (17%)	5 parts (83%)	1 part (17%)
4 parts (80%)	1 part (20%)	4 parts (80%)	1 part (20%)
3 parts (75%)	1 part (25%)	3 parts (75%)	1 part (25%)
2 parts (67%)	1 part (33%)	2 parts (67%)	1 part (33%)
1 part (50%)	1 part (50%)	1 part (50%)	1 part (50%)
0 parts (0%)	1 part (100%)	0 parts (0%)	1 part (100%)

Rinse Acid Options

Optimal package opening demands a wide range of mix and post-etch rinse options. After plastic removal, the user can select an appropriate rinse option—nitric acid, sulfuric acid or no rinse. The JetEtch Pro's intelligently programmed software ensures that any etch recipe with a temperature greater than 100°C uses a sulfuric rinse or no rinse at all.



SOIC-8 sample with copper wires, etched with mixed-acid ratio; also showing complete second bond

SOIC-8 sample with copper wires, showing complete integrity of wire bonds after decapsulation

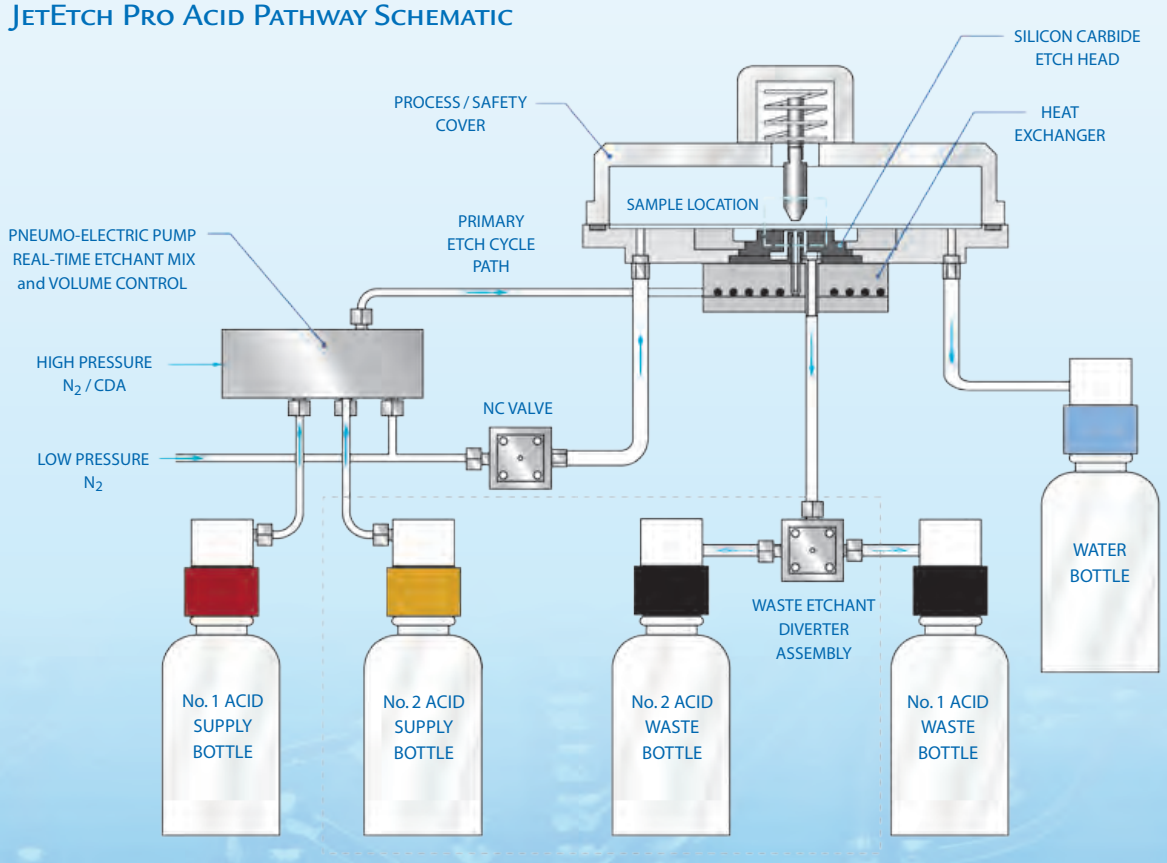
Copper Bond Wires Package

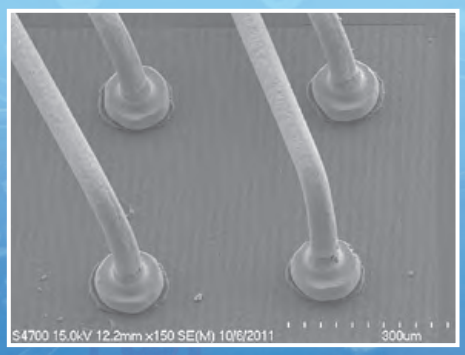
Please contact us if you are interested in seeing our proprietary specifications for this process.

"Nisene's JetEtch was added to our lab and ever since it has been the favorite method of chip decapsulation. The simple yet complete interface, quick start-up and processing time, and ease of break-down and maintenance are all reasons why we love our unit and prefer it over manual or mechanical methods of die exposure."
— G. W. Christian Adams, M.S. Chemist, Lockheed Martin Missiles and Fire Control

Ensuring Accuracy & Reproducibility

JetEtch Pro Acid Pathway Schematic





Copper Bond Wires Package

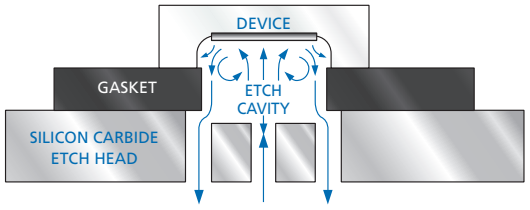
Please contact us if you are interested in seeing our proprietary specifications for this process.

Multi-chip Module

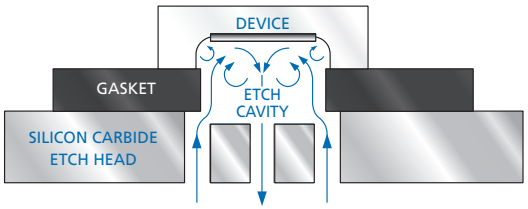
Process conditions:

- 4:1 nitric:sulfuric acid mix at 90°C for 35 seconds
- 12-second post-decapsulation rinse cycle
- A Monolithic Gasket is recommended for this application

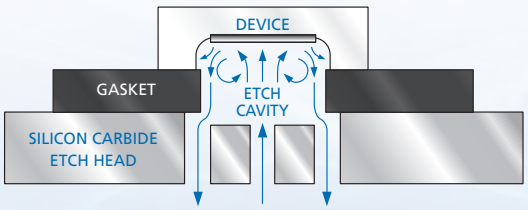
Etchant Flow Options for Optimal Cavities



Vortex Etch — *Primary etchant flow produces symmetrically distributed microvortex eddy currents propagating outwards from the device center.*



Vortex Etch — *Secondary etchant flow produces opposite microvortex etch currents to etch crevices remaining from primary flow distribution paths.*



Pulse Etch — *Using greater acid flow rates than Vortex Etch, Pulse Etch produces an etch cavity with more curved side walls and is ideal for opening large cavities and for exposing second bonds, for example.*

"My extensive research for the best equipment available to do decapsulation of electronic components led me to the Nisene Technology Group time and again. Nisene's fully automated JetEtch system was exactly what SMT's Quality Control department was looking for in a safe, easy to use and self-contained unit. This equipment allows us to quickly and cleanly expose the die for absolute component verification."

— Tom Sharpe, Vice President
SMT Corporation

Vortex Etch

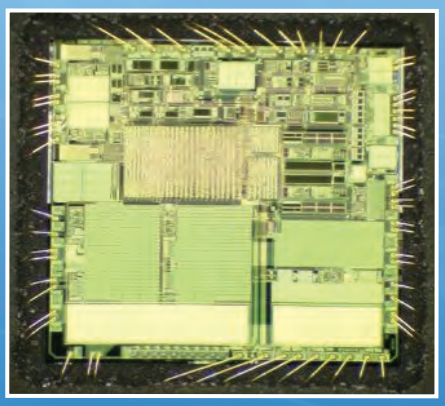
Vortex Etch produces an etch cavity with extremely straight sidewalls when used with lower-temperature nitric or mixed-acid ratios. The straight sidewalls result from the bidirectional acid flow combined with the abrasive action of nonsoluble encapsulant filler that is released from the plastic polymer as the encap is dissolved. Vortex Etch is the preferred method for the precise opening of small cavities when using either nitric or concentrated sulfuric acid.

Pulse Etch

Pulse Etch generally uses greater acid flow rates than Vortex Etch. The end result is an etch cavity with a more curved sidewall. Typically, Pulse Etch is ideal for opening large cavities. This is often the preferred method for exposing second bonds when etching ICs that do not have chip-scale configuration.

JetEtch Pro Minimal Etchant Use

The JetEtch Pro is designed to minimize acid use. Acid volume is software selectable from 1–10 mL/minute. Our efficient design means that whether using Vortex or Pulse Etch mode, opening any package never requires etchant flow rates greater than 1–10 mL/minute.



Chip-Scale Package

Process conditions:

- 3:1 nitric:sulfuric acid mix at 90°C for 85 seconds
- 12-second post-decap rinse cycle
- A Monolithic Gasket is recommended for this application

Superior Etch Consistencies and Process Time

Etch Head Assemblies

The JetEtch Pro Etch Head Assembly can be supplied with a standard fixed Etch Head or with an optional removable Etch Head insert. Removable Etch Head inserts offer the ability to select specific etchant dispersion patterns for large or complex packages, such as large QFP or extra-long TSSOP devices.

Three basic removable Etch Head inserts are available: the standard slot design, long slot design and the Quadraport, a multiple-hole design. Additional custom configurations are available to accommodate your specific decapsulation needs.

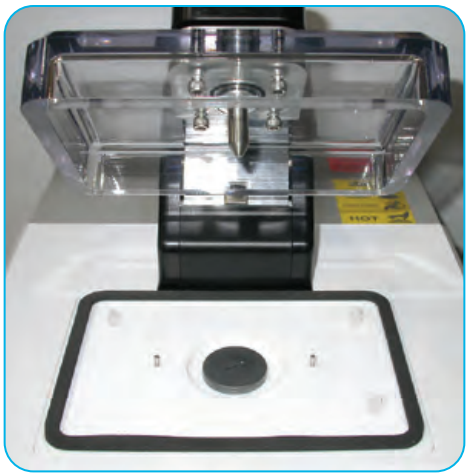
Heat Exchanger

The Heat Exchanger employs 4-millimeter Teflon tubing, which significantly reduces the possibility of clogging and eases the flow of acids to and from the Heat Exchanger. The Heat Exchanger chassis, now constructed completely of silicon carbide, allows for a more continuous heat transfer from the Etch Head to the decapsulating package.

This enhancement is especially helpful when etching with high-temperature sulfuric, whose chemically caustic properties increase exponentially with temperature. Due to the increased contiguity between the components of the Etch Head assembly with the new fixed Etch Head design, this is no longer a problem. The fixed Etch Head assembly significantly improves etch consistency and process time, more efficiently using the acid supply.

In addition, the advanced Heat Exchanger design on the JetEtch Pro features precisely located heaters, providing a temperature ramp-up from ambient to 250°C that is over 50 percent faster than competing systems.

The precise heater placement enables more stable temperature control than ever before. Especially at higher etch temperatures, less-sophisticated equipment cannot maintain a continuous temperature at the etch head. The JetEtch Pro solves this issue, with its Advanced Control of Temperature In Varying Etches — or ACTIVE™ — system, the industry-leading system for temperature monitoring and control.



Standard fixed Etch Head Assembly

Optional removable Etch Head Assembly, showing silicon carbide etch insert adapter and removable Etch Head inserts

"North Shore Components recently purchased the JetEtch automated acid decapsulator, which significantly enhances our counterfeit component detection capabilities. We have found your system and your software to be easy to use and highly intuitive, and the service and support behind this product has been outstanding.

We highly recommend the Nisene JetEtch automated acid decapsulator to anyone looking to prevent counterfeit components from entering the supply chain."

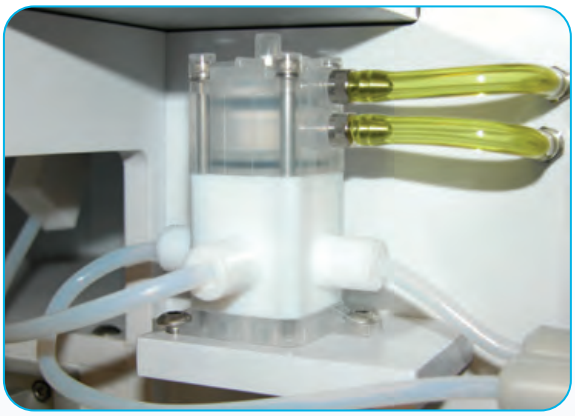
— Joseph Ruggiero, Vice President
North Shore Components, Inc.

Components Designed for Efficiency and Durability

Cover Arm Assembly

The JetEtch Pro incorporates a redesigned, robust cover arm assembly. This innovative cover arm is made from a black anodized alloy, whose physical properties greatly reduce the likelihood of set-screw back-out.

Competing models use polyvinyl chloride (PVC), which is susceptible to wear. Over time, this leads to a less-than-perfect seal between the safety cover and the etch plate, because the set screws are likely to back out as a result of the constant opening and closing of the safety cover.



The JetEtch Waste Diverter minimizes acid leaks and increases the longevity of the system's internal parts.

JetEtch Pro Safety Cover Purging

Nitrogen (or clean dry air, depending on your facility) is used to purge the safety cover. This cover is lightly pressurized with a continuous gas stream to eliminate water vapor and oxygen in the vicinity of the Etch Head.

Nitrogen flow is high when the cover first closes, but then it reduces to maintain a slight positive pressure until the programmed etching and rinse sequence is completed.

At the completion of the etch program, the acid pathways of the JetEtch Pro are purged with nitrogen gas to remove all residual acid. To save cost, nitrogen is not consumed when the system is in idle mode.

JetEtch Pro SmartWare Valving

When using a mixed-acid etch, the SmartWare waste diverter valve ensures that a mixed acid is automatically and safely routed to the appropriate waste bottle.

The JetEtch Pro allows the operator to select rinse parameters after the primary etch cycle. If a rinse cycle is selected, the SmartWare valve automatically routes the rinse acid to the appropriate waste bottle.

Less sophisticated designs require the operator to change waste bottles when different etch-specific acid supplies are used.

Waste Diverter

The JetEtch Pro's waste diverter has an all-Teflon valve. This significantly minimizes acid leaks, reducing the possibility of acid fumes inside the system—thereby increasing the longevity of the system's internal parts.

JetEtch Pro Pneumo-Electric Pump

The JetEtch Pro Pneumo-Electric Pump (Patent No. US 6,350,110 B1) is a multiport programmable metering pump. It is warranted for five years from date of shipment or 250 litres—whichever comes first.

All internal wettable surfaces are manufactured from fluorinated polymers that offer the highest corrosion resistivity available.

The pump design incorporates real-time acid mixing, eliminating the need for an etchant-mixing reservoir.

A hermetically sealed bulkhead isolates the pump's electrical components from the fluid-handling compartment of the decapsulator. The upgraded micrometering pump has new robust springs and improved piston design for increased longevity. Nisene offers a five-year, no-questions-asked replacement policy on all of its micrometering pumps.

To address the wide range of contemporary plastic package designs, the pump is software-controlled to deliver etchant flow from 1–6 mL per minute using either Vortex or Pulsed mode.

Bottle Box Assembly

The JetEtch Pro incorporates a bottle box assembly that houses two acid-supply bottles and two waste-acid bottles. In compliance with SEMI safety standards, the bottle box volume is sufficient to contain 110 percent of the total, including the bottle capacity.

Selecting an etchant from the front panel triggers the pneumatically controlled waste diverter valve to select the correct waste bottle for post-decap acid. Unlike other systems, the operator does not need to switch waste bottles manually when replacing acids, minimizing operator contact with the acid bottles.

The standard bottle size is 500 mL.*

The 500-mL bottle caps are designed to prevent acid dripping and splashing. As shown in the photo below, the bottle caps are an integral part of the secondary containment system.

Acid delivery is via a siphon tube that is not connected to the bottle cap. This ensures that there is no chance of splashing or dripping.

Bottle changing is both easy and safe. To replace a bottle, the operator simply unscrews the bottle cap and tilts it out of the way, places the siphon tube into a fresh supply bottle of acid, places the bottle in the containment unit, flips down the cap, and tightens it.

Bottle cap detail showing cap assembly integral to bottle box containment unit.

JetEtch Pro bottle box assembly

Dual Acid Waste Bottle Setup

Nisene Technology Group's knowledge and understanding of safety of wet chemical decapsulation is the foundation of the JetEtch Pro's unparalleled safety features. The dual acid waste bottle exemplifies this. The JetEtch Pro employs the safest method of acid waste delivery available on the market with its dual acid setup. In conjunction with its waster diverter system, never again will you have to worry about the mixing of hazardous and incompatible acids.

Pneumatically Controlled Cover Arm

The JetEtch Pro's process cover is kept closed during the etch process by pressurized nitrogen or clean dry air (user's choice). Manual cover arm closures are dangerous and unreliable, because they can open during the etch cycle — while the acid is still pumping! The pneumatically controlled process-cover closure operation on the JetEtch Pro is a testament to Nisene Technology Group's concern for operator safety and system reliability.

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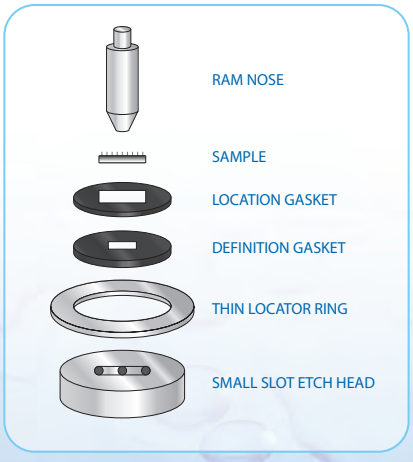
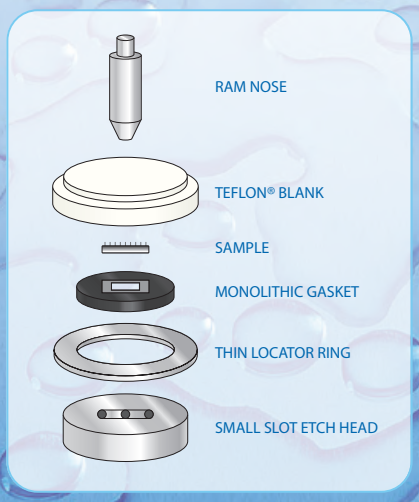
* The JetEtch Pro can also be supplied with an optional 1,000-mL bottle size (using Merck standard bottle cap configurations).

Large Selection of Accessory Kits

Three from our large selection of standard Accessory Kits.



Definition/Location Gasket stack-up



Monolithic Gasket stack-up

Gaskets and Alignment Plates

Nisene Technology Group offers a wide range of standard Accessory Kits, typically consisting of gaskets and Alignment Plates, that meet the requirements for the accurate and reproducible decapsulation of most common plastic IC packages.

Our Definition and Location Gaskets are manufactured by laser fabrication from a proprietary formulation of a fluoro-elastomer that is highly resistant to hot acid exposure. Like the Heat Exchanger and similar components, our Definition and Location Gaskets are created using fluorinated polymers offering the highest acid and temperature resistivity available.

Depending on the application, a Location Gasket is used to locate the region of interest accurately on the Etch Head, while a Definition Gasket is used to define the region of the package that will be exposed to acid etching. These gaskets can be fixed using vacuum grease (supplied with every JetEtch Pro) to create a semipermanent bond and ensure proper fixture alignment. The gaskets can be separated and cleaned after the etch process. They can be used hundreds of times if maintained properly.

During the etch process, the gaskets are contained within an alloy Locator Ring that ensures concentric positioning relative to the Etch Head and to the die location within the package. The illustrations at the left show a typical Definition/Location Gasket stack-up (exploded view) and a typical Monolithic stack-up (exploded view).

Accessory Kits Include:

Basic Kit - supplied with each JetEtch Pro Decapsulator

Die-down BGA Kit

DIP/SIP Kit

PBGA Kit

PLCC Kit

QFP Kit

QFN/MLP Kit

SOIC Kit

Universal Accessory Kit

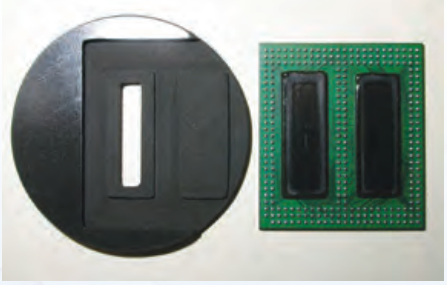
Custom Gaskets for Unique Requirements

Monolithic Gaskets

Nisene Technology Group offers comprehensive design and fabrication services for the manufacture of custom Monolithic Gaskets. These gaskets are manufactured from a single piece of a proprietary formulation fluoroelastomer. They replace the typical Location/Definition Gasket set in a glued-gasket stack-up.

Monolithic Gaskets completely prevent misalignment of a part relative to the decapsulator Etch Head. They are also used when precise openings are required. These Monolithic Gaskets are custom-made for a customer's application by the Nisene Application Group. Any idea that can be conceived for a gasket can be designed and produced as a custom Monolithic Gasket by our highly trained staff. These proprietary designs are not available anywhere else. All Monolithic Gasket designs are saved for easy reordering.

A small selection of custom Monolithic Gaskets from our Decapsulator Application Design Group

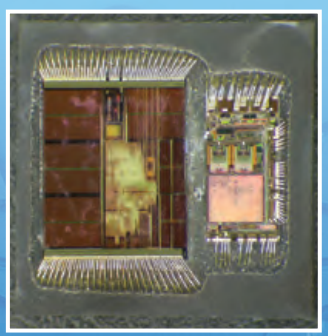


Highly specialized Monolithic Gasket design on left, die-down BGA sample with two die on right—prior to decapsulation of glob 1.

Die-down BGA sample after decapsulation of glob 1.

Die-down BGA sample after rotation and decapsulation of glob 2.

An example of an etch result that can only be attained using the most sophisticated Monolithic Gasket designs. The end-user wanted to see only one die etch at a time in this multi-chip module (MCM).



Another example of an etch result only attainable using the most sophisticated Monolithic Gasket designs. The end-user wanted to see both die in the same etch for this multi-chip module (MCM).

JetEtch Pro Specifications

Dimensions

Etcher unit (mm/in)

290 h x 290 w x 419 d / 11.5 h x 11.5 w x 16.5 d

Bottle container, each unit (mm/in)

230 h x 110 w x 110 d / 9 h x 4.25 w x 4.25 d

Weight (kg/lbs)

17 / 38 (excluding bottle container and accessories)

Power

350 W @ 95 - 130 VAC or 350 W @ 210 - 250 VAC

CDA/N_2 Requirements

CDA	4.2 kg/cm^2 / 60 –100 psi
Nitrogen supply	2.8 lpm / 0.1 cfm

Etchants Available

Etchant volume 1.0 to 10.0 mL/min (software selectable)

- Fuming nitric acid
- Fuming sulfuric acid
- Sulfuric acid (concentrated reagent grade)
- Nitric : sulfuric acid mix 6:1, 5:1, 4:1, 3:1
- Sulfuric : nitric acid mix 6:1, 5:1, 4:1, 3:1

Temperature Ranges

Nitric acid (°C)	20 – 90
Sulfuric acid (°C)	20 – 250
Mixed acids (°C)	20 – 100

(mixed etchant range automatically calibrated to ratio selected)

Etching Time & Modality

(user selectable)

1 – 1800 seconds in 1.0-second increments

Pulse Etch mode, Vortex Etch mode (user selectable)

Program capacity: 100, user-defined, in nonvolatile memory

Specifications are subject to change without notice.

Heat-up Time

(user selectable)

0 – 120 seconds in 1.0-second increments

Rinse Options

Nitric acid, sulfuric acid, no rinse

Reservoirs

500-mL or 1-litre bottles

33/38/40/45-mm cap sizes

4 bottles standard: 2 acid, 2 waste

Certifications

CE certification, SEMI S-2-93, SEMI S-2-2000

Accessories

All JetEtch Pro systems are supplied with a standard basic Accessory Kit. A wide range of Accessory Kits and custom-designed Monolithic Gaskets is available (contact Nisene for details).

Die-down BGA Kit	0300606
DIP/SIP Kit	0300601
PBGA Kit	0300605
PLCC Kit	0300602
QFP Kit	0300604
QFN/MLP Kit	0300609
SOIC Kit	0300603
Universal Accessory Kit	0300612

Warranties

12-month warranty includes all parts and labor. Excludes consumable items.

5-year warranty for micrometering pump assembly.

Installation

Installation in chemical fume hood required. 0.5 meters/sec minimum flow rate (100 surface ft/min)

"A big part of my job is getting integrated circuits open and keeping them functional for failure analysis. The JetEtch decapsulation system (and other models) from Nisene Technology Group has been instrumental in accomplishing this goal for over 20 years. More recently, our goal of keeping functionality after the decapsulation process has become difficult due to Intel's cutting-edge IC technologies. Thanks to Nisene Technology Group's Applications Support division, the etch recipes they've developed makes this goal possible. Nisene Technology Group has a great team of people who are very resourceful, and they're very easy to work with. To the entire Nisene team, I just want to say thank you. You guys are awesome. This is why you are the vendor of choice here at Intel."

— Lori Santiago, Failure Analysis Division, Intel

Comprehensive Support Services

Technical and Applications Support

Nisene Technology Group's ongoing commitment to providing our customers with the finest quality service is our paramount concern. We are continually expanding our service and applications support capabilities to better serve our customer base.

Application support and development functions are centered in our facilities in California. Our Applications Group offers direct support to our customers as well as to our representatives and distributors worldwide. Nisene's Applications Group specializes in product-specific applications—either decapsulation or delayering/deprocessing.

Service support is also based in our California facilities. When a system is in need of service, simply call us at our headquarters and a certified Nisene Technology Group trained service technician will work with you to get your issue resolved. In the event that the system needs professional and up-close inspection, Nisene Technology Group's California facility is fully equipped to service any of our decapsulation systems. Send in your system to us and have it thoroughly inspected within 24 hours.

Sales Support

Further technical and sales service is also available worldwide through our network of representatives and distributors who offer factory authorized service on our products. Nisene's Systems Group offers direct field and factory service as well as providing service support to our representatives and distributors. Because of our extensive network, Nisene Technology Group's equipment can be purchased, serviced, and supported anywhere on the globe.

"Nisene Technology is a company that strives to please their customers by offering well-engineered and reliable products. They provide excellent sales, service, and engineering support and are a pleasure to do business with."

— Dave Kern, FA Analyst
LSI Corporation

Nisene Technology Group

World Leaders for Over 30 Years

Contact Us

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Nisene Technology Group

World Leaders for over 30 Years

JetEtch CuPROTECT

JetEtch CuPROTECT Highlights

Proprietary Cu Decapsulation Process

- Specifically designed for processing integrated circuits with copper wires.
- Targets the removal of a wide variety of mold compounds while maintaining the integrity of sensitive copper wires.
- Etches virtually any package with any wire thickness
- Produces results that facilitate a host of post-decapsulation failure analysis tests.

Innovative Features of JetEtch Pro

- Industry-leading safety features
- Faster etch processing times
- Flexible etch head designs
- Superior pump longevity
- The most effective software in the industry

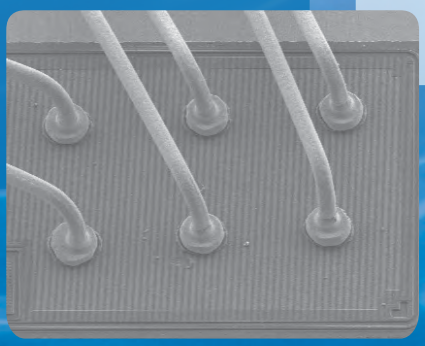
Advanced Decapsulation System

With the price of gold at an all-time high, a current trend in the manufacturing of integrated circuits is the shift from gold to copper bond wires. To support manufacturers in making this shift, Nisene Technology Group has developed a version of its new JetEtch Pro decapsulation system that is specifically designed to handle the processing of sensitive copper wires: the JetEtch CuPROTECT — the latest in a series of innovative solutions for the failure analysis industry from Nisene.

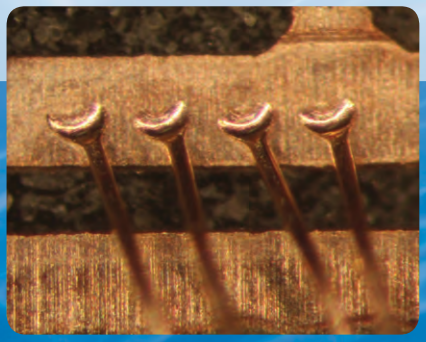
The JetEtch CuPROTECT is the world's most advanced decapsulation system. Employing a proprietary electrolysis process,* its operation is similar to that of Nisene's industry-leading JetEtch products. It retains the intuitive user interface, premier etching capabilities, and robust safety features you've come to expect from Nisene Technology Group equipment. In addition the JetEtch CuPROTECT incorporates a unique decapsulation process that specifically targets the removal of a wide variety of mold compounds while protecting and maintaining the integrity of sensitive copper wires.

Unlike less-sophisticated decapsulation systems that cannot etch integrated circuits with copper wires while maintaining their electrical integrity, the JetEtch Pro CuPROTECT can etch virtually any package, with any wire thickness, and yield results that facilitate a host of post-decapsulation failure analysis tests — from bond pull testing to electrical conductivity and resistance.

** patent pending*



SEM image showing preserved copper wires



Complete copper wire bond exposure

JetEtch CuProtect Specifications

Dimensions

Etcher unit (mm/in)

290 h x 290 w x 419 d / 11.5 h x 11.5 w x 16.5 d

Bottle container, each unit (mm/in)

230 h x 110 w x 110 d / 9 h x 4.25 w x 4.25 d

Weight (kg/lbs)

17 / 38 (excluding bottle container and accessories)

Power

350 W @ 95 - 130 VAC or 350 W @ 210 - 250 VAC

CDA/N_2 Requirements

CDA	4.2 kg/cm^2 / 60 –100 psi
Nitrogen supply	2.8 lpm / 0.1 cfm

Etchants Available

Etchant volume 1.0 to 10.0 mL/min (software selectable)

- Fuming nitric acid
- Fuming sulfuric acid
- Sulfuric acid (concentrated reagent grade)
- Nitric : sulfuric acid mix 6:1, 5:1, 4:1, 3:1
- Sulfuric : nitric acid mix 6:1, 5:1, 4:1, 3:1

Temperature Ranges

Nitric acid (°C)	20 – 90
Sulfuric acid (°C)	20 – 250
Mixed acids (°C)	20 – 100

(mixed etchant range automatically calibrated to ratio selected)

Etching Time & Modality

(user selectable)

1 – 1800 seconds in 1.0-second increments

Pulse Etch mode, Vortex Etch mode (user selectable)

Program capacity: 100, user-defined, in nonvolatile memory

Specifications are subject to change without notice.

Heat-up Time

(user selectable)

0 – 120 seconds in 1.0-second increments

Rinse Options

Nitric acid, sulfuric acid, no rinse

Reservoirs

500-mL or 1-litre bottles

33/38/40/45-mm cap sizes

4 bottles standard: 2 acid, 2 waste

Certifications

CE certification, SEMI S-2-93, SEMI S-2-2000

Accessories

All JetEtch Pro systems are supplied with a standard basic Accessory Kit. A wide range of Accessory Kits and custom-designed Monolithic Gaskets is available (contact Nisene for details).

DIP/SIP Kit	0300601
QFP Kit	0300604
QFN/MLP Kit	0300609
PLCC Kit	0300602
PBGA Kit	0300605
SOIC Kit	0300603
Die-down BGA Kit	0300606
Universal Accessory Kit	0300612

Warranties

12-month warranty includes all parts and labor. Excludes consumable items.

5-year warranty for micrometering pump assembly.

Installation

Installation in chemical fume hood required. 0.5 meters/sec minimum flow rate (100 surface ft/min)

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Nisene Technology Group

World Leaders for over 30 Years

JetEtch TotalPROTECT

JetEtch TotalPROTECT Highlights

- Etches the widest variety of integrated circuits of any system on the market.
- Maintains the integrity of sensitive components.
- Incorporates patented bias voltage application process.
- Allows sub-ambient cooling of the etching acid through special cooling feature.
- Offers tremendous range of etching parameters for virtualy limitless recipe combinations.

Innovative Features of JetEtch Pro

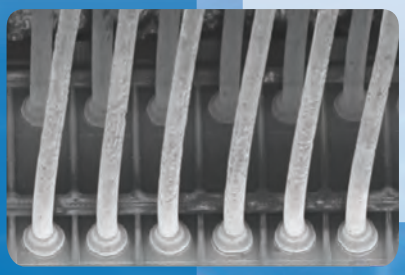
- Industry-leading safety features
- Faster etch processing times
- Flexible etch head designs
- Superior pump longevity
- The most effective software in the industry

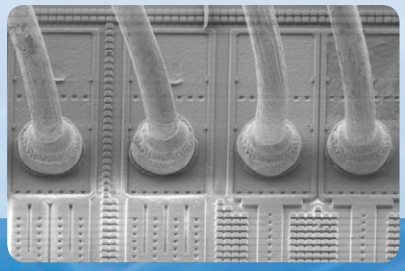
Advanced Decapsulation System

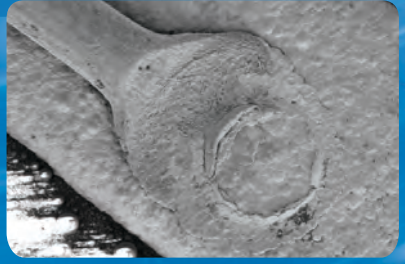
The JetEtch Pro TotalPROTECT is the latest in a series of innovative solutions for the failure analysis industry from Nisene Technology Group.

The JetEtch TotalPROTECT is the world's most advanced decapsulation system. With an unequaled feature set, the JetEtch TotalPROTECT can etch the widest variety of integrated circuits of any system on the market, while maintaining the integrity of sensitive internal components. Its operation is similar to that of Nisene's other industry-leading JetEtch products. It retains the intuitive user interface, premier etching capabilities, and robust safety features you've come to expect from Nisene Technology Group equipment.

In addition, the JetEtch Pro TotalPROTECT incorporates the patented bias voltage application process capability of the JetEtch CuPROTECT. It also has a special cooling feature that allows sub-ambient cooling of the etching acid. When combined with the bias voltage application process, the JetEtch TotalPROTECT offers the end user a tremendous range of etching parameters for virtually endless recipe combinations – making it the total package for total protection of sensitive components.







SEM images showing preserved copper wires

JetEtch TotalProtect Specifications

Dimensions

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Power

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CDA/N_2 Requirements

CDA	4.2 Kg/cm^2 / 60 –100 psi
Nitrogen supply	2.8 lpm / 0.1 cfm

Etchants Available

Etchant volume 1.0 to 10.0 mL/min (software selectable)

- Fuming nitric acid
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- Nitric : sulfuric acid mix 6:1, 5:1, 4:1, 3:1
- Sulfuric : nitric acid mix 6:1, 5:1, 4:1, 3:1

Temperature Ranges

Nitric acid (°C)	10 – 90
Sulfuric acid (°C)	10 – 150
Mixed acids (°C)	10 – 100

(mixed etchant range automatically calibrated to ratio selected)

Etching Time & Modality (user selectable)

1 – 1800 seconds in 1.0-second increments

Pulse Etch mode, Vortex Etch mode (user selectable)

Bias selection: 0.0 – 20 V in 0.1-V increments

Program capacity: 100, user-defined, in nonvolatile memory

Specifications are subject to change without notice.

Heat-up Time

(user selectable)

0 – 120 seconds in 1.0-second increments

Rinse Options

Nitric acid, sulfuric acid, no rinse

Reservoirs

500-mL or 1-litre bottles

33/38/40/45-mm cap sizes

4 bottles standard: 2 acid, 2 waste

Certifications

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