

UpTime Sub-Atmospheric
Delivery Moves the Efficiency
and Productivity of Your Fab
to the Next Level

COST + TECHNOLOGY + SAFETY + QUALITY

FAB FORWARD™



PRAXAIR
Making our planet more productive

COST + TECHNOLOGY + SAFETY + QUALITY

4 KEYS TO MOVING YOUR FAB FORWARD

Praxair, Inc., the maker of *UpTime* delivery systems, has been one of the world's leading gases companies for 100 years. *UpTime* cylinders are a direct result of our expertise in gases and our focus on quality, sustainability and safety.

Factor in Praxair's commitment to innovation and leadership and it's no wonder that the world's most successful companies, in every industry, rely on Praxair as their gases supplier of choice.

When it comes to the keys to moving your Fab Forward, no product delivers like *UpTime* cylinders — and no company provides the confidence and assurance you need like Praxair. We invite you to find out more about *UpTime* technology and the world of Praxair at www.praxair.com/uptime.



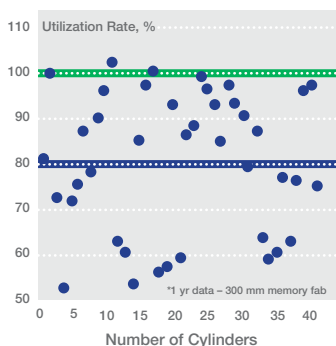
More capacity and the ability to use all you've paid for with *UpTime* cylinders. The result? As much as \$10M in value per year. Something that's not so easy with other technologies.

UpTime cylinders makes it easy to move your Fab Forward because it loads more gas-in-cylinder than any other product on the market. And, when you couple that with *UpTime's* industry leading utilization performance (the ability to extract the full amount of usable product in a cylinder) ***UpTime* technology reduces the frequency of cylinder change-outs by a factor of 3 to 8 over adsorbent technology.**

The result?

- More than 20% reduction in gas spend
- As much as 80,000 wafers per year additional throughput
- A full year of labor savings for cylinder changes

Just look at *UpTime* utilization rates compared to adsorbent technology and you'll see the difference is nothing short of startling. Then, when you consider the numbers in the illustration below — showing the 25% cost penalty you can pay with adsorbent technology — the *UpTime* advantage for you and your fab becomes crystal clear.

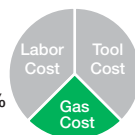


Absorbent Cylinder Utilization Case Study*

***UpTime* Global Average > 99%**

Adsorbent Average < 80%

- Adsorbent utilization highly variable
- Average < 80% vs *UpTime* cylinders > 99%
- 25% price premium at 80% utilization



When gas utilization matters, buy *UpTime* cylinders

The reason why *UpTime* cylinders make it easy to get all the product you've bought is because they come with a pre-loaded, no-cost factory heel that ensures its delivery system always has adequate product. Unlike adsorbent products, where system vacuum limitations can make it difficult to pull all of the molecules off of the adsorbent, *UpTime* cylinder technology is designed to allow you to extract all you've paid for.

The facts are undeniable: No product on the market matches the capacity and utilization rates of *UpTime* cylinders.

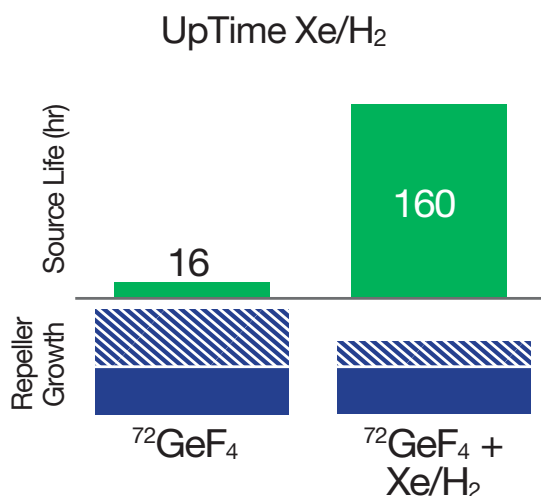
Innovation from Praxair and a flexible package to take advantage of it. The *UpTime*® delivery system is the platform for today's — and tomorrow's — fab needs.

Longer source life, more stable ion beam performance, new molecules: these are advances that Praxair has brought to the implant world. And Implant OEMs have endorsed us!

Free from the limitations of adsorbent technology, *UpTime* cylinders afford the flexibility to put pre-blended mixtures in the package and take advantage of a wide variety of source molecules to meet your needs.

Cleaning and source molecule mixtures have extended source life up to 10-fold in processes like germanium, carbon and boron, while nearly doubling beam current and reducing beam start/stop and glitching. Mixtures are simply not possible on adsorbents.

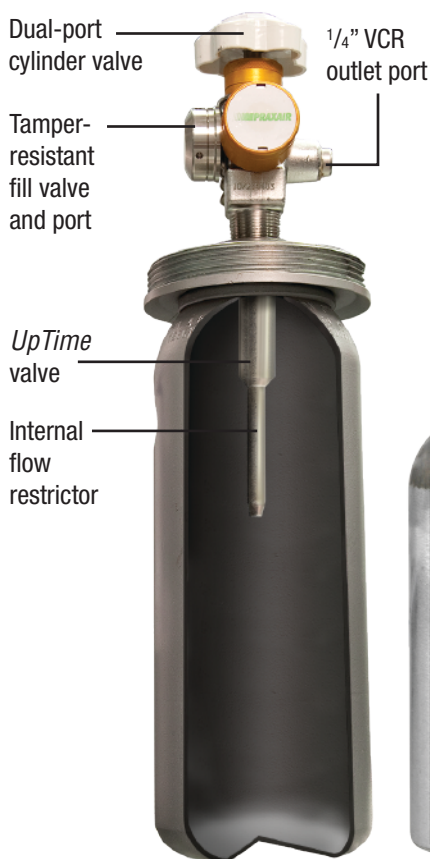
Not constrained by adsorbent issues, Praxair is working on new source molecules such as selenium, silicon, carbon and aluminum with OEM and fab partners—and developing co-flow mixtures to maximize performance with these new applications.



There have been tens-of-thousands of *UpTime* cylinders circulated among the fabs of leading semiconductor manufacturers worldwide — without a single report of product release from an *UpTime* cylinder in a fab.

That's what we call safety. That's what you'll call peace-of-mind. And that means you get to spend more time concentrating on the productivity of your enterprise. The increased capacity and usable gas in *UpTime* cylinders are coupled with triple redundant safety features (Illustration below) to guard against unintentional releases of gas. The result is the best of both worlds – reduced cylinder handling and an unsurpassed level of safety whenever cylinders must be handled. In short, your fab may avoid over a hundred cylinder changes a year! And because it's *UpTime* technology, you'll be doing so with a supreme level of safety.

Designed for safety, tested for reliability, industry validated



Triple Safety Features:

- Tamper-resistant fill valve and port
- *UpTime* valve
- Internal flow restrictor



Adsorbent System

- Single point failure
- May not provide subatmospheric delivery when > 23°C

You don't become a leading industrial gases producer and supplier — and an industry leader for 100 years — unless you deliver quality.

For example, with *UpTime* technology:

We never top fill product into an *UpTime* cylinder. In fact, each cylinder is purged and refilled with carefully manufactured, sourced and analyzed gases. There is no possibility of adsorbed residual heels and potential associated decomposition.

We analyze and perform extensive testing on our gases and cylinders to ensure they meet the highest quality standards.

What's more, as an industry leader who has set the standard for world-class supplier management practices, we ensure that everything that goes into your *UpTime* cylinder is up to that standard.

UpTime cylinder components are checked and rechecked multiple times during the manufacturing process.

With *UpTime* technology you can rest assured that:

- Valve components are tested as received, during assembly and again after assembly.
- Cylinders are post-fill tested for flow and performance, including testing after temperature stress to ensure no leaks due to thermal expansion effects.
- Every cylinder leaving a Praxair warehouse is tested within 24 hours of departure.
- Because of *UpTime*'s cylinder design, there's no possibility of purge gas backflow into the cylinder while on the implant tool – an all too often observed problem with adsorbent cylinder designs.

With *UpTime* technology, quality is never taken for granted. And your fab needs are never, ever compromised.

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QUALITY FORWARD