



Western Digital

Beyond Air.
Helium Takes You Higher.

100M

Since its introduction in 2013, more than 100 million HelioSeal drives have been deployed through six generations of proven reliability.

The **Foundational** Building Block for High-capacity HDDs

Today's data centers face many storage challenges—from storage density, to power and cooling costs, to reliability and more. As your data center's capacity needs grow, your challenges grow as well.

Since 2013, Western Digital has used HelioSeal® technology as the foundational building block for high-capacity Ultrastar® hard disk drives (HDDs). Industry leading capacities depend on a number of innovative technologies such as OptiNAND(TM), Energy-Assisted Magnetic Recording (EAMR) technology, Triple-Stage Actuator, Shingled Magnetic Recording (SMR) and UltraSMR. However, these technologies need to work in a helium environment to achieve the highest capacity.

The Science of HelioSeal

Capacity gains can be realized by adding ever more disks into a standard 3.5" form factor, requiring thinner disks. Helium is necessary to realize more disks per HDD. Helium is important because it reduces the vibration in the drive, which allows the areal density on the disk to improve. It allows the drive to run cooler and it takes less power. HelioSeal technology hermetically seals the HDD and replaces the air inside with helium, which is one-seventh the density of air. The less-dense atmosphere inside the drive allows for dramatic increases in efficiency, reliability and capacity compared to conventional air-filled HDDs.

Proven Reliability

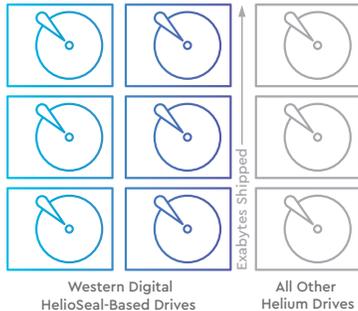
Western Digital helium drives undergo accelerated stress testing, including high-temperature soaking, thermal cycling, pressure cycling, humidity cycling and shock testing. Every drive is tested for seal integrity during the manufacturing process prior to shipping. Additionally, our helium drives utilize internal environmental telemetry to monitor seal integrity and report any potential issues.

The Ultrastar DC HC570 22TB¹ CMR HDD & DC HC670 26TB UltraSMR HDD are our eighth generation of HelioSeal drives. UltraSMR technology enables our SMR drives to achieve a +4TB capacity advantage over our CMR drives. Our HelioSeal platform quality proved so successful in the field that we increased the reliability rating by 25% to 2.5M hours MTBF compared to enterprise-class air-filled drives.

¹One megabyte (MB) is equal to one million bytes, one gigabyte (GB) is equal to 1,000MB (one billion bytes), and one terabyte (TB) is equal to 1,000GB (one trillion bytes) when referring to storage capacity. Actual user capacity may be less due to operating environment.

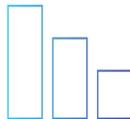
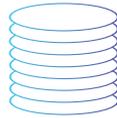
2/3^{rds}

Over **2/3^{rds}** of Helium exabytes shipped in 2019 were based on Western Digital's **HelioSeal** technology*



* Source: WDC Internal Market Intelligence, CQ3/2019

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Uncompromising capacity. The less dense atmosphere inside a HelioSeal HDD virtually eliminates turbulence, allowing read/write mechanisms to track more precisely and reliably over storage media, enabling higher recording densities.

Piling on the platters. Less internal turbulence also makes it possible to add more disks and heads to achieve even higher capacity per HDD. This is how Western Digital delivers 22TB CMR and 26TB UltraSMR capacities in a ten-disk design.

The power of helium. Disks spin more easily in a helium-filled environment, resulting in less power usage—even with additional platters. Less power consumption means cooler operation and lower cooling requirements, reducing both energy costs and carbon footprint.

Reducing the risk. Many air-filled drives use a breather filter leading to reliability problems when used in environments with high levels of carbon in the air. This problem does not exist with sealed drives.

Driving Down TCO: The **Value** of HelioSeal® Technology

HelioSeal technology delivers today's lowest total cost of ownership (TCO) for hyperscale and data-centric applications.

Unmatched storage density with 22TB CMR and 26TB UltraSMR capacity in a ten-disk design and a 3.5-inch HDD footprint. The Ultrastar DC HC570 22TB HDD has 120% more storage capacity for mainstream applications than 10TB air-based drives, saving you rack space.

Greater power efficiency with 28% lower operating power than Ultrastar 10TB air drives. Our 22TB HelioSeal drives consume just 5.7 watts during idle operation, a 67% reduction in watts-per-TB compared to Ultrastar 10TB air-based HDDs.

Lower cooling requirements with drives that typically run 4°– 5°C cooler to lower power and cooling cost. Cooler operation also results in better reliability and enables systems with higher storage densities.

Quieter operation and up to 59% lower weight-per-TB for 22TB HelioSeal drives, compared to 10TB air-filled drives, improve environmental conditions in high-density deployments and enable more storage capacity where building codes enforce floor loading limits.

Enabling lower TCO with the eighth generation of Ultrastar data center HDDs with HelioSeal technology. High capacity 22TB CMR and 26TB UltraSMR HDDs lead to lower system-level TCO for the data center.

He FACTS

Abundant and Safe. Helium Quick Facts.

It's colorless, odorless, tasteless and non-toxic.
Here are some little-known facts about this inert gas.

Helium is the second lightest and the second most abundant element in the observable universe.

One standard helium tank provides enough gas to fill nearly 10,000 Western Digital drives.

Helium is used to create stable breathing mixtures for deep sea divers.

HDD vendors have used helium for years in the servo-writer manufacturing process.

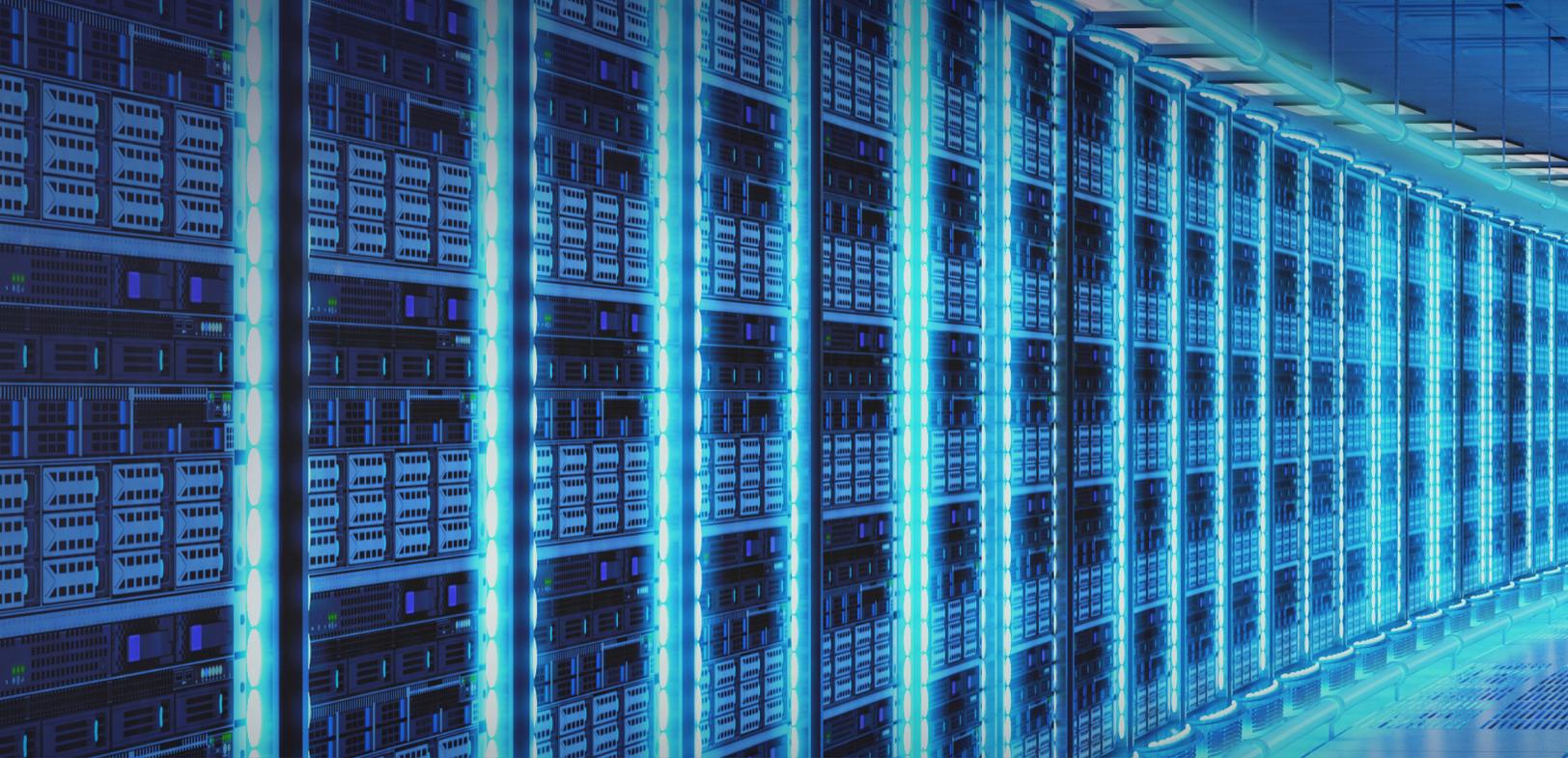
There is a wealth of commercially available helium today.



Why Western Digital

Western Digital creates environments for data to thrive. Everywhere data is captured, preserved, accessed and transformed, we're leading the charge to unlock its potential. From advanced data centers to mobile sensors to personal devices, our industry-leading solutions create environments where the flow of information leads to smarter decisions, breakthrough discoveries and deeper connections.

Learn more about us at
www.westerndigital.com



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