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ENTERPRISE  ◇  HDD

# Seagate Constellation ES Review (2TB)

written by StorageReview Consumer Desk    |    March 9, 2010

The Constellation ES is Seagate's 4th generation 3.5" 7200 RPM enterprise-class hard drive. The drives come in 500 1TB and 2TB capacities and support both SATA II and SAS interfaces. The Constellation ES isn't all about high capac and performance though; Seagate's high on their power management and temperature tolerance for enterprise applications. The entire line also offers self-encrypting drive technology as an optional feature. With a spec sheet l this, it's hard to imagine wanting anything else in a high-capacity enterprise-class storage solution.

**Technical Overview**

2TB Seagate Constellation ES SATA Specifications:

- Interface: SATA 3Gb/s

- Cache: 64MB

- Capacity: 2TB

- Areal density (avg): 347Gb/in2

- Guaranteed Sectors: 3,907,029,168

- Spindle Speed: 7200 RPM

- Sustained data transfer rate: 140MB/s

- Average latency: 4.16ms

- Random read seek time: <8.5ms

- Random write seek time: <9.5ms

- Unrecoverable read errors: 1 in 10^15

- Average idle power: 7.0W

- Average operating power: 11.2W

- Average seek power: 10.2W

- Maximum start current, DC: 2.8

- Acoustics (Idle Volume): 2.7 bels

- Acoustics (Seek Volume): 3.0 bels
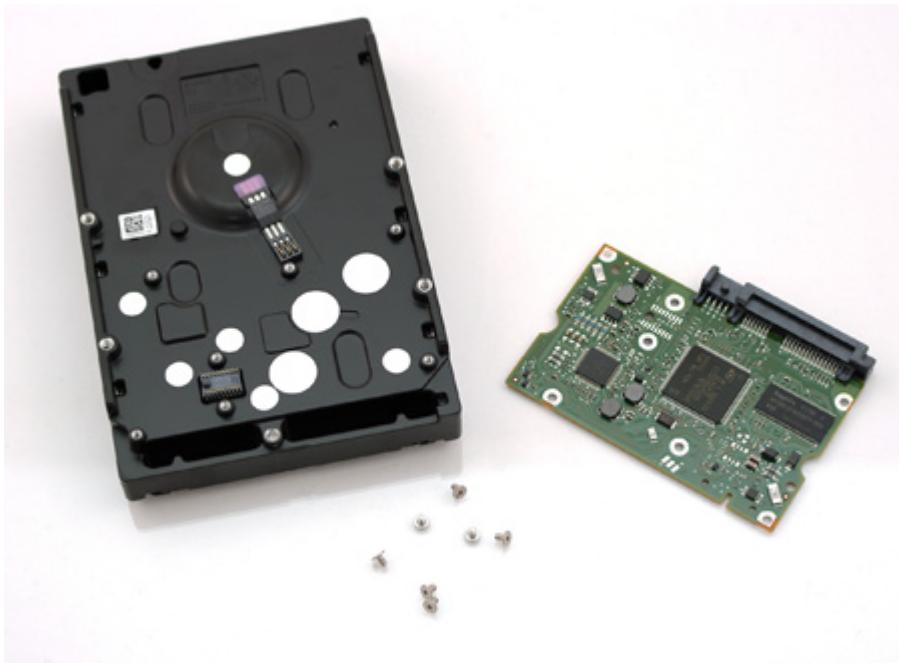
**Aesthetics**

The Seagate Constellation ES doesn't stand out from the pack with a unique body color or sticker choice. Seagate s with the tried and true satin black painted body and silver lid with white sticker stuck on top design. The label inclu information including the model number, lot number, serial number, voltage requirements, and shipping firmware revision for quick reference. Build quality is nice with a design protecting the circuit board by using the drive body as a heatsink. All chips on the board except for the RAM module make direct contact with the drive body.
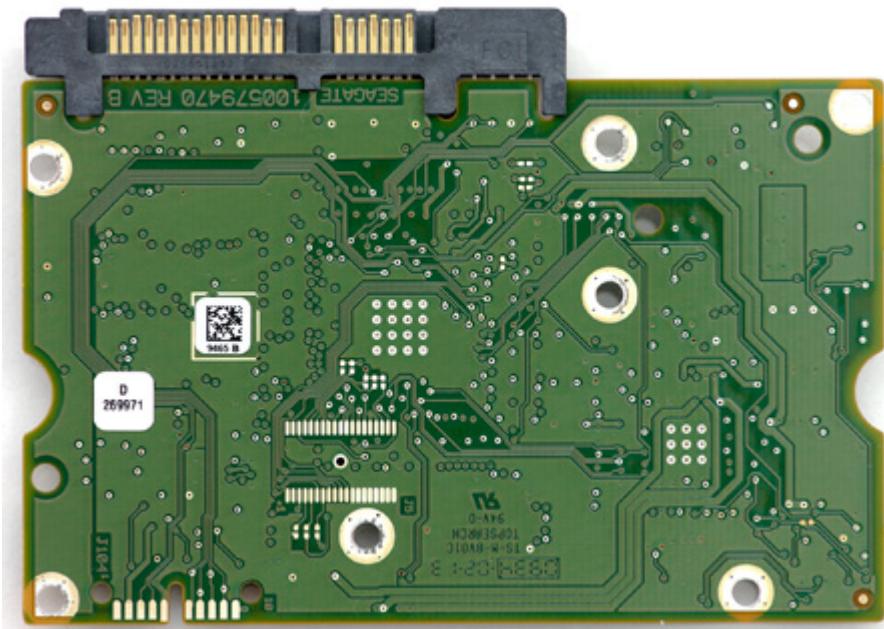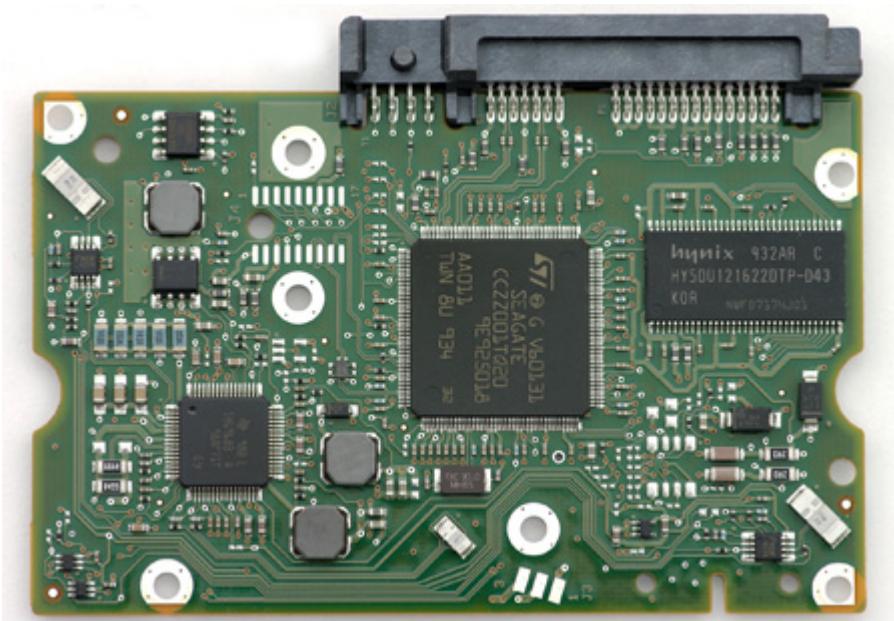
**Disassembly**

The controller card was simple to remove with the help of a small torx screwdriver. While removing the circuit boa found a foam section placed in-between the drive and board. Metal fingers connect the drive motor and control circuitry to the board with constant tension, preventing loose connections under shock or vibration.
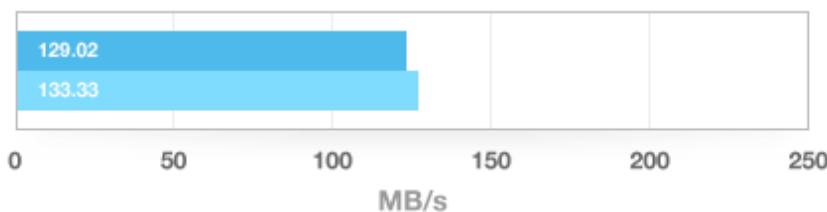


The board itself consists of a Seagate cczz001tq20 controller chip, a Texas Instruments SH6968B motor driver, and 64MB Hynix 400MHz DDR RAM module.

**Benchmarks**

Seagate claims a sustained transfer speed of 140MB/s with the 2TB Constellation ES drive. To test this we used IOM
with 2MB sustained read and write profiles to get the average transfer speed over a period of two minutes. We sav
read speeds of 129MB/s and a write speeds of 133MB/s. We also used IOMeter to perform 2MB and 4K random
transfers.
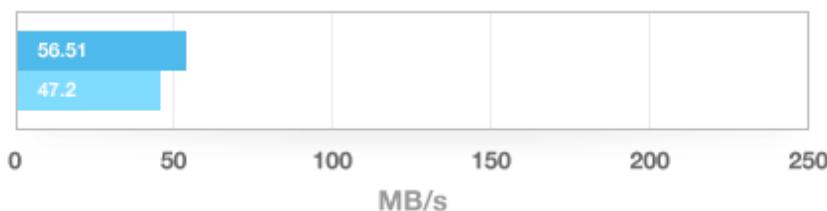
IOMETER

# 2MB SEQUENTIAL TRANSFERS READ / WRITE

| | |
|---|---|
| 129.02 | |
| 133.33 | |

MB/s

Seagate Constellation ES 2TB
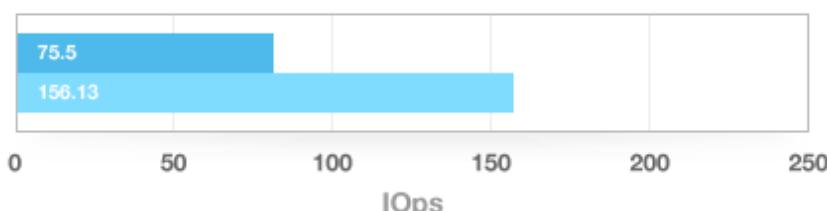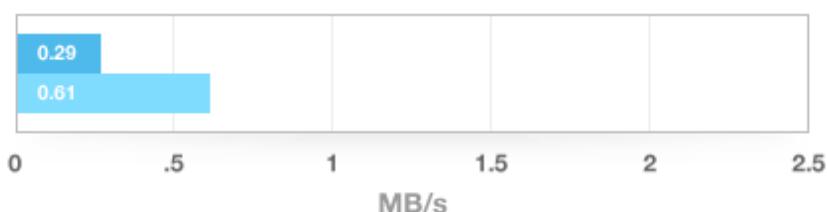
● Read    ● Write

IOMETER

# 2MB RANDOM TRANSFERS READ / WRITE

| | |
|---|---|
| 56.51 | |
| 47.2 | |

MB/s

Seagate Constellation ES 2TB

● Read    ● Write

IOMETER

# 4K RANDOM TRANSFERS READ / WRITE

| | |
|---|---|
| 0.29 | |
| 0.61 | |

MB/s

| | |
|---|---|
| 75.5 | |
| 156.13 | |

IOps
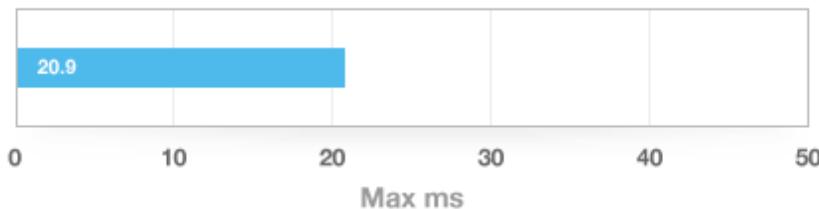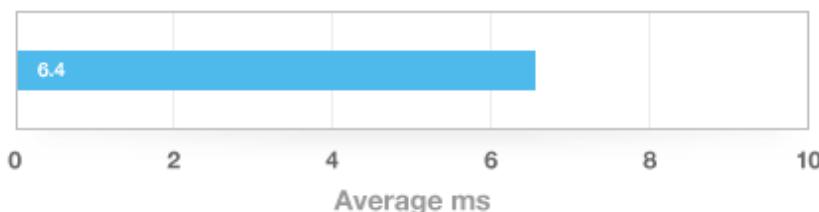
Seagate Constellation ES 2TB

● Read    ● Write

IOMETER

## 4K WRITE LATENCY
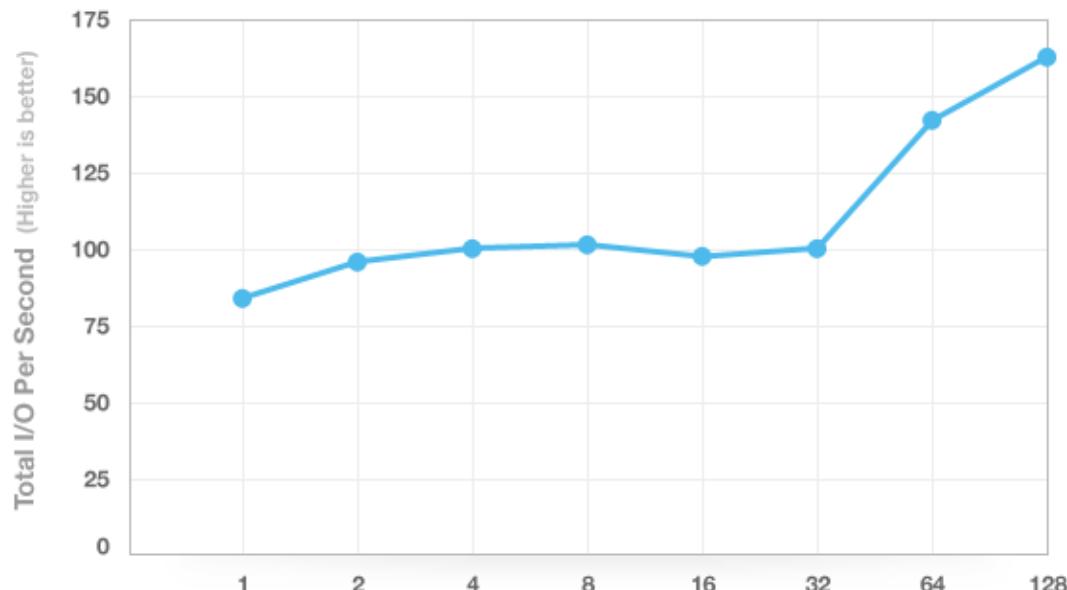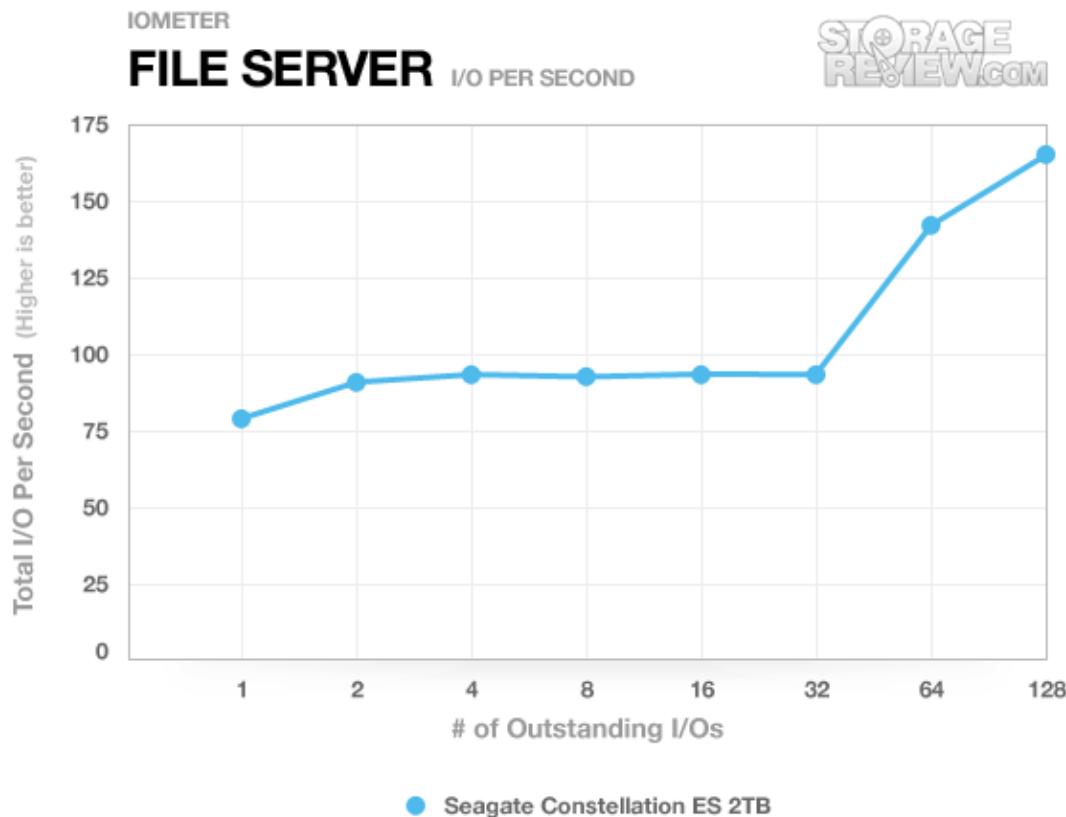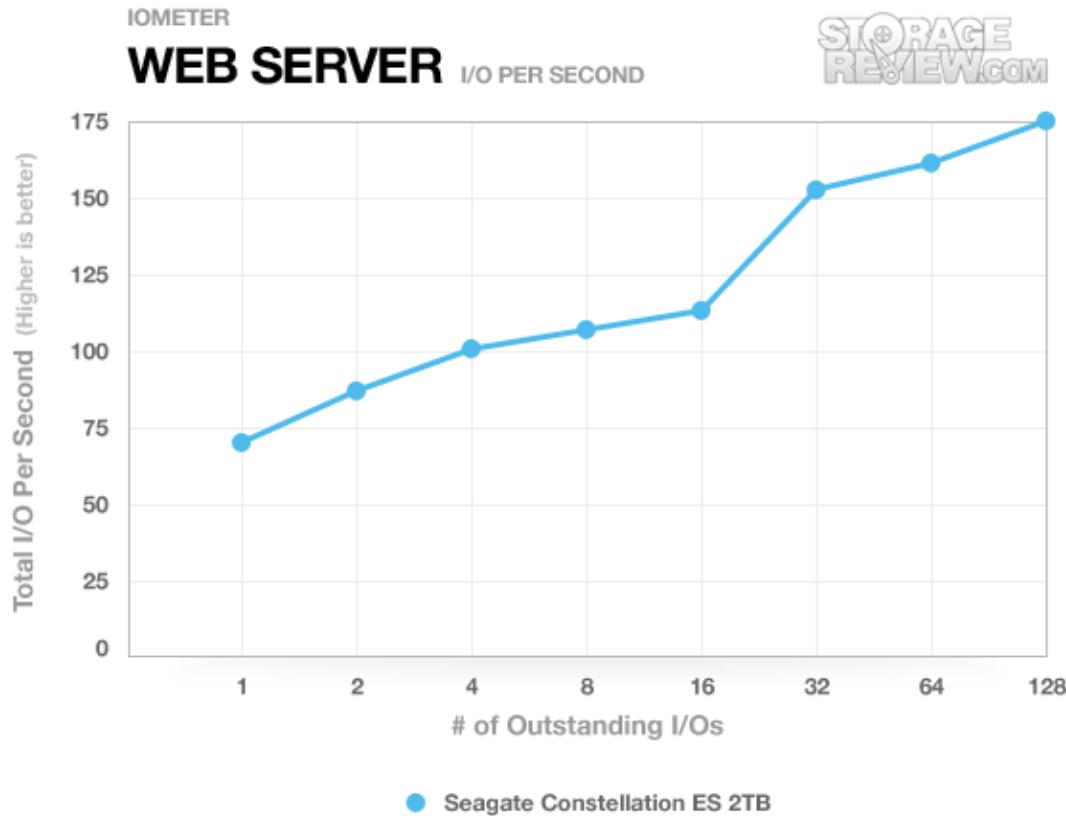


To see how well the drive performs with a stacked request load we used standard Database, Web Server, File Serv
and Workstation profiles spanning 2 minute individual test with a 5 second ramp time and a depth queue of 1 to 1

IOMETER

# WEB SERVER I/O PER SECOND



● Seagate Constellation ES 2TB

IOMETER

# FILE SERVER I/O PER SECOND



● Seagate Constellation ES 2TB

IOMETER

# WORKSTATION I/O PER SECOND
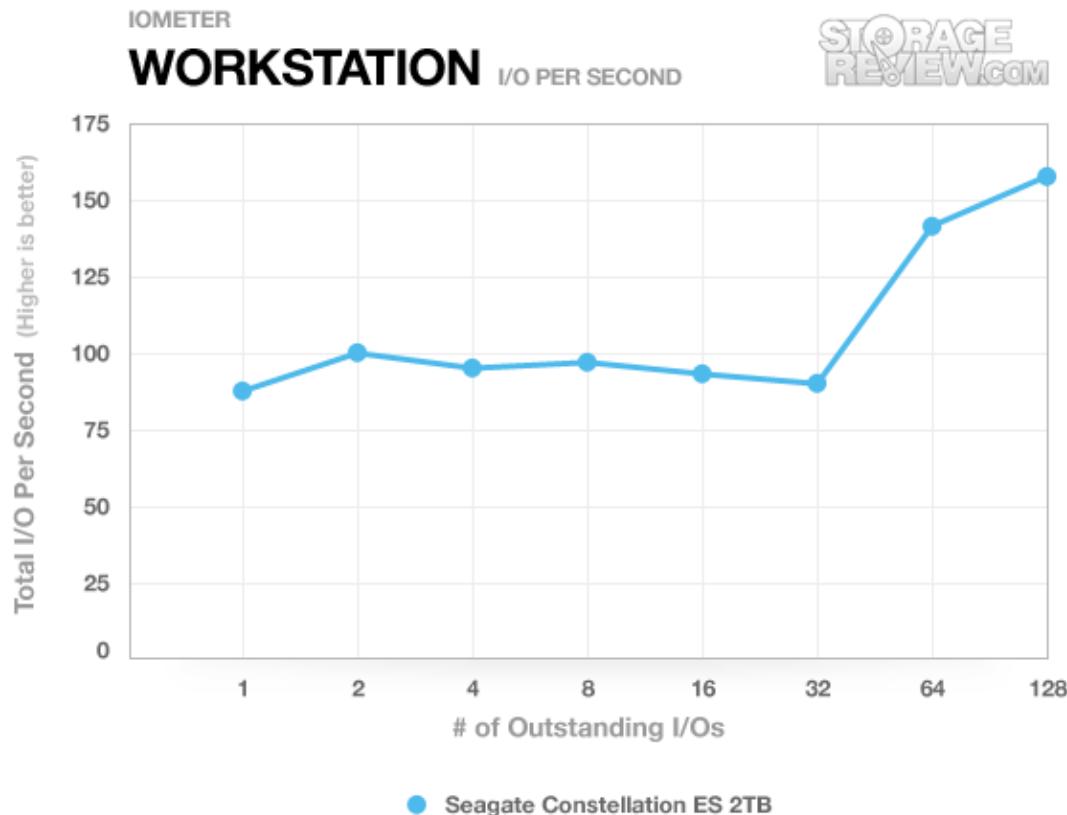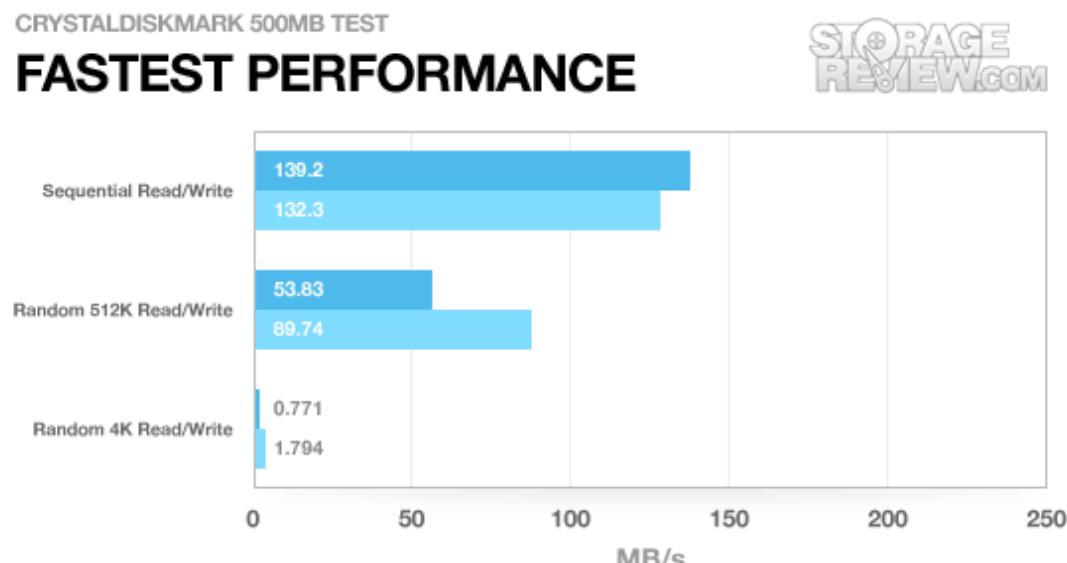


Seagate Constellation ES 2TB
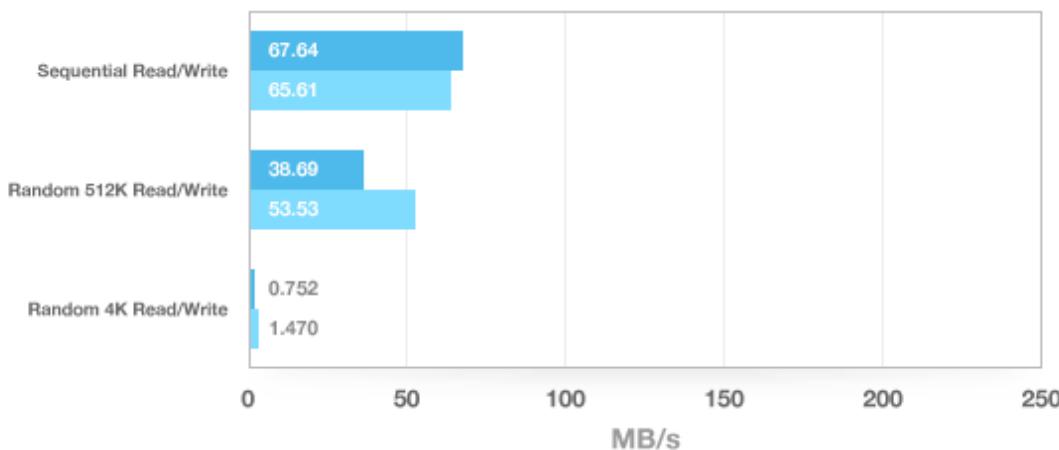
CrystalDiskMark showed slightly higher sequential read transfers then our IOMeter tests using the 500MB test size compare performance between the slowest and fastest sections of the drive we used 600MB partitions positioned the outermost and innermost locations on the platters. At its best the drive transfers data at about 130MB/s for read/write and at its worst it slows down to about 65MB/s read/write.

CRYSTALDISKMARK 500MB TEST

# FASTEST PERFORMANCE



Seagate Constellation ES 2TB

● Read ● Write

CRYSTALDISKMARK 500MB TEST

# SLOWEST PERFORMANCE



Seagate Constellation ES 2TB

● Read    ● Write

## Power Consumption

Power usage and heat output are very important items when companies look at drives to use in datacenters. The power a drive uses, the more heat it puts out, and the more the company needs to spend on cooling. Seagate lists average idle power draw of 7w, an average operating power draw of 11.2w, and an average seek power draw of 1(

To test power consumption we used the same IOMeter profiles for our speed tests with in-line meters logging and averaging the power usage. At the end of the test we stopped our rig and recorded the values. The peak startup wattage was measured over three tests with the maximum 5v and 12v amp draws recorded.

For the Constellation ES drives Seagate offers PowerChoice which lets the end-user select one of four advanced pc savings modes.

Idle_A

- Disks rotating at full speed (7200 RPM)

Idle_B

- Heads are unloaded to drive ramp.
- Disables processor and channel power consumption.
- Disks rotating at full speed (7200 RPM)

Idle_C/Standby_Y (SAS)

- Heads are unloaded to drive ramp.

- Disk speed reduced to a lower RPM (reduced RPM)

Standby_Z

- Heads are unloaded to drive ramp.

- Drive motor is spun down.

- Disk still responds to non-media access host commands

We measured an average idle power draw of 6.46w, 8.56w and 8.63w for write and read respectively, and 10.15w f

constant random 4K read activity. While running inside the drive cage assembly in the StorageReview Dell XPS 900

Constellation ES reached a maximum temperature of 103F as recorded with a Fluke IR thermometer.



**POWER CONSUMPTION**

| | Watts |
|---|---|
| Constant Sequential Write Activity | 3.34 / 5.22 / 8.56 |
| Constant Sequential Read Activity | 3.40 / 5.23 / 8.63 |
| Constant Random 4K Read Activity | 2.01 / 8.14 / 10.15 |
| Idle | 1.54 / 4.92 / 6.46 |

| | Watts |
|---|---|
| Startup | 2.56 / 24.31 / 26.87 |

Seagate Constellation ES 2TB

● 5 V      ● 12 V      ● TOTAL

**Warranty**

Seagate offers a 5-year limited warranty on the Constellation ES which is in line with other hard drive manufacture

handle defective or broken drives they have standard and advanced replacement programs. With the standard

replacement program you pay to ship the drive to Seagate and upon receipt they mail a new drive out. Advanced

pay a $20 free and they mail a replacement drive to you with a return box for the old drive.

## Conclusion

The Seagate Constellation ES 2TB gives users solid performance with 129MB/s read and 133MB/s write transfer sp

on the 2TB SATA model. Seagate puts a strong emphasis on energy savings with the Constellation ES, offering

PowerChoice to reduce power during slow or idle periods. In our tests with the drive in an active state we saw an i

power draw of 6.46w which was just under the advertised power draw of 7w. For users with security in mind Seaga

also offers Self-Encrypting Drive (SED) as an option. Factor in that there's also an SAS model and the Constellation

has its bases covered.

## Pros

- 5- year warranty
- Makes use of four 500GB platters
- SATA or SAS interface
- SAS models support Self-Encrypting Drive

## Cons

- 6.0Gbps speed currently only offered for SAS model (unless you go to the consumer Barracuda XT)

## Bottom Line

512GB, 1TB, and 2TB configurations offered in SAS and SATA interfaces with plenty of security and power savings

options make the Seagate Constellation ES line a solid drive for high-capacity enterprise storage needs.

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