open-e JovianDSS

Seagate Exos M 30TB HDD (ST30000NM004K)

Certification Report

Release date: 2025.11.18

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1. INTRODUCTION

The purpose of this report is to describe in detail the tests and the results of integrating the **Seagate Exos M 30TB ST30000NM004K** Hard Disk Drives with the Open-E JovianDSS software platform. The report aims to demonstrate the compatibility and reliability of the tested Seagate HDDs under various operational conditions, scenarios, and applications.

The Seagate Exos M 30TB ST30000NM004K is part of the Exos enterprise storage line. This drive offers a massive 30TB of capacity in a standard 3.5-inch form factor. It's also a key component of the Exos M (Mozaic) platform, making it the first HDD to feature 3TB per platter by utilizing **HAMR (Heat-Assisted Magnetic Recording)** technology. Additionally, it uses advanced **CMR (Conventional Magnetic Recording)** technology and has a helium-sealed design to increase storage density, maintain low power consumption, and ensure high durability. It's designed for data-intensive environments such as hyperscale data centers, cloud infrastructure, large-scale backup, and archiving operations.

Open-E JovianDSS is a software-defined data storage platform based on the ZFS file system. It provides features such as data deduplication, compression, encryption, snapshots, replication, and High Availability clustering. Open-E JovianDSS offers flexible compatibility with various hardware configurations and operating systems, making it highly adaptable to modern enterprise storage needs.

Open-E conducted the certification tests under the assumption that the **Seagate Exos M 30TB** drives were intended for data storage roles due to their large capacity and enterprise-grade reliability. The evaluation included an assessment of their performance as data storage drives in both single-node systems and High-Availability storage clusters.

The certification scope included a series of functional and performance tests performed under various operational conditions to validate compatibility, stability, and reliability. The following applications were considered during the Open-E certification process:

- **Data storage drive**

2. DEVICE UNDER TEST DESCRIPTION

Table 1. Seagate Exos M 30 TB (ST30000NM004K)

Product name	Seagate Exos M
Model name	ST30000NM004K
Storage capacity	30 TB
Form factor	HDD 3.5”
Interface	SATA
Rotational speed	7200 RPM
Memory disk buffer size	512 MB
Power Supply Requirements	+12V and +5V
Power consumption	9.5W
Mean Time To Failure (MTTF)	2,500,000 hours
Power-On Hours per Year (24×7)	8760
Firmware	SE04

3. TEST ENVIRONMENT DESCRIPTION

Table 2 provides a detailed list of the hardware specifications for the environments used during the certification testing. Table 3 shows the general configuration settings for Fio, which was the tool for performance benchmarking.

Table 2. Per-Node hardware specification

System name	Supermicro SuperServer 6028U-TR4T+
Motherboard	Supermicro X9DRD-7LN4F(-JBOD)/X9DRD-EF
CPU	2x Intel(R) Xeon(R) CPU E5-2620 v2 @ 2.10GHz
RAM	64GB - 8x Kingston 8 GB 1600 MHz
Storage controller	HBA Broadcom (LSI) SAS 9400-8i8e SAS 12Gb/s
Drives	8x Seagate Exos M 30TB 1x NVMe Intel Optane SSD P1600X Series
System	Open-E JovianDSS up32 61683

Table 3. Fio test tool configuration

Version	3.31
Test size	200GB
Block size	4kB (random workload); 1MB (sequential workload)
Ramp time	30s
Runtime	90s
IOengine	libaio
Direct IO	Yes

4. FUNCTIONALITY TEST

Open-E performed functional testing, shown in Table 4.

Table 4. Functional test results

Functional aspect	Result
Open-E JovianDSS system compatibility	passed
Stripe compatibility	passed
Mirror compatibility	passed
RAID-Z1 compatibility	passed
RAID-Z2 compatibility	passed
RAID-Z3 compatibility	passed
System stability	passed*
Disk write-back cache management	passed
Drive failure simulation with the replacement	passed
Hot-Plug Support	passed
Disk activity and health monitoring	passed
LED's management functionality	passed

5. HIGH AVAILABILITY NON-SHARED STORAGE CLUSTER TESTS

Open-E performed a series of compatibility tests to validate the performance and stability of the **Seagate Exos M 30TB ST30000NM004K** HDDs in the Open-E JovianDSS High Availability Non-Shared Storage Cluster environment.

The tests focused on ensuring that all essential and critical non-shared storage cluster mechanisms operated correctly when using the tested drives. Key features such as failover, synchronization, redundancy, and access to data in cluster configurations were thoroughly examined.

Table 5 below presents a summary of the tested functionalities and their respective results.

Table 5. Results for the HA Non-shared Storage Cluster compatibility test.

Tested functionality	Result
Manual Failover	passed
Remote disk support	passed
Automatic Failover triggered after network failure	passed
Automatic Failover triggered after system shutdown	passed
Automatic Failover triggered after system reboot	passed
Automatic Failover triggered after system power-off	passed
Automatic Failover triggered after I/O failure	passed*
Failover operations under heavy load (stress test)	passed

6. PERFORMANCE TEST

The test cases are described in Table 7. Open-E applied every combination of thread numbers (1, 4, 8, 16) and queue depths (1, 16, 64, 128) to the Fio test tool in all instances. All tests were performed locally on the Open-E JovianDSS system.

Table 7. Test cases description

Test case	IO pattern	Read to write %	Block size
Mixed	random	70/30	4 kB
Random read	random	100/0	4 kB
Random write	random	0/100	4 kB
Sequential read	sequential	100/0	1 MB
Sequential write	sequential	0/100	1 MB

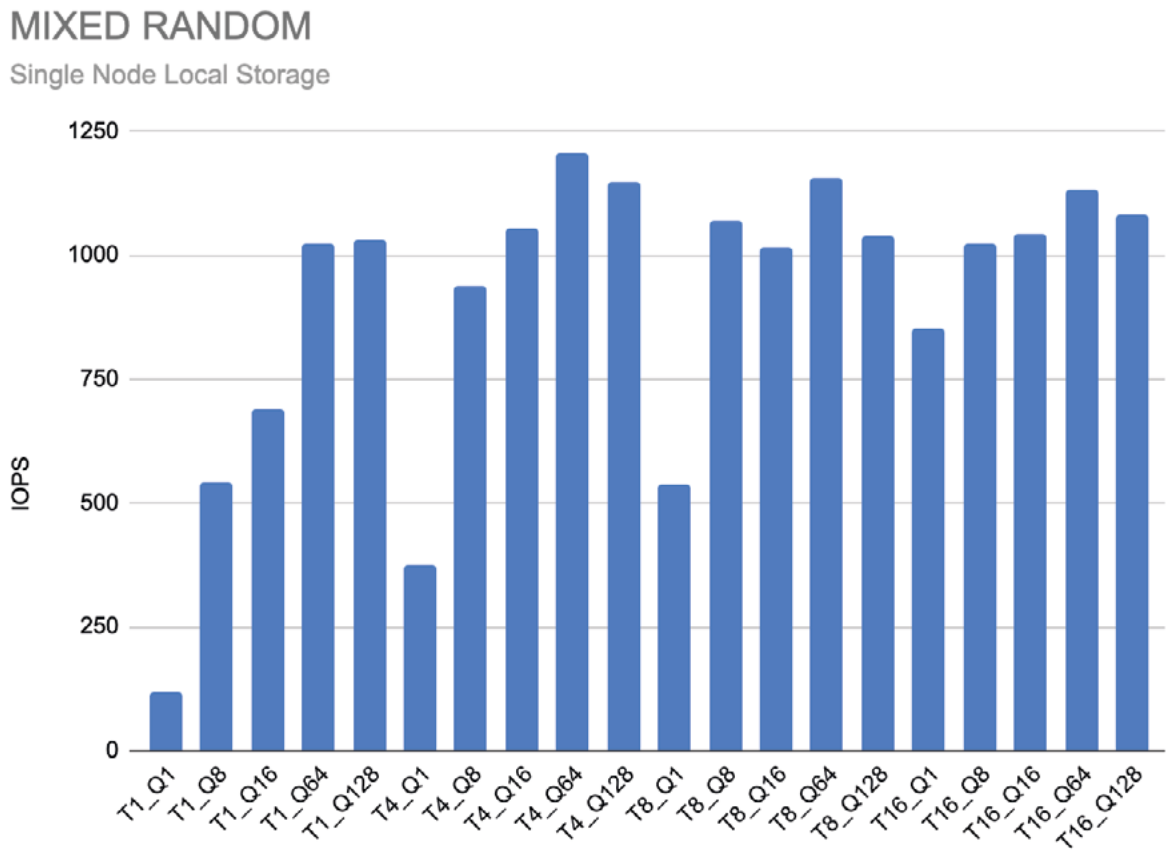
The table 8 below presents the ZFS configuration used for testing.

Table 8. Tested pool configuration

Zpool configuration	RAID-Z2
Write log	Yes (NVMe Intel Optane SSD P1600X Series)
Read cache	No
Zvol size	200 GB
Sync	Always
Provisioning	Thin
Compression	lz4
Zvol initialization	Zvol was initialized by writing data to it before tests began.

The charts below present the following performance results:

- **Mixed Random IO Performance**
- **Random Read IO Performance**
- **Random Write IO Performance**
- **Sequential Read MB/s Performance**
- **Sequential Write MB/s Performance**


MIXED RANDOM
Single Node Local Storage
IOPS
1250
1000
750
500
250
0
T1_Q1
T1_Q8
T1_Q16
T1_Q64
T1_Q128
T4_Q1
T4_Q8
T4_Q16
T4_Q64
T4_Q128
T8_Q1
T8_Q8
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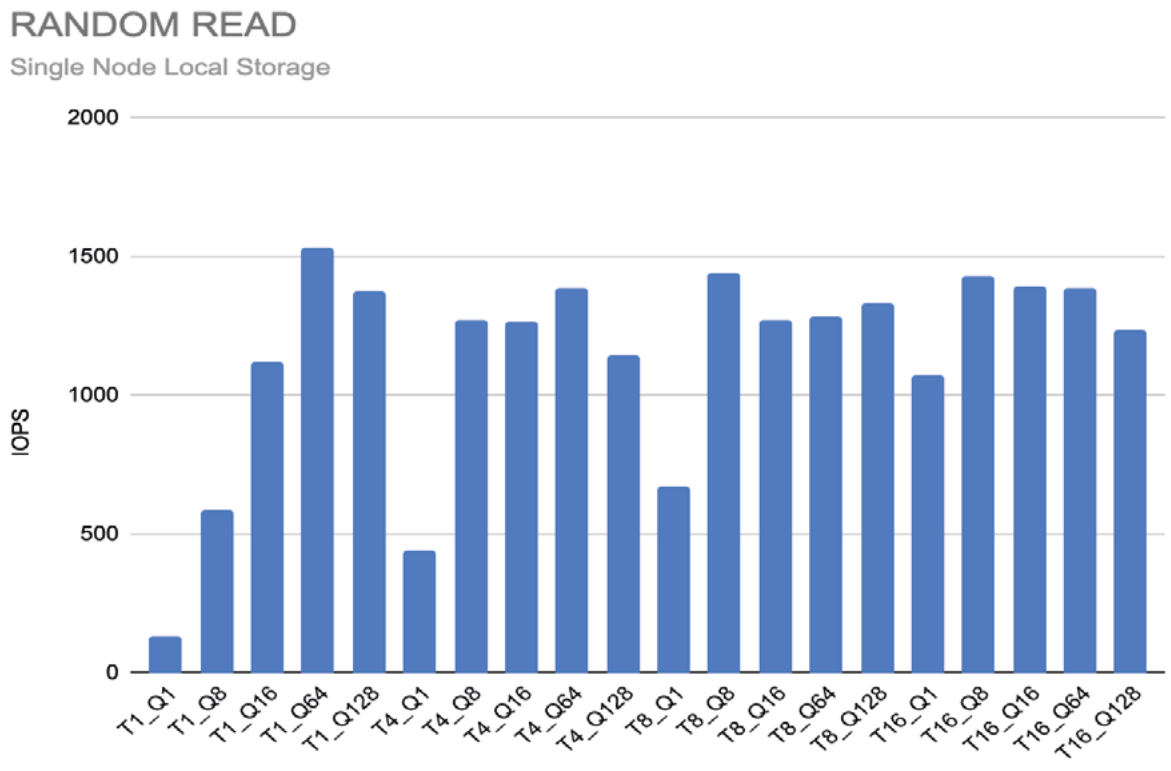
T8_Q128
T16_Q1
T16_Q8
T16_Q16
T16_Q64
T16_Q128


RANDOM READ
Single Node Local Storage
IOPS
2000
1500
1000
500
0
T1_Q1
T1_Q8
T1_Q16
T1_Q64
T1_Q128
T4_Q1
T4_Q8
T4_Q16
T4_Q64
T4_Q128
T8_Q1
T8_Q8
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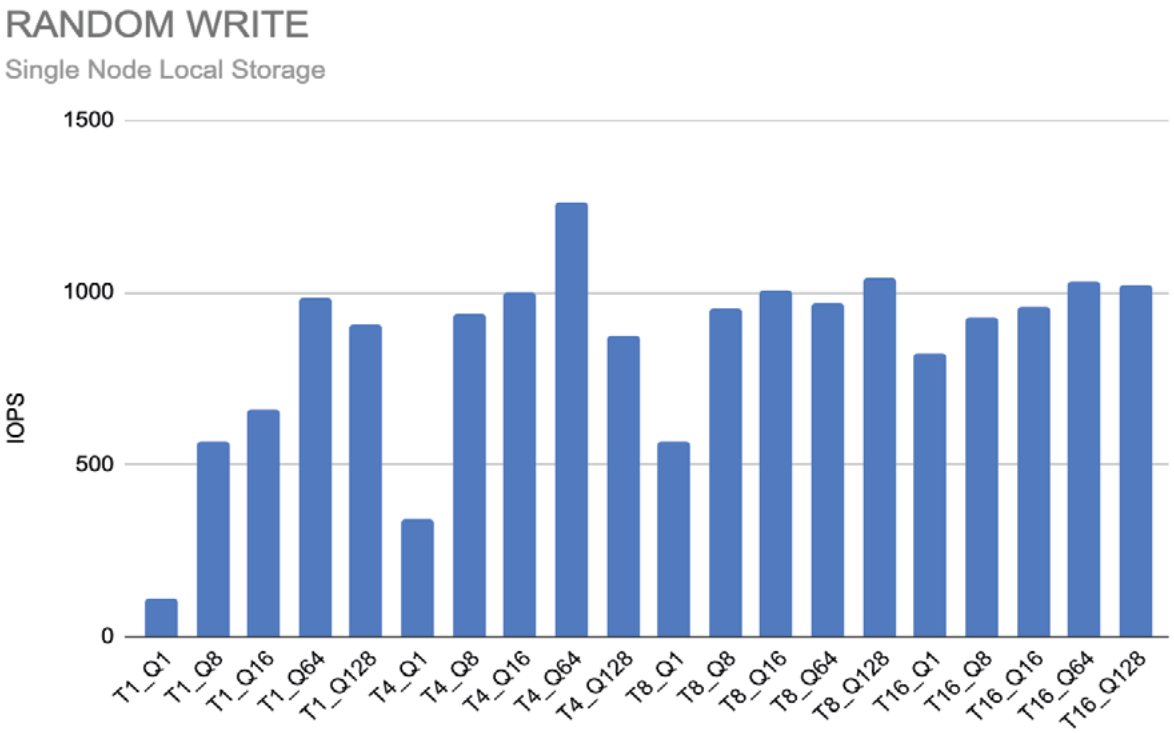
T8_Q128
T16_Q1
T16_Q8
T16_Q16
T16_Q64
T16_Q128


RANDOM WRITE
Single Node Local Storage
IOPS
1500
1000
500
0
T1_Q1
T1_Q8
T1_Q16
T1_Q64
T1_Q128
T4_Q1
T4_Q8
T4_Q16
T4_Q64
T4_Q128
T8_Q1
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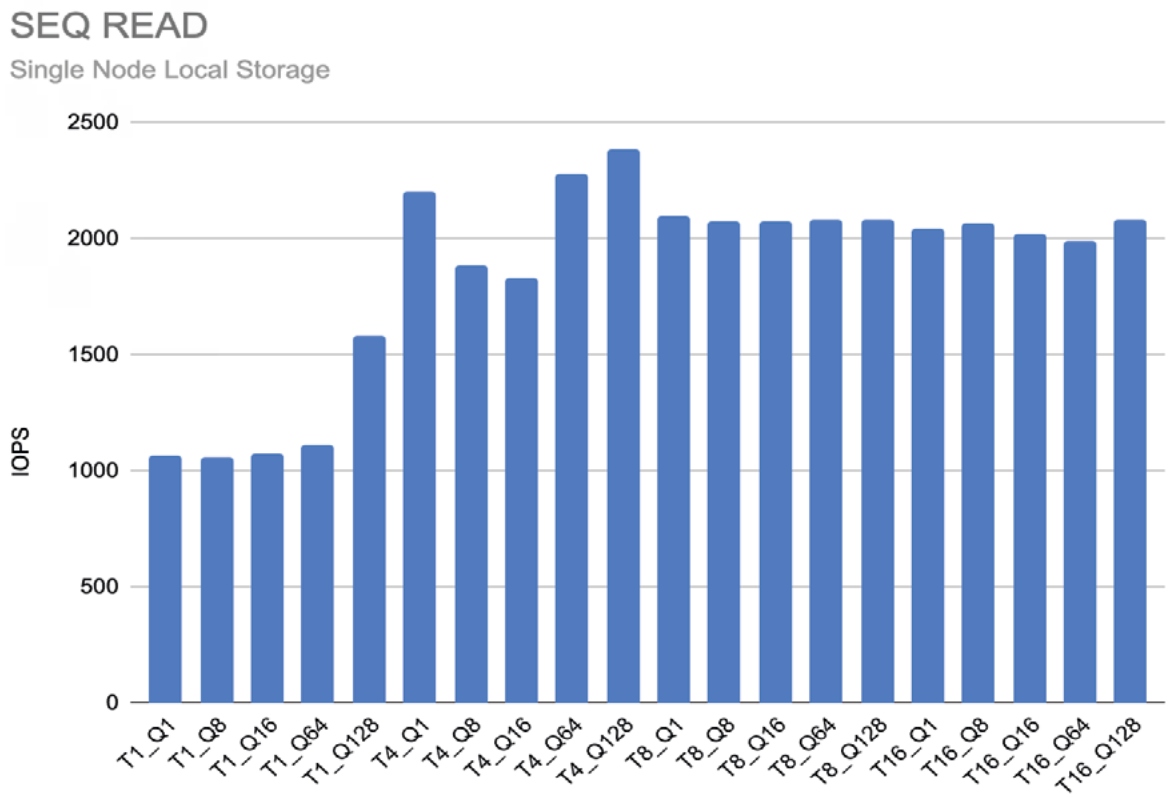
T8_Q128
T16_Q1
T16_Q8
T16_Q16
T16_Q64
T16_Q128


SEQ READ
Single Node Local Storage
IOPS
2500
2000
1500
1000
500
0
T1_Q1
T1_Q8
T1_Q16
T1_Q64
T1_Q128
T4_Q1
T4_Q8
T4_Q16
T4_Q64
T4_Q128
T8_Q1
T8_Q8
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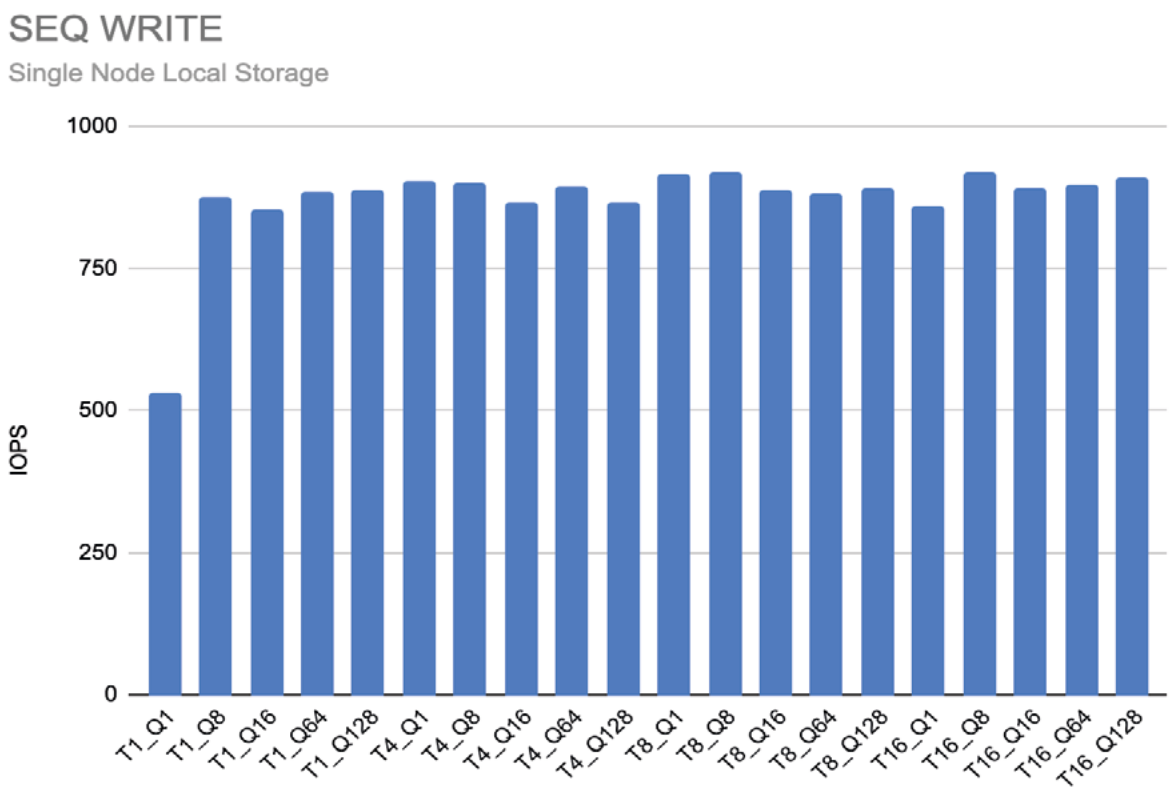
T8_Q128
T16_Q1
T16_Q8
T16_Q16
T16_Q64
T16_Q128


SEQ WRITE
Single Node Local Storage
IOPS
1000
750
500
250
0
T1_Q1
T1_Q8
T1_Q16
T1_Q64
T1_Q128
T4_Q1
T4_Q8
T4_Q16
T4_Q64
T4_Q128
T8_Q1
T8_Q8
T8_Q16
T8_Q64
T8_Q128
T16_Q1
T16_Q8
T16_Q16
T16_Q64
T16_Q128

7. TEST CONCLUSIONS

The **Seagate Exos M 30TB ST30000NM004K** HDD has demonstrated excellent performance in a comprehensive suite of certification tests, confirming its reliability as a data storage solution in enterprise environments. The drive showed strong endurance, high throughput, and consistent performance, making it well-suited for systems that require maximum data integrity, massive storage capacity, and continuous availability under operational stress.

The certification process included several rigorous test scenarios, including high-load stress tests, sequential and random read/write performance evaluations, and prolonged operation simulations under real-world conditions. The results confirmed that the **Seagate Exos M 30TB** model is a top-tier enterprise storage drive, capable of supporting high-demand workloads in both Single-Node and High-Availability configurations running on the **Open-E JovianDSS** platform.

Thanks to its advanced helium-sealed design, **HAMR** and **CMR** technology, as well as proven compatibility with **Open-E JovianDSS**, the **Seagate Exos M 30TB HDD** is an excellent choice for organizations seeking a highly reliable and efficient high-capacity storage solution.

Based on the testing results and the drive's specifications, Open-E recommends using this certified model in the following scenarios:

- **Massive enterprise-scale storage infrastructures**
- **Business-critical server and data storage systems**
- **File and block data storage solutions**
- **Backup and archiving systems**
- **CCTV and surveillance recording environments**

Following the successful completion of all certification tests, Open-E has added the **Seagate Exos M 30TB ST30000NM004K** to its Hardware Certification List and awarded it the "Certified by Open-E" status.

8. DISCLAIMER

Due to the large capacity of a single disk, which significantly increases the time required for data rebuild in case of drive failure, Open-E recommends configuring data groups with at least two levels of redundancy for optimal data protection.

For this purpose, the recommended configuration is **RAID-Z2**, which was evaluated during the certification process and demonstrated high resilience and performance. Alternatively, if mirror groups are used, an at least 3-way mirror setup is advised to ensure adequate redundancy and minimize the risk of data loss during disk replacement or rebuild operations.

Proper redundancy planning plays a crucial role in maintaining system integrity, especially when deploying high-capacity drives like the **Seagate Exos M 30TB ST30000NM004K** in enterprise storage environments.