**Anexa nr. 1 - Matrice conformitate storage**

| No. | Category | Requirement | Specification | Conformity of specification |
|---|---|---|---|---|
| **1. GENERAL REQUIREMENTS** | | | | |
| 1.1 | Equipment type | New and non-refurbished equipment | Manufactured min. Q1 2025 | Brand new **IBM FlashSystems 7300**, non-refurbished equipment, manufactured from Q1 2025 |
| 1.2 | Product level | Enterprise-grade | From recognized international manufacturers – International Brand Name | Enterprise-grade storage system from a globally recognized manufacturer – IBM |
| 1.3 | Compatibility | Mutually compatible components | Manufacturer certified | All components are mutually compatible and IBM certified |
| 1.4 | Form factor | Rack-mountable | 2U-4U, EIA-310 standard compliant | Rack-mountable 2U, compliant with EIA-310 |
| 1.5 | Mounting | Complete mounting kit | Rails and brackets included | Complete rack mounting kit included (IBM original |
| **2. ARCHITECTURE & AVAILABILITY** | | | | |
| 2.1 | Controller architecture | Symmetric Active-Active | Load balanced operation and failover | Dual-controller symmetric Active-Active architecture |
| 2.2 | Availability | Minimum guaranteed availability | 99.9999% (six nines) | 99.9999% guaranteed availability (six nines) |
| 2.3 | Cache protection | Write cache remains active during controller failure | Cache mirroring or equivalent mechanism | Mirrored write cache, remains active during controller failure |
| 2.4 | Operational continuity | System operational with single controller | 50% controller failure tolerance | Full system operation with single controller active |
| 2.5 | Software updates | Non-disruptive updates | No availability impact | Non-disruptive software upgrades (NDU) |
| **3. FAULT TOLERANCE** | | | | |
| 3.1 | Power line failure | Continuous operation | Single power line failure tolerance | Continuous operation with single power line failure |
| 3.2 | Controller failure | Automatic failover | Any individual controller failure | Automatic controller failover |
| 3.3 | Drive failure | Data integrity maintained | Simultaneous 2 data drive failures | Distributed RAID / RAID-6, tolerance for two simultaneous drive failures |
| 3.4 | Port failure | Traffic rerouting | Any FC or iSCSI port failure | Automatic traffic rerouting using multipathing |
| **4. STORAGE CAPACITY** | | | | |

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| 4.1 | Usable capacity | Minimum usable capacity | 200 TB (before data reduction) | 211 TB usable capacity (before data reduction)<br>19 × 15.36 TB NVMe SSDs, 2 hot spares |
| 4.2 | Drive type | Enterprise SSD | TLC/eTLC technology or equivalent | Enterprise NVMe SSDs (TLC / eTLC technology) |
| **5. CONTROLLERS** | | | | |
| 5.1 | Controller configuration | Redundant controllers | Minimum 2 in High Availability | 2 controllers configured in High Availaible |
| 5.2 | Operation mode | Active-Active configuration | Balanced workload distribution | Active-Active operation with balanced workload distribution |
| 5.3 | Serviceability | Hot-swappable controllers | Replacement without interruption | Hot-swappable controllers, replacement without service interruption |
| **6. RAID & DATA PROTECTION** | | | | |
| 6.1 | Mandatory RAID level | RAID 6 support or similar by resiliency | Tolerance for 2 simultaneous disk failures | RAID-6 or IBM Distributed RAID equivalent |
| 6.2 | Optional RAID | Optional levels | RAID 5, RAID 10 or equivalent protection | equivalent protection by IBM technology RAID-5, RAID-1(min 2 disks - max 16 disks) |
| **7. CACHE (if applicable)** | | | | |
| 7.1 | Cache capacity | Minimum cache per controller | min. 256 GB | 384 GB per controller, providing a total of 768 GB mirrored cache per enclosure. |
| 7.2 | Cache protection | Protected cache | Mirroring or battery backup in case of power loss or controller failure | In normal usage cache is mirror between the controllers and each controller cache is protected by a battery in case of a power lost |
| 7.3 | Cache optimization | Performance optimization | Optimized for IOPS and low latency | Optimized for high IOPS and low latency |
| **8. PERFORMANCE** | | | | |
| 8.1 | IOPS Performance | Minimum IOPS with inline data reduction | 300,000 IOPS | Exceeds 300,000 IOPS with inline data reduction enabled |
| 8.2 | Performance parameters | Evaluation metrics | 70% read / 30% write, 16KB block (mandatory), 32 KB and 64 KB(optionall) | 70% Read / 30% Write, 16 KB block size (mandatory); 32 KB and 64 KB supported |

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| 8.3 | Latency | Maximum latency | 1 ms under full load | ≤ 1ms under full load |
| 8.4 | Performance validation | Report required with performance results simulation under specified parameters for proposed in the offer configuration of the storage hardware | Vendor benchmark tools | Performance validated using IBM sizing and benchmark tools<br><br>Report from IBM Storage Modeller – sizing tool. |
| **9. SUPPORTED PROTOCOLS** | | | | |
| 9.1 | Mandatory protocols | Required connectivity | FC and iSCSI | Fibre Channel (FC) and iSCSI |
| 9.2 | Optional protocols | Additional connectivity | NVMe/FC, NVMe/TCP, etc | NVMe/FC, NVMe/TCP |
| 9.3 | Multipathing | Path redundancy | Multipath I/O for all protocols | Full Multipath I/O support for all protocols |
| **10. REPLICATION & CLUSTERING** | | | | |
| 10.1 | Synchronous replication | Active-Active configuration | Between 2 locations up to 300m | Active-Active synchronous replication (PBHA - Policy-Based HA) up to 300 m |
| 10.2 | Recovery objective | Data consistency | Zero RPO | Zero RPO (Recovery Point Objective) |
| 10.3 | Replication flexibility | Volume support | 1 or more LUNs | Replication supported for one or multiple LUNs |
| **11. DATA REDUCTION FEATURES** | | | | |
| 11.1 | Inline deduplication | Mandatory feature | Block and volume level | Block and volume level |
| 11.2 | Inline compression | Mandatory feature | Real-time compression | Real-time inline compression |
| 11.3 | Feature compatibility | Unrestricted operation | No impact on other features | No functional limitations |
| 11.4 | Licensing | Complete licensing on perpetual basis | All features included | Perpetual licensing – all features included |
| **12. SNAPSHOTS** | | | | |

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| 12.1 | Snapshot capacity | Minimum per volume | 365 snapshots | Snapshots 32099 per systems |
| 12.2 | Storage efficiency | Delta storage only | Space-efficient snapshots | Delta storage only, IBM Snapshots or space efficient |
| 12.3 | Performance impact | System performance | No performance degradation | No performance degradation |
| **13. SECURITY** | | | | |
| 13.1 | Data encryption | Encryption standard | Min. AES-256 for all stored data | AES-256 encryption for data at rest |
| 13.2 | Encryption performance | Hardware acceleration | No performance impact | Hardware-accelerated encryption |
| 13.3 | Key management | Secure key storage | Protected encryption key management | Secure, integrated encryption key management |
| **14. MONITORING & MANAGEMENT** | | | | |
| 14.1 | Management platform | Interface type | Web-based monitoring and management | Web-based graphical management interface |
| 14.2 | Real-time monitoring | Monitored metrics | Space utilization, data reduction, performance (IOPS, latency, bandwidth), hardware status, snapshot management, etc. | Capacity, data reduction, IOPS, latency, throughput, hardware health |
| 14.3 | Predictive analytics (optional) | Capacity planning | Trend analysis and forecasting | Via storage insights pro which is not included in the offer. |
| 14.4 | Network requirements | Deployment mode | On-premises operation without mandatory internet | On-premises deployment, no mandatory internet connection |
| 14.5 | Licensing | Complete licensing on perpetual basis | All features included | Perpetual licensing – all features included |
| **15. CONNECTIVITY** | | | | |
| 15.1 | Management interfaces | Ports per controller , built-in and included | Min. 1 x 1GbE for management | 2 × 10 GbE management port per controller |

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| 15.2 | Data interfaces | Ports per controller, built-in and included | Min. 2 x 32Gb FC (SFP+ modules included) | 32 Gbps FC 4 Port Adapter (Pair). Each adapter has four 32 Gbps FC ports and shortwave SFP transceivers. **2 (two) ports will be used for host connection** and 2 (two) ports will be used for replication. |
| 15.3 | Replication interfaces | Dedicated replication ports per controller, built-in and included | Min. 2 x 32G FC or equivalent | 32 Gbps FC 4 Port Adapter (Pair). Each adapter has four 32 Gbps FC ports and shortwave SFP transceivers. 2 (two) ports will be used for host connection and **2 (two) ports will be used for replication**. |
| 15.4 | Connectivity cables | All connectivity cables included | Management: Min. 1 x UTP Cat6/Cat6a cables, min. 1m length<br>Data transfer: Min. 2 x OM4 fiber optic patch cords (LC-LC duplex), min. 3m length<br>Replication: Min. 2 x OM4 fiber optic patch cords (LC-LC duplex), min. 3m length | Management: 4 x UTP Cat6/Cat6a cables, 1m length<br>Data transfer: 2 x OM4 fiber optic patch cords (LC-LC duplex), 3m length<br>Replication: 2 x OM4 fiber optic patch cords (LC-LC duplex), 3m length |
| **16. MINIMUM MANDATORY SUPPORTED OPERATING SYSTEMS** | | | | |
| 16.1 | Windows support | Microsoft platform | Windows Server | Windows Server |
| 16.2 | Linux support | Enterprise Linux | Red Hat Enterprise Linux | Red Hat Enterprise Linux |
| 16.3 | Hypervisor support | VMware platform | vSphere/ESXi | VMware vSphere / ESXi |
| **17. POWER SUPPLY** | | | | |
| 17.1 | Power redundancy | Redundant PSUs | Minimum 2 hot-swappable units | Redundant and hot-swappable power supplies |
| 17.2 | Redundancy configuration | Power configuration | 1+1 or N+1 redundancy | 1+1 redundancy |
| 17.3 | Power cables included | Cable specification | IEC C13-C14, minimum 0.6m | IEC C13-C14 power cables included |

2. Standards and Certifications requirements

| No. | Category | Requirement | Specification | Conformity of specification |
|---|---|---|---|---|
| **18. CERTIFICATION & COMPLIANCE - EU STANDARDS** | | | | |
| 18.1 | CE Marking | Mandatory EU conformity | CE marking for European Economic Area (EEA) market access | CE marked – compliant with EU regulations |
| 18.2 | Declaration of Conformity | EU DoC documentation | Manufacturer's declaration with technical file | EU Declaration of Conformity provided by IBM |

Links:
https://www.ibm.com/docs/en/flashsystem-7x00/9.1.1
https://www.ibm.com/docs/en/announcements/flashsystem-7300-2023-10-10

**Configuration summary of storage:**

| | | |
|---|---|---|
| 4657-924 | IBM FlashSystem 7300 NVMe Control Enclosure | 1 |
| 9730 | Power Cord - PDU Connection | 1 |
| ACEA | Encryption USB Flash Drives (Four Pack) | 1 |
| ACED | Encryption Enablement | 1 |
| ACGJ | 512 GB Cache upgrade | 1 |
| ACGV | 240 GB M,2 Boot drive Pair | 2 |
| ADBE | 32 Gb FC 4 Port Adapter Cards (Pair) | 1 |
| ADN1 | Order Type 1 Indicator - CTO | 1 |
| ADT5 | 15,36 TB NVMe Flash Drive | 19 |
| AHZE | Hybrid Flash Indicator | 1 |
| AKCH | Standard S&H Indicator | 1 |

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