

Ref. #	Topic	Subtopic	Stakeholder Comment	EPA Response
1	Definition	Computer Server	A stakeholder requested that the Version 2.0 Computer Server specification be referenced in this definitions.	EPA has updated the Computer Server definition in the Final Specification to harmonize with the V2.0 Computer Servers Final Program Requirements definition.
2	Definition	Product Family	<p>Several stakeholders agreed with the use of flexible as well as fixed bounds for qualifying product families. One stakeholder specifically mentioned their support for allowing a percentage difference of 15% in the performance per watt metric to qualify minimum and maximum configurations. Other stakeholders encouraged EPA to consider flexible limits at -25% or less and +10% or higher for a configuration because some products may not meet the 15% performance threshold at -40% or +15%. They stated that manufacturers should be able to expand the qualification range beyond the -20% and +5% stated in the requirements where they cannot meet the requirement broader testing range.</p> <p>A stakeholder suggested that it be clarified that the flexible maximum and minimum qualification configuration data may be rounded up to the nearest drawer boundary. Another commenter requested a methodology with supporting calculations and rules to derive the qualifying product ranges to submit optimized data.</p>	<p>EPA thanks stakeholders for their support on the changes to product family in the Final Draft Specification. EPA is not making any additional changes to the qualification range language in the Final Specification.</p> <p>EPA has included additional guidance in the Mixed Qualification Criteria definition which provides clarity on when a fixed testing point may used in place of a flexible testing point to extend the range of qualification of a product family. EPA provided examples of product family creation through a slide deck distributed to industry in May 2013, as well as examples presented in person during the SNIA Emerald training session in Colorado Springs, CO in late June 2013.</p>
3	Definition	Single Device Combinations	<p>A stakeholder stated their support for the drawer rounding approach because it will allow companies to have the option of selecting an approach that provides the most efficient system for their products.</p> <p>Two stakeholders proposed that the language pertaining to maintaining device percentages when rounding be clarified to state that the ratios be maintained as closely as possible rather than precisely (as it is in 1.1.7.ii).</p> <p>Another stakeholder requested examples of how the single device concept would be used to manage a multi-storage device product. They asked if their understanding was correct: The relationship of device counts between groups of storage devices can be represented by a ratio of 1:x:y:z, where the 1 is set against the smallest number of devices in the multi-device system and x, y, and z represent the ratio of the other devices to the device type that is represented in the smallest quantity.</p>	<p>EPA thanks stakeholders for their comments on drawer rounding.</p> <p>EPA has clarified language in the Final Specification regarding maintaining device percentage ratios in automated storage tiering solutions.</p> <p>See Index #2</p>
4	Definition	Mixed Qualification Range	A stakeholder stated that it is not clear how to determine the optimal point for a system with multiple device types that employs automated storage tiering.	It is up to the manufacturer to identify the optimal point in a mixed storage device solution with automated storage tiering, as this configuration will be dependent on proprietary variables including hardware and software implementation.
5	Definition	Scale-Up/Scale-Out	A stakeholder supported the use of the terms "scale-up" and "scale-out" as opposed to centralized and distributed.	EPA thanks stakeholders for this comment.
6	Definition	Advanced Data Recovery Capability	Two stakeholders supported the expansion of the definition of Data Recovery to include technologies other than RAID.	EPA thanks stakeholders for this comment.

7	Definition	Object Based Storage	A stakeholder pointed out that there is no definitions for Object Based Storage.	EPA feels it is too late in the development process for new definitions to be added that are not essential for the function of the specification. The current Version 1.0 specification works fine without this definition, though future scope expansions in Version 2.0 and beyond may eventually require developing such a definition. EPA looks forward to working with stakeholders on this issue in the future.
8	Power Modeling	Presale Tool	A stakeholder requested that the power modeling presale tool would be stated as a requirement as opposed to an expectation. If this is difficult to comply with, they suggested it be included as a consideration for future revisions.	EPA thanks the stakeholder for this comment, but will retain the current language on the power modeling presale tool as it may be difficult to comply with.
9	Information Reporting Requirements		A stakeholder supported the clarifications made to Tables 5 and 6 which delineate what metric data need to be reported to EPA and what will be published on the ENERGY STAR website. This commenter also agreed with the addition of the Hot Band workload to the data reported to EPA and published on the website because it is critical to properly assess storage system performance per watt characteristics.	EPA thanks the stakeholder for this comment.
10	Information Reporting Requirements	Workload Weighting Requirements	<p>A stakeholder expressed concern that the SNIA Emerald test results are not yet understood and it would be premature to attempt to modify or weight the sequential read and write scores. They recommended that EPA gather substantially more data to assess the best use of the SNIA metrics to measure product energy efficiency. At a minimum, this commenter requested the sequential read and write scores be reported unweighted and weighted on the ENERGY STAR webpage so that the results are clear. One stakeholder noted that it is appropriate that EPA require reporting of SNIA Emerald metrics, including Hot Band data in Version 1.0 rather than trying to set specific performance/power thresholds.</p> <p>Several stakeholders asked for further clarification on the methodology to incorporate the weighting for the 70%/30% split on the sequential reads and writes into published scores. One of these stakeholders asked if EPA intends to apply this sequential I/O weighting to the spindle counts that result for the optimal and boundary configuration points. They requested that the device count for the optimal configuration be set by the sequential read configuration because writing will play such a small part in the actual workload.</p>	After additional discussion with industry, EPA has revised the streaming optimization section to require 50%/50% split for sequential reads and writes when optimizing for a streaming workload. EPA has discussed the methodology for incorporating the weighting into published scores with industry in a series of recent meetings, and has been informed that any questions on the methodology have been answered adequately. For any additional clarifications, please contact EPA at Meyers.Robert@epa.gov or John.Clinger@icfi.com.
11	Testing Requirements		One stakeholder recognized the benefits of the restructuring of the testing requirements section.	EPA thanks the stakeholder for this comment.

12	Information Reporting Requirements		<p>A stakeholder asked if they should first choose the biggest seller device type for a given workload and test for the Optimal Point qualification range. At that point, it is possible to select other device types to do more qualification range testing. One stakeholder stated that it would be more appropriate to say that a manufacturer may determine to submit rather than test a Fixed, Flexible and Mixed Qualification Range.</p> <p>Another stakeholder recommended that EPA add specific language to state the intent that SSDs can be included in a qualified mixed drive configuration built without testing the SSD drive.</p>	<p>EPA has revised this language to state that the manufacturer shall choose the representative highest <i>predicted</i> deployed volume of a storage device. This allows manufacturers to focus on the storage device they anticipate will be the largest seller during the life of product certification, rather than potentially on a device which has sold significantly in the past, but is no longer a focal point of the product family.</p> <p>EPA has clarified that SSDs must be tested when used as part of an automated storage tiered mixed storage device solution.</p>
13	Information Reporting Requirements	Modeled Data	Two stakeholders supported the decision to allow the use of validated performance and power models to generate qualification data.	EPA thanks stakeholders for this comment.
14	Public Information	General	Several stakeholders suggested that EPA consider a process of reviewing initial submissions with an industry body to ensure the data to be published is consistent and well-vetted. They requested that the review period could cover the first months of submissions, during which the data could be made anonymous.	EPA agrees that a review period would be desirable for the collected data and is currently exploring ways to make the data available anonymously for a limited period of time. Since the effective date is currently listed at the beginning of December and testing and certification will take some time, EPA will look to hold a review meeting in late Q1 2014.
15	Public Information	Product Characteristics	A stakeholder stated that the product characteristics may vary with the actual configuration under test, as different device types may require different drawer types. They stated it will be difficult to match the components of a single dataset.	EPA is collecting product characteristics on all configurations tested for ENERGY STAR certification, collecting the data through Qualified Product Exchange (QPX) XML system.
16	Public Information	Qualified System Configurations	Two stakeholders pointed out that these requirements should state performance/power scores and not absolute power or performance scores. One of these commenters stated that it was unclear what information is being requested in 3.5.7.iii.	See Index #15
17	Public Information	ASHRAE	Several stakeholders asked which selected data from the ASHRAE Thermal Report is being requested to be displayed on the ENERGY STAR website. They also stated that since temperature and humidity readings are already recorded for each test, this requirement should be removed.	EPA has simplified and clarified the thermal reporting requirements in the Final Specification.
18	Public Information	Energy Efficiency Performance	One stakeholder requested a definition for energy efficiency performance data be provided. They stated that the appropriate meaning of this term is confused by the separate reference to performance/watt data in 3.3.1. This commenter asked if EPA could specify units for active and idle state efficiency test results in Table 7 as well, assuming they are IOPS per watt for active and GB per watt for capacity.	EPA has clarified that the energy efficiency performance data in Table 7 refers to the performance/watt data appropriate for each optimization type.
19	Public Information		A stakeholder asked for further clarification on the methodology to incorporate the weighting for the 70%/30% split on the sequential reads and writes into published scores.	See Index #2

20	Product Family Variation		<p>One stakeholder noted that the revised product family requirement that allow for replacement drives make testing more efficient and reduce the quantity of testing while still providing EPA with data needed to evaluate representative metrics.</p> <p>A stakeholder noted that the CBs will need to review proprietary vendor drive data sheets under a NDA to evaluate all the criteria listed in 3.6.2. As a result, stakeholders suggested that EPA should require that the CB certify the replacement drive criteria are met and agree that only the generic drive specification sheets from the device vendor's website be supplied to EPA to support identification of replacement drive types.</p> <p>Another stakeholder asked if system retesting will be required if a set of product changes are made that are suspected of leading to a greater than 20% shift in the overall system performance/watt.</p>	<p>EPA thanks the stakeholder for this comment.</p> <p>EPA has clarified to manufacturers that CBs may review whichever storage device data sheets they feel is necessary to certify a replacement device. All storage device replacement criteria will be certified by the CB and the resulting storage device data sheets will not be passed along to the EPA.</p> <p>Systems that surpass the 20% limit on increased performance/watt of the storage product as a whole will require a retest for a new submission for that product family.</p>
21	Product Family Variation	Transfer Speed	<p>Two stakeholders noted that the transfer speed is listed as a variable that must not change even though the Sustained Transfer Rate has been given flexibility. These commenters stated that this is a contradiction because a change to transfer speed from the disk to its interface may make no difference to the actual data transfer rate as it is likely to be capped by device and bus interfaces.</p>	<p>EPA has clarified that a Replacement Storage Device may contain new transfer speeds providing the new speeds are not able to be utilized in the storage system due to architectural / design limitations (e.g., new transfer speeds not supported by the host bus adapter).</p>
22	Data Elements		<p>A stakeholder requested clarification on what the phrase "discretion of the user" meant during a discussion regarding data elements.</p>	<p>The language referenced in this comment was part of a note box explaining the changes to the data elements section of the Final Draft Specification, specifically explaining how different implementations may be chosen to measure power and temperature at a system level. All note boxes from the Final Draft Specification have been removed in the Final Specification.</p>
23	Sampling Requirements	Inlet Air Temperature	<p>A stakeholder proposed that the inlet air temperature requirements be optional in Version 2.0 because products with high scalability require a specific placement of thermal sensors and also how to report data to end users. These factors largely affect product development.</p>	<p>EPA cannot determine inlet air temperature requirements for the Version 2.0 Storage Specification at this time.</p>
24	Sampling Requirements	Rolling Average	<p>A stakeholder stated that the simplification resulting from the removal of the rolling average requirement for input power will eliminate a potential source of confusion.</p>	<p>EPA thanks the stakeholder for this comment.</p>
25	Sampling Requirements	Timestamping	<p>One stakeholder noted that timestamping should be optional.</p>	<p>The timestamping requirements are only required for storage products which implement timestamping. The capability itself is not required.</p>
26	Documentation Requirements		<p>Several stakeholders noted that temperature reporting should be optional to provide manufacturers time to incorporate temperature measurement capabilities into their systems. One of these stakeholders suggested providing the time period and sampling rate used along with language that specifies the rolling average is not required as the noteboxes will be removed for the final version.</p>	<p>EPA has clarified Section 3.7.4 that air inlet temperatures are optional.</p>

27	iPDUs		<p>A stakeholder recommended the requirements of sales, delivery and support by manufacturers be optional in order for customers to have the flexibility to purchase iPDUs from other vendors. As an example, they stated a customer could have previously purchased an iPDU from another vendor and then purchase an ENERGY STAR certified storage product that can use this iPDU.</p>	<p>EPA would like to clarify that storage products which cannot provide the input power reporting requirement internally must have the option to be purchased with an iPDU in the same place that the purchaser is purchasing the storage product. The purchaser is not required to acquire the iPDU from the same vendor as the storage product, but it must be an available option in this scenario.</p>
28	Considerations for Future Revisions		<p>One stakeholder requested that the rolling average calculation be included in considerations for future revisions because it is beneficial for users and they may be able to find a solution to the issue of varying time scales for averages.</p> <p>Another stakeholder suggested the following for the Version 2.0 specification:</p> <ul style="list-style-type: none"> • Usage of market data with respect to the number of options that exist in the market and the overall volume of sales. The emphasis should be on those segments of the market that would generate notable savings when aggregated and where the incremental costs of improved efficiencies are outweighed by the incremental savings within the useful life of the product. • Avoid considering specific technology solutions, but instead identify areas that might yield effective savings will not hindering the functional end-user requirements of products in respect to their performance, RAS, useable scalability, or other aspects important to data center operations. <p>A stakeholder also stated that the right sizing and system management offerings involve tradeoffs between energy efficiency, expandability, and system flexibility which has energy and material use implications.</p>	<p>EPA has added potential rolling average calculation requirements in the Version 2.0 Storage Specification. EPA has also added inlet air temperature sensing as a potential requirement in Version 2.0.</p>
30	Device Qualification		<p>A stakeholder expressed concern regarding appropriately communicating which storage device types and combinations of those devices are ENERGY STAR certified due to the large number of permutations of devices and combinations. They requested that EPA be flexible in accepting approaches for defining qualifies systems and be open to discussions with manufacturers.</p>	<p>EPA has held additional discussions with industry on this topic, and welcomes any additional questions on the creation of product families and qualification range of particular storage products.</p>
32	Data Submission		<p>One stakeholder supported the EPA in ensuring that non-anonymized data is published from the point the specification comes into effect because the Final Draft is less stringent in terms of tolerances and the main goal of the specification seems to be to provide a data foundation for future revisions.</p>	<p>See Index #14.</p>
34	Verification Testing		<p>Two stakeholders agreed with EPA that Verification testing for Data Center Storage products would have added a significant complexity and not provide benefits.</p>	<p>EPA thanks stakeholders for these comments.</p>