Questions and Responses on Clothing Storage Unit Stability Testing (16 CFR 1261)

NOTE: These questions and responses were presented at the January 30, 2023 meeting on testing clothing storage units (CSUs) to the stability requirement in the new CPSC Safety Standard for Clothing Storage Units, 16 CFR 1261. Questions were provided to staff by members of the public and are presented verbatim here. Note that questions are presented in the form asked, and posting here does not mean that CPSC agrees with the statements contained therein..

Question: Should Test method 1 be used for any case with drawers that extend at least 6 inches past the fulcrum, even if this is not the most onerous test (for example if the case also has doors)?

Response: Yes, Test Method 1 should be used for any case with extendable elements that extend past 6 inches, including those that have doors in addition to extendable elements.

All CSUs are tested to determine their tip over moment, which is the rotational force required to cause them to tip over. The tip over moment is then compared to calculated comparison moments in order to determine whether the unit meets the stability requirement. The comparison moments are based on the dimensions of the CSU, including door length, and represent the forces that children can exert on the CSU while climbing or pulling on the CSU.

For a unit with doors, even though weight is not placed on the doors, the configuration of the product and the comparison moments factor the doors into the test.

Question: Is the handhold height in this rule only for the calculation? Or is it intended to be a placement for weights?

Response: The handhold height is used in the calculation for the third comparison moment, which is the one that is related to a child pulling on a unit.

No part of the stability test requires weight or force to be applied at this height.

Question: There is concern about how to identify exactly when the case begins to tip forward for freefall. It is extremely difficult to do this safely in lab conditions and determine if the case will truly freefall or restabilize. How would you recommend we document this "freefall" moment with minimal risk to lab personnel?

Response: Laboratory safety is always a priority, regardless of whether the product being tested is a CSU. Test labs will likely already have safety procedures in place for furniture testing, and similar procedures would apply here. Individual labs should develop their own safety procedures. It may be appropriate, for instance, to have a

second person present to prevent the CSU from falling on the person placing the weights, as shown in the testing demonstration video. Alternatively, the tester could have a structure offset from the test unit that could act to catch the tipping unit at an angle past the tipping point.

Question: Rounding on measurements and weights are unclear. Is rounding allowed and to what amount for each?

Response: As with other product testing, distances and weights should be measured to a reasonable precision using test equipment that has been calibrated and has a known accuracy based on its calibration certificate. If the level of precision affects whether the unit passes or fails, it may be appropriate to make design changes to increase the stability of the unit. Rounding of calculated values based on measurements should be done at the end only, and using standard rounding protocols.

Question: There are a number if drawer inserts that will interfere with the correct loading of drawers (silver dividers, jewelry trays, etc.). Should these inserts be removed for testing? If not, how should they be treated?

Response: In general, removable drawer inserts that make a CSU more stable should be removed during testing, to test the CSU configuration most likely to cause tip over. Drawer inserts could also be removed during testing if they have a negligible effect on stability.

If drawer inserts are retained in a drawer that requires fill weights, testers should create fill weights that work with the geometry of the drawer inserts. Section 1261.4(b)(8)(i) specifies that fill weights are placed at the center of the bottom surface of each extendable element and consist of “a uniformly distributed mass in pounds, that is at least 8.5 pounds per cubic foot times the functional volume for open extendable elements,” and “no more than 8.5 pounds/cubic foot times the functional volume (cubic feet)” for closed extendable elements. The design, material, and construction of fill weights is left up to the manufacturer/tester.

For questions about specific instances, manufacturers and testers can contact Compliance staff, or the Small Business Ombudsman.

Question: If there are only two drawers that have the same approximate volume (variable by a small amount that could possibly be equivalent based on rounding and an interlock is used, would the case be tested weighted in one drawer or empty?

Response: If a unit has two drawers with equal functional volume and an interlock that allows one to open at a time, the unit would be tested per Section 1261.4(b)(8)(i), which contains instructions for placing fill weights when “50 percent or more of the extendable elements by functional volume are open.” Fill weights would be placed in both the open drawer and the closed drawer, and, assuming that the drawers had the same design

(*e.g.,* weight, and drawer extension), the unit would be tested with the drawer in the highest position open, since this would be the configuration most likely to cause tip over.

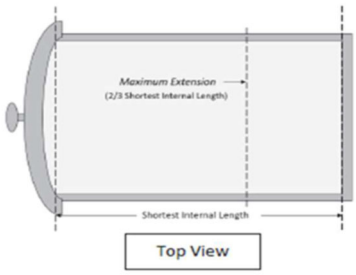
Question: Should the horizontal force be applied in the center of the width of the top or on the top edge?

Response: The regulatory text for Test Method 2, which is the test method that uses a horizontal force, states, "[r]ecord the vertical distance from where the center of force will be applied to the fulcrum. Gradually apply over a period of at least 5 seconds a horizontal force to the unit orthogonal to the fulcrum to cause the unit to tip over." (Section 1261.4(c)(2)). The appropriate force application method and location is left up to the tester, and may differ depending on the unit design.

Question: The final rule does not address furniture on casters. How should a unit on casters be tested?

Response: Like other CSUs, a unit with casters should be placed on a hard, level, and flat test surface in the orientation most likely to cause tip over. Testers should consider the potential effect of the casters on the orientation most likely to cause tip over (*e.g.*, does the position of the caster change the fulcrum). If necessary, secure the unit from sliding without preventing tip over. Tilt the unit forward by placing the test block(s) under the unit's most rear floor support(s) (*i.e.*, the rear casters) such that either the entire floor support contact area is over the test block(s), or the back edge of the test block(s) is aligned with the back edge of the rear floor supports.

Question: How does the agency suggest calculating the bottom surface area of an extendable element with a curved or scalloped bottom? Will the agency recommend taking an average of the shortest and longest dimensions [see figure below]?



Response: The actual volume including the curved area shall be calculated. The area of the bottom surface can be calculated using a measuring device and geometry.

Question: What are the tolerances for the test block?

Response: Per the definition of test block in Section 1261.2(v), a test block is "constructed of a rigid material, such as steel or aluminum, with the following dimensions: at least 0.43 inch thick, at least 1 inch deep, at least 1 inch wide."

Question: What are the 'test block' dimensions used to simulate carpet as required by Test Method 1?

a. *The rule states: 'at least 0.43 inch thick, at least 1 inch deep, at least 1 inch wide'. Without defined tolerances for the block's dimensions, the block used by different labs for testing will have conflicting dimensions leading to variations in the calculus used to determine the stability rating.*
b. *Define 'at least' in the description above.*

Response:

"At least" means the minimum thickness cannot be less than 0.43 inches. Testers should ensure that the test block is not less than 0.43 inches thick.

Question: There is no tolerance for the weights or total volume used to determine the fill weight for extendable elements. Again, the final rule states: 'the fill weight in open extendable elements must be at least 8.5 pounds/cubic foot times the functional volume (cubic feet).'

a. *Can CPSC provide instructions, diagrams, and fill materials of the fill weights?*
b. *Will the agency provide tolerances for the weights used once the fill weight is calculated for each extendable element?*
c. *Will the agency be rounding to 1-lb., 0.5-lb., or 0.1-lb.?*
d. *Define 'at least' and 'no more than'. As written, you could load the closed elements with as little as no weight and could load open elements with any weight desired.*

Response:

a. The design, material, and construction of fill weight is left up to the manufacturer/tester, as long as it is uniformly distributed. The testing demonstration video shows one possible method to build fill weights.

b. The minimum (for open extendable elements) and maximum (for closed extendable elements) weights are provided in Section 1261.4(8)(i) of the regulatory text. It is up to the manufacturer/tester how close they want the weights to be to the stated minimum or maximum.

c. For the testing demonstration video, CPSC staff measured fill weights to the gram and measured dimensions used in volume calculations to the nearest 1/16 inch.

d. "At least" means "no less than."

Question: There are no instructions on how to apply the weight to the 'front of the drawer'.

a. *Will CPSC staff provide instructions on how to apply the weights?*
b. *Will CPSC staff provide instructions on how to apply the weights to multiple drawers?*

Response: The regulatory text for Test Method 1 in Section 1261.4(c)(1) says, "[g]radually apply over a period of at least 5 seconds weights to the face of an extended extendable element of the unit to cause the unit to tip over. The weights are to be placed on a single drawer face or distributed evenly across multiple drawer faces or as adjacent as possible to the pull-out shelf face. The weights shall not interfere with other extended extendable elements."

Question: What 'loading device' will CPSC use to apply the force to the drawer face?

Response: For the Test Method 1 procedure to determine tip-over moment, the rule specifies that weights are applied to the face of an extendable element. The design, material, and construction of weight is left up to the manufacturer/tester. The testing demonstration video shows examples of possible weights.

Question: Test Method 1 states "weights". Should we read this as only weights are allowed and not an applied force by other means?

Response: Yes, the Test Method 1 procedure to determine tip-over moment specifies the use of weights to apply force.

Question: Where does staff recommend applying the test weights?

i. *The language states: 'the weights are to be placed on a single drawer face or distributed evenly across multiple drawer faces or as adjacent as possible to the pull-out shelf face.'*
ii. *Will the 'weights', e.g., lead filled shot bags or a test apparatus like the one designed for ASTM F2057, be allowed to extend inside the drawer and/or forward of the load application point?*
iii. *Will tolerances be provided for the weights used?*
iv. *Will rounding be to 1-lb., 0.5-lb., or 0.1-lb?*
v. *Will there be a diagram of a test apparatus illustrating dimensions, materials, tolerances, and construction?*

Response:

ii. As discussed in the response to the earlier question, the regulatory text in Section 1261.4(c)(1) says, "Gradually apply over a period of at least 5 seconds weights to the face of an extended extendable element of the unit to cause the unit to tip over. The weights are to be placed on a single drawer face or distributed evenly across multiple

drawer faces or as adjacent as possible to the pull-out shelf face. The weights shall not interfere with other extended extendable elements."

The tester must determine where the center of gravity of the weights will be applied. This will be easier if the weights do not extend far from the center of the drawer face.

iii. The design, material, and construction of weights is left up to the manufacturer/tester.

iv. The testing demonstration video shows examples of possible weights that are configured to measure tip weight to sufficient accuracy.

v. As with the response to the earlier question, I design, material, and construction of weights is left up to the manufacturer/tester.

Question: When modifying the CSU to achieve a stability rating of 1 or greater, the added weight presents several challenges:

- *i. Safety issues for the technician applying 60+ pounds to the top extendable element that would most likely cause tip-over.*
- *ii. Drawer guides will be stressed and potentially bend or break – how does CPSC staff intend to address broken components; will chocking be allowed?*
- *iii. The addition of the weight will cause the drawer front to 'bow down'. This affects the distance of the drawer front from the fulcrum. How will CPSC staff address this issue?*

Response:

i. As answered earlier, laboratory safety is always a priority, regardless of whether the product being tested is a CSU. Test labs will likely already have safety procedures in place for furniture testing, and similar procedures would apply here. It may be appropriate, for instance, to have a second person present to prevent the CSU from falling on the person placing the weights, as shown in the testing demonstration video, or to have a structure offset from the test unit that can act to catch the tipping unit at an angle past the tipping point.

ii: Section 1261.4(c)(3) states, "[i]f a failed component prohibits completion of the test, then to continue testing, the failed component(s) must be repaired or replaced to the original specifications, or the component(s) must be replaced and the test repeated with the failed component(s) secured to prevent the component(s) from failing, as long as the modifications do not increase the tip-over moment." So, for example, shimming of a drawer, as shown in the testing demonstration video, is allowed, so long as the modification does not add substantial weight to the case.

iii: The *horizontal distance from where the center of force will be applied (the center of gravity of the weights to be applied) to the fulcrum* is measured in Section 1261.4(c)(1) before the weights are applied.

Question: If all drawers can be opened, but the center of the loading is on the unit's side of the fulcrum, shall the drawers still be loaded? (An empty unit is tipping easier in this case)

Response: You should follow the regulatory text in Section 1261.4(b)(8)(i), which says, "[i]f 50 percent or more of the extendable elements by functional volume are open, place a fill weight in the center of the bottom surface of each extendable element… that consists of a uniformly distributed mass in pounds. The fill weight in open extendable elements must be at least 8.5 pounds/ cubic foot times the functional volume (cubic feet)…. If necessary, secure the fill weights to prevent sliding."

Question: How to assess a unit that slides when Test Method 2 applies the force? Slide prevention will to different extent affect when tip over occurs. Is it ok to block front legs with ½ inch high blocks that many test labs use?

Response: The regulatory text in Section 1261.4(b)(2) says, "[i]f necessary, secure the unit from sliding without preventing tip over." We recommend contacting Compliance staff, or the Small Business Ombudsman, to address product-specific testing questions.

Question: Extendable element extension from fulcrum distance is defined on a flat surface but the Test Methods indicate that it should be measured when tilted. When should the measurement be taken?

Response: The *extendable element extension from fulcrum distance* is measured in Section 1261.4(b)(4), after placing the unit on a hard level and flat test surface (in Section 1261.4(b)(2)), and before tilting the unit (in Section 1261.4(b)(5)).

Question: In setting up the unit, it states: 'measure the longest extendable element extension from the fulcrum, then tilt forward.' Is this measurement used in the performance requirement equation before the CSU is tilted forward? This is a critical measurement in determining the stability rating of the unit:

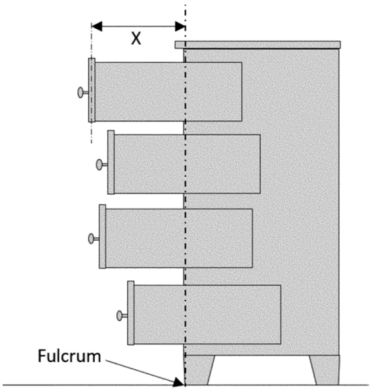
a. *(d) Performance Requirement: the tip-over moment of the clothing storage unit must be greater than the threshold moment, which is the greatest of all the following applicable moments.*
   (1) for units with extendable element(s) 55.3-lbs times the extendable element extension from fulcrum distance in feet + 26.6 pounds feet.

Response: The *extendable element extension from the fulcrum distance* is used in the first comparison moment, and may be used to calculate the stability rating if the first comparison moment is the threshold moment. As explained in the previous response, *extendable element extension from the fulcrum distance* is measured on a hard, level, and flat test surface, consistent with the definition in Section 1261.2(h).

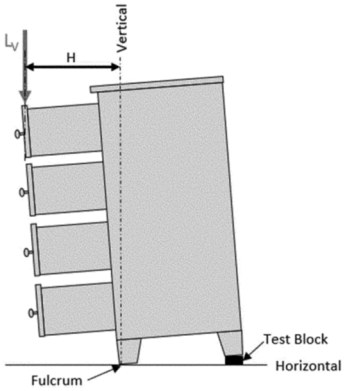
Question: There is a definition for the 'extendable element extension from fulcrum distance', but Test Method 1 uses the 'horizontal distance from where the center of force is applied (the center of gravity of the weights to be applied) to the fulcrum'. These are not the same and cause a lot of confusion. Which is the correct distance calculating the distance from the fulcrum?

Response: The *extendable element extension from fulcrum distance* is a different measurement than the *horizontal distance from where the center of force will be applied to the fulcrum*. The measurements are used in different moment calculations.

The *extendable element extension from fulcrum distance* is measured on a hard, level, and flat test surface, as described in Section 1261.4(b)(4), and is used to calculate the first comparison moment in Section 1261.4(d)(1). The *extendable element extension from fulcrum distance* is illustrated by the letter X in Figure 2 to paragraph (h), shown below.



The *horizontal distance from where the center of force will be applied to the fulcrum*, is measured as part of Test Method 1, Section 1261.4(c)(1), and is used to calculate the tip over moment of the unit for Test Method 1. The *horizontal distance from where the center of force will be applied to the fulcrum* is illustrated by the letter H in Figure 3 to paragraph (c)(1), shown below.



Question: How to determine the fulcrum position when the fulcrum changes after tilting?

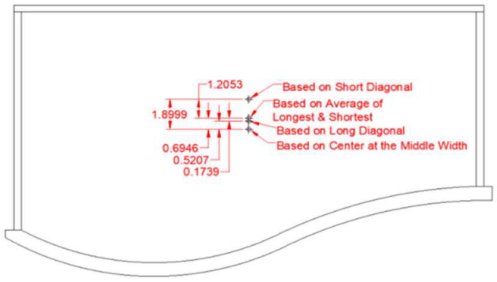
Response: The definition of fulcrum in Section 1261.2(k) is, “the point or line at the base of the clothing storage unit about which the clothing storage unit pivots when a tip-over force is applied (typically the front feet). The fulcrum position is determined while the clothing storage unit is on a hard, level, and flat test surface with all doors and extendable elements closed.”

We recommend contacting Compliance staff, or the Small Business Ombudsman, to address product-specific testing questions.

Question: Should loading weights be placed inside of closed storage areas that are not extendable elements, e.g., open shelves behind doors, to simulate loaded units?

Response: Fill weights are only placed in extendable elements (drawers or pull-out shelves), when applicable; they are not placed in open storage areas.

Question: When placing the drawer load weight in the center of an extendable element where the front is not straight and 90 degrees to the drawer sides, how is the center determined? The illustration below references four different centers based on different measurements.



Response: There are methods for determining the centroid, which is the geometric center, of an irregular shape. If estimating the position of the center of the bottom surface of the drawer, a precautionary approach to ensure compliance with the rule would be to use a method that places the center closer to the front of the drawer.

Question: The force application distance from fulcrum needs clarification. When the force is applied using weights stacked on top of each other, the horizontal distance from the center of gravity of the weight to the fulcrum is constantly changing as more weight is stacked and the drawer sag increases. As more weight is applied, the center of

gravity rotates further out from the fulcrum (see photo below). What does CPSC suggest to determine this critical dimension?

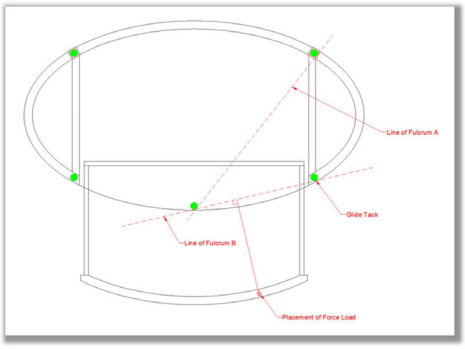
Response: The *horizontal distance from where the center of force will be applied (the center of gravity of the weights to be applied) to the fulcrum* is measured in Section 1261.4(c)(1) before the weights are applied.

In addition, as discussed in response to an earlier question, in Section 1261.4(c)(3) states, "[i]f a failed component prohibits completion of the test, then to continue testing, the failed component(s) must be repaired or replaced to the original specifications, or the component(s) must be replaced and the test repeated with the failed component(s) secured to prevent the component(s) from failing, as long as the modifications do not increase the tip-over moment." So, for example, shimming of a drawer, as shown in the testing demonstration video, is allowed, so long as the modification does not add substantial weight to the case.

Another option is to change the design of the weights or how they are applied to the extension element (*e.g.*, distribute the weight across the drawer face, or across multiple drawer faces instead of concentrating the weight in one spot).

Question: The illustration below is the top view of an oval chest of drawers showing the CSU on the 0.43" test blocks and the front contact with the platform is the front center glide tack. This creates a fulcrum line (A) between the back glide tack and center front glide tack. As the test begins, one of the front "corner" glide tacks will contact the platform. This creates a jolt to the test process and begs the question of which line is

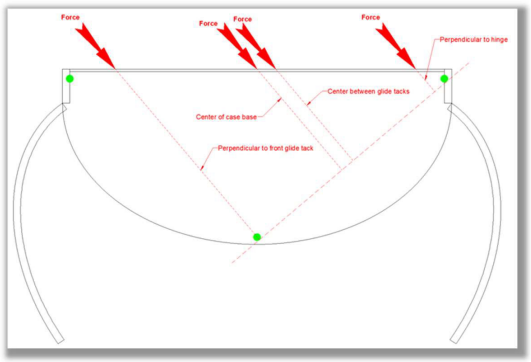
the fulcrum line used in the calculation? How does CPSC recommend measuring the distance from fulcrum?



Response: Per the definition in Section 1261.2(k) *fulcrum* means "the point or line at the base of the clothing storage unit about which the clothing storage unit pivots when a tip-over force is applied (typically the front feet). The fulcrum position is determined while the clothing storage unit is on a hard, level, and flat test surface with all doors and extendable elements closed."

We recommend contacting Compliance staff, or the Small Business Ombudsman, to address product-specific testing questions.

Question: When using Test Method 2 on a case where the fulcrum is not parallel to the back of the case, where should the force be applied? How does CPSC recommend keeping the force from slipping? How are the doors secured in the least stable position (see illustration below).



Response: Test Method 2 specifies that the force be applied orthogonal to the fulcrum; however, it does not specify that the force needs to be applied to the back of the case. An alternative would be to apply a pull force to the front of the case.

As shown in the testing demonstration video, doors can be secured in the position that makes the CSU least stable using a variety of methods, as long the tester is not increasing the tip-over moment.

Question: Related to §1261.4(c)(1) and (3): In the case of a 'non-rigid drawer', 1261.2(f) defines most fabric bins as drawers. How is this unit tested? By definition, the unit is to be tested using Test Method 1 to determine the stability rating if the bin extends 6 inches or greater.

a. *There is no discussion or allowance to repair, replace, or secure the bin, and such bins are unlikely to support the required 8.5-lbft³ drawer volume weight or to withstand the required test weight to complete Test Method 1 and calculate the stability rating. How does staff envision testing of non-rigid fabric bins?*

Response: In Section 1261.2(f), "drawer" is defined as, "a furniture component intended to contain or store items that slides horizontally in and out of the furniture case and may be attached to the case by some means, such as glides. Only components that are retained in the case when extended up to 2/3 the shortest internal length, when empty, are included in this definition."

With regards to stability testing, Section 1261.4(c)(3) states, "[i]f a failed component prohibits completion of the test, then to continue testing, the failed component(s) must be repaired or replaced to the original specifications, or the component(s) must be replaced and the test repeated with the failed component(s) secured to prevent the component(s) from failing, as long as the modifications do not increase the tip-over moment." So the tester can repair, replace, secure, or reinforce drawers, as long as the modifications do not improve the stability of the unit.

Question: We have cases that we believe will be in scope that have opaque doors with glass shelves behind the doors. Should these be removed prior to testing for safety, or kept in the case for testing? If in the case, what would be a recommendation for securing the shelves?

Response: Securing the shelves, without increasing stability, is allowable.. If there are product-specific issues with that, we recommend contacting Compliance staff, or the Small Business Ombudsman.

Question: How to test units where the unit cannot hold the test weight even when supported as per Test Method 1?

Response: If a unit tips over before any test weight is applied, the tip over force would be 0 pounds, and the unit would not meet the stability requirement.

If an extension element fails when a test weight is applied, it must be repaired or replaced to the original specifications, or secured to prevent the component from failing per Section 1261.4(c)(3). Another option is to change the design of the weights or how they are applied to the extension element (*e.g.*, distribute the weight across the drawer face, or across multiple drawer faces instead of concentrating the weight in one spot).

Question: How to calculate the threshold moment if the fulcrum extends further than the drawer extension (e.g., for a big baseboard), would this be a negative value?

Response: The first comparison moment could theoretically be a negative number for a unit with a fulcrum more than about 5.8 inches beyond the largest maximum drawer extension. In this case, either the second comparison moment, if applicable, or the third comparison moment would be the threshold moment. The lowest possible value for the third comparison moment is 38.7 pounds-feet, based on the minimum height of 27 inches for in-scope CSUs; therefore, the lowest possible value for the threshold moment is 38.7 pounds-feet.

Question: Doors are not listed in the description of extendable elements, does this mean we do not have to apply a vertical force to doors?

Response: Extendable element is defined in Section 1261.2(g) as “drawer or pull-out shelf”.

Test Method 1 applies only to units with extendable elements. Units that have only doors would be tested using Test Method 2, which uses a horizontal force.

Question: Is the rounding for the stability rating <0.05 down / 0.05 or greater up?

Response: As stated in the response to the earlier question, rounding of calculated values based on measurements should be done at the end only. You should follow standard rounding rules: if the hundredths digit is 5 or greater, the tens digit changes. For example, a stability calculation of 1.449 would be rounded to a stability rating of 1.4, while a stability calculation of 1.451 would be rounded to a stability rating of 1.5. It is unlikely that there will be a result that is exactly, 0.05, but in this case, you can round up.

Question: Is standard rounding to the nearest tenth accepted in listing the stability rating on the hang tag, e.g., if the stability rating is 1.09, do I round down to 1.0 or up to 1.1; if the stability rating is 1.04, do I round down to 1 or up to 1.1; if I have a stability rating of 1.5, do I round up to 2?

Response: Under the mathematical rules for rounding to the nearest tenth:

- 1.09 rounds to 1.1;
- 1.04 rounds to 1.0;
- 1.5 is already at the tenths digit, so would not be rounded further.

Question: What are the allowed tolerances on the ratio rating?

Response: The stability rating is a calculation based on previously determined values. Tolerances do not apply.

Question: How can the data collection and testing required by the final rule be performed accurately by in-house labs per production run at both domestic and offshore manufacturers?

Response: CPSC staff demonstrated one way the measurements and testing can be performed accurately in the testing demonstration video.

Question: The definition and illustrations for storage volume assumes all drawers and storage behind doors is rectangular. AHFA requests guidance on how to measure drawers and the spaces behind doors that are not rectangular. For example, how are the units below measured?
a. How do you measure the drawer depth?

Response: As discussed in the response to a previous question, drawer bottom surface area shall be measured using geometry. The CPSC rule does not require a specific drawer depth measurement for calculating volume.

Extendable element extension from fulcrum distance is defined in Section 1261.2(h) as "the horizontal distance measured from the centerline of the front face of the drawer or the outermost surface of the pull-out shelf to the fulcrum, when the extendable element is at the maximum extension and the clothing storage unit is on a hard, level, and flat test surface." It specifies, "[f]or a curved or angled surface this measurement is taken where the distance is at its greatest."

Question: When CSUs are sold separately, e.g., modular as a top and a deck, and the deck can be sold as a standalone CSU, how is it to be tagged? When tested as the

base alone it will have one stability rating, when testing as the base and deck together it will have a different stability rating. How are these units tagged (see photo below).

Response: As far as testing is concerned, the product should be tested as assembled in accordance with its instructions. We recommend contacting Compliance staff, or the Small Business Ombudsman, to address product-specific questions.