# SAFETY AND PERFORMANCE TEST REQUIREMENTS FOR BUNKABLE AND LOFTABLE BEDS, BEDS WITH DRAWERS AND DRAWER UNITS FOR USE UNDER BEDS

The offeror/contractor is responsible for having all applicable performance test requirements performed as specified herein. The Government reserves the right to witness any tests where such inspections are deemed necessary to ensure that the beds meet all test requirements. Therefore, vendors must notify GSA IWACenter by emailing Schedule71@gsa.gov at least three weeks in advance of scheduled testing with the dates and locations of the testing and a point of contact and phone number of the laboratory so that GSA can schedule appropriate timing to witness certain tests.

**Worst case determinations and required documentation.** If "worst case" beds or bed drawer units are being tested, documentation shall be provided clearly explaining why these units were determined to be "worst case" from all the models being offered. This documentation shall also clearly identify by model number, in a "table" format, the "worst case" units that were tested and by model number, the untested units they represent. This documentation shall be provided by the offeror with the test reports.

**General Test Requirements.**

1. Scope: Tests in this document are intended to evaluate the safety and performance of beds/drawers designed and marketed for adult dormitory/institutional use. These units include bunk and loft beds and beds that can be configured into bunk beds and/or high/low loft beds, beds with built-in drawers such as captain's beds and drawer units designed to be placed or attached under a bed.
2. Test sample: Sample submitted for testing shall be identical in design, components (including bed deck and connection methods), materials, overall dimensions and component/material dimensions (including thickness/gauge) to the unit that is being offered for contract. Configurations into which test samples are assembled shall be as marketed and illustrated in the company pricelist/literature/website.
3. All tests shall be performed as specified, directly on the bed or "drawer unit" as applicable. Each offered model or unit type of bed or "drawer unit", in any configuration, shall comply with all applicable test requirements.
4. Testing laboratory: All tests shall be performed by an independent test laboratory accredited to perform these tests, by an accreditation organization that is a member of the International Laboratory Accreditation Cooperation (ILAC). ILAC members include accreditation organizations such as A2LA, IAS and SCC. For testing conducted in 2011 only, as an alternative, laboratories performing Group 1 and Group 2 tests and not accredited for these specific tests, must at least be accredited to perform ANSI/BIFMA X5.4 tests; laboratories performing Group 3 tests and not accredited for these specific tests, must at least be accredited to perform ANSI/BIFMA X5.9 tests. A list of test labs that are accredited to perform bed and/or bed drawer unit tests in accordance with the alternative accreditation requirements specified above, is available from the Contracting Officer. If you choose to have your products tested by a test lab not on this list, you must provide proof of the test lab's accreditation as required above, prior to start of any testing.
5. Bed/drawer drawing(s) and component list: An accurate perspective, PDF drawing(s) of the bed/drawer being tested shall be provided to the test lab with the test sample. Drawing shall identify the manufacturer and model number of the bed/drawer being tested, contain an itemized list of each bed/drawer component, material(s) each component is made of (including wood species if applicable), dimensions and thicknesses of each component (including spring gauge and steel gauge if applicable), and an illustrated description of method of fastening components together including bolt sizes. In addition, if a major component (such as a bed spring or drawer suspension) is sourced from another vendor, the name of the vendor and part number of the component shall be provided in the drawing. A clear copy of the bed/drawer drawing(s) and component list shall be included as part of the Test Report that is provided to GSA and maintained by the contractor for the term of the contract.

6. Laboratory verification of unit being tested: Test lab shall check and verify that the bed/bed drawer being tested is the same as the unit illustrated and described on the submitted drawing. This includes checking component wood species (when applicable), component dimensions and gauges of steel (when applicable). Any required information that is omitted or any discrepancies between the drawing/component list and the test unit shall be noted in the Test Report Forms.

7. Test report: Complete, passing test results, in PDF format, recorded on the Test Report Forms within this document, shall be submitted with the offer. Test reports shall be not more than three (3) years old at the time an offer is submitted.

8. Test Photographs: All photographs shall be clear, in color and minimum 640 x 480 digital jpg format. Images shall be provided electronically with the test report. The first image in the series of images, that shows the entire assembled unit, shall be labeled to identify the manufacturer, model number and test date.

   The following photographs shall be provided with each test report for each bed tested.
   - Minimum of one photograph of the entire assembled bed unit to be tested, without insulator, pad or any test equipment in the way, taken prior to starting any testing. Photo(s) shall provide a perspective view of the bed, taken from a high enough angle to show the top surface of the top bed deck.
   - Minimum of one photograph showing the structure (underside) of the bed deck.
   - Minimum of one photograph showing the entire bed with each test set up on the bed being tested.
   - Minimum of one photograph, taken from the same distance and angle, of the tested bed after each test is completed and all test equipment and test padding has been removed.
   - Additional photographs shall be taken to clearly show any loss of serviceability.

   The following photographs shall be provided with each test report for each bed drawer unit tested.
   - Minimum of one photograph of the entire assembled bed drawer unit taken prior to starting any testing .
   - Minimum of one photograph showing the entire bed drawer unit with each test set up on the unit being tested.
   - Minimum of two photographs of the entire assembled drawer unit or bed with drawers taken after all testing is completed. One photo shall show the unit with all drawers closed and one photo shall show the unit with all drawers open. Photos shall show the entire drawer unit or bed with drawers.
   - Additional photographs shall be taken to clearly show major changes in structural integrity, as applicable or loss of serviceability as applicable.

9. Video of Deck Impact Test (Test B): A clear minimum 640 x 480 video in mov, qt, m4v, mp4, wmv or mpg format, of test shall be taken beginning 10 to 30 seconds before the 1st impact and ending with removal of the test bag, inspection for damage and measuring for deformation. If there is any failure of the bed, an additional video segment, with close-up views, shall be taken to clearly show the failure. Camera shall be positioned to obtain the best vantage point for taking the video to show the test procedure. Camera angle and distance from the bed being tested shall be the same throughout the test except for taking close-ups of damage as applicable. Video(s) shall be provided electronically with the test report and shall clearly identify the manufacturer and model number of the bed being tested.

10. Design, component or component vendor changes: When bed/bed drawer unit design, component or component vendor changes are made during the contract, the entire unit shall be retested and shall meet all test requirements. Accurate electronic versions of all records of design changes and test reports shall be maintained by the contractor for the term of the contract. The contractor shall provide a copy of the test report, covering the bed/bed drawer unit with changes and a description of the changes, to GSA ACO and PCO prior to shipment of units.

**Definitions**.

Vertical end support.(VES). Support structure at the head and foot of bed (headboard-footboard). Examples of different designs of VES's include open wood frame, wood frame and panel, solid wood panel, open steel frame and steel frame and panel.

Bed. Bunkable or loftable beds (low loft and high loft).

Bed configuration. Arrangements that available bed components can be assembled into such as bunk, low loft or high loft. Worst-case bed configurations are listed in Table 1, Footnote 2/.

Bed deck. Horizontal surface (e.g. sinuous springs, plywood deck, steel deck) with perimeter frame (side rails and end rails) that supports the mattress.

Bed deck type. Rigid or non rigid mattress support surface. Examples of bed deck types are listed in Table 1, Column 1.

Connection method. Type of hardware used to attach bed deck to vertical end supports. Examples of connection methods are listed in Table 1, Footnote 6/.

Drawers. Under bed drawers that are part of the bed such as captain's beds, or 1 or 2 drawer high under bed drawer units that are attached to the bed or are freestanding.

Head and foot ends of the bed. The terms "head" and "foot" ends of the bed are used to differentiate one end of a bed from the other. They are not absolute terms.

Loss of serviceability. The failure of any component to carry its intended load or to perform its normal function. Broken or disconnected deck parts, such as springs or links, is considered a loss of serviceability.

Series testing. Tests performed on one bed, one test after another.

**Tolerances.** When other tolerances or a measurement range is specified the below tolerances do not apply.

Test masses, forces, velocities and time: ± 5%.

Linear measurements: ± 5 mm.

Angles: ± 1 degree.

Level: Level to within 5 mm/m.

Cycle: Cycle requirements are minimums.

**Tests.**

**Group 1 - Tests required for each bunkable/loftable bed type.** Group 1 Tests shall be performed in series (one after another), in alphabetical order (A, B, C), on the upper deck of one of each bunkable/loftable bed type as defined in Table 1, Footnote 1/. Beds being tested shall be assembled into the "worst case" configuration as defined in Table 1, Footnote 2/. Each type of connection method offered shall be tested. A sufficient number of beds shall be tested so that each offered deck type and each offered connection method is tested at least one time.

A. Bed End Impact Test (Figure 1).

Purpose of test: To evaluate the durability, structural integrity and rigidity of a completely assembled bed when subjected to this test. Tests A, B and C shall be performed on the same bed.

Preparation of unit being tested: Assemble bed as required in Table 1, Footnotes 2/, 3/, 4/ and Figure 1. Install the upper bed deck in the uppermost position and install lower bed deck or stabilizer bar as applicable, in the mid-position. Remove any floor glides and place bed on a smooth, rigid, level surface. Block the bed at the floor, on the inside edges of the VES's as shown in Figure 1. Blocking

shall be securely attached to the floor and shall not come loose during testing. Blocking shall be of sufficient height but not over 100 mm high, so that during testing the bed does not bounce over the blocking.

Securely clamp or bolt (at four corners) one 600 mm W x min. 19 mm thick plywood “shield” to the face of the “head” and “foot” VES’s, centered on the width of each VES. “Shields” shall not shift or come loose during testing. On post-and-rail vertical end support construction, the “shields” shall be mounted to overlap the two uppermost horizontal rails. The top of the “shields” shall be mounted flush with the top edge of the top rail and shall not extend more than 100 mm below the bottom edge of the lower of the two rails. If VES’s are “solid” one piece construction without horizontal rails, the “shields” shall be 300 to 350 mm high. Cover plywood “shields” with 1.9 - 2.5 mm thick sheet steel, 300 x 300 mm, positioned so steel piece is centered over the impact point. In no case shall the shields be positioned so that they add support or rigidity to the bed assembly (such as by covering the joints between the top and bottom bunk units or the joints between the posts and the cross rails). If bed design does not accommodate this shield positioning requirement, the test lab shall contact the GSA/IWAC Engineering Division **before** testing is started to discuss the best location for positioning the shield. A new set of shields shall be used for each bed tested (25 impacts per shield maximum). Shields shall not be reused.

Pre-test bed racking measurements: Secure a dial indicator at one corner of the “foot” end of the bed, so that the plunger contacts a flat surface on the outside face of VES. Plunger shall be positioned 90° to the face of the VES, be within 50 mm of the closest outside vertical corner and be level ($\pm$ 25 mm) with the height of the top edge of the uppermost bed deck. Adjust plunger to allow for the anticipated “racking” movement of the VES. Set the dial indicator to “0”. Apply a 200 N horizontal "pushing" or “pulling” force to the face of the VES at the "head" end of the bed at a point opposite ($\pm$ 25 mm) the contact point of the dial indicator as shown in Figures 7 and 7a. After force has been applied for 1 minute, record racking measurement ($AX_1$). After measurement has been taken, remove force. Repeat this procedure at the other “foot” and "head" corners of the bed, in the same relative positions, and record the second racking measurement ($AY_1$). Calculate and record the average of the two pre-test racking measurements ($Ave_1$). Remove force application and measurement equipment before testing.

Preparation of test apparatus: Suspend two steel masses, 45.5 kg each, with steel chain, cable, rod or bar, 1220 mm above the point of impact as shown in Figure 1. Steel mass shall be either a solid round ball or a series of barbell weights symmetrically bolted together in such a way that the disks will not move in relation to each other upon impact and so that the center weight is larger diameter than the outer weights. An example of this arrangement is shown in Figure 1. Position one suspended mass at each end of the bed. At rest, with the chain/cable/bar/rod perpendicular to the floor, one mass shall just touch the shield at the head and one mass shall just touch the shield at the foot of the bed. These masses shall be located at the center (side to side) of the shield. The vertical center point of the impact mass shall strike the shield 150 mm below the top edge of the shields.

Test procedure. From its rest position at the “head” end of the bed, pull one mass out to a 36.5 to 37 degree angle (the center of the mass will be 240 to 250 mm above the point of impact) as shown in Figure 1. Carefully release the mass so that it swings freely, does not wobble and squarely impacts the shield on the VES. Repeat this procedure for the mass at the “foot” end of the bed. Repeat this procedure so that alternate impacts are made on the “head” and “foot” ends of the bed assembly. Each mass shall strike the bed 25 times, 50 impacts total.

Post-test bed racking measurements: After testing is completed, perform and record the same force and racking measurement procedures that were done before testing ($AX_2$, $AY_2$). Calculate and record the average of the two “post-test” deflection measurements ($Ave_2$).

Acceptance Level: The difference between bed racking measurements ($Ave_1$) and ($Ave_2$) shall be not more than 10 mm and shall be identified as the “A” racking measurement. During and after testing, bed components shall not become disengaged. There shall be no loss of serviceability after performing the test or from performing bed racking measurements. Not meeting any one of these criteria shall be considered an “overall failure” for this test and be cause for rejection.

B. Deck Impact Test (Figure 2).

Purpose of test: To evaluate the performance and structural integrity of a completely assembled bed when the upper bed deck is subjected to this test. Test B shall be performed on the same bed that Test A was performed on.

Preparation of unit being tested. Bed shall be assembled in the same configuration and blocked in the same manner as done for Test A (Bed End Impact Test). Bolts/nuts shall be tightened and "wedge locks" shall be reseated with suitable mallet before Test B is performed. No bed components may be replaced.

Attach a sheet of cotton duck (minimum 24 oz/yd$^2$ Trade #4) insulator, at least 100 mm wider than the test bag diameter, in the center of the bed deck, see Figure 2. Attach a 150 ±5 mm thick, 45 ±5 IFD foam pad, at least 100 mm wider than the test bag diameter, to the top of the bed deck centered over the cotton duck insulator sheet. Attachment method(s) shall keep insulator and foam pad in position during testing but shall not damage or penetrate the deck. A new cotton duck insulator and a new foam pad shall be used for each bed that is tested (4 drops total). The cotton duck insulator and foam pad shall not be reused.

Pre-test bed racking measurements: These racking measurements shall be taken after bed components are re-tightened/reseated. Perform the same "pre-test" force and racking measurement ($BX_1$ and $BY_1$) procedures that were done for Test A above. Calculate and record the average of the two racking measurements ($Ave_1$). Remove force application and measurement equipment before testing.

Pre-test bed deck measurements: Measure and record the vertical distance from the bottom of each deck perimeter frame side rail to the floor, the horizontal distance between the left and right side rails and the vertical distance from the center of the horizontal deck surface (e.g. sinuous springs, plywood deck, steel deck) to the floor. All four measurements shall be taken midway between the VES's.

Preparation of test apparatus. A test bag 406 mm in diameter, constructed in accordance with Appendix A in ANSI/BIFMA X5.4, containing sand and/or shot and having a mass of 100 kg shall be used. Attach the bag to a retention device that will permit the test bag to free fall to the foam pad on the bed. Position the test bag so it is centered (head to foot and side to side) over the uppermost deck surface, 610 mm above the top surface of the foam pad.

Test Procedure. Test the upper bed deck. Position test bag as required above and shown in Figure 2, and allow it to free-fall. Repeat this procedure for a total of four (4) impacts.

Post-test bed deck measurements: Measure and record dimensions taken at the same four locations as done before testing. Subtract and record the difference between the "pre-test" and "post-test" measurements at each of these four locations.

Post-test bed racking measurements: After testing is completed, perform the same force and racking measurement ($BX_2$ and $BY_2$) procedures that were done before testing. Calculate and record the average of the two "post-test" racking measurements ($Ave_2$).

Acceptance Level: The difference between bed racking measurements ($Ave_1$) and ($Ave_2$) shall be not more than 13 mm and shall be identified as the "B" racking measurement. The difference between the "pre-test" and "post-test" side rail measurements (deformation) at each of the three locations shall be not more than 7 mm. The difference between the "pre-test" and "post-test" measurements from the center of the horizontal deck surface to the floor shall be not more than 15 mm. During and after testing, bed components shall not become disengaged. There shall be no loss of serviceability after performing the test or from performing bed racking measurements. Not meeting any one of these criteria shall be considered an "overall failure" for this test and be cause for rejection.

C. Deck Static Force Test (Figure 3).

Purpose: To evaluate the performance, durability and structural integrity of a completely assembled bed when the upper bed deck is subjected to this test. Test C shall be performed on the same bed that Tests A and B were performed on.

Preparation of the unit being tested: Bed shall be assembled in the same configuration and blocked in the same manner as done for Test B (Deck Impact Test). Bolts/nuts shall be tightened and "wedge locks" shall be reseated with suitable mallet before test C is performed. No bed components may be replaced.

Pre-test racking measurements: These racking measurements shall be taken after bed components are re-tightened/reseated. Perform the same "pre-test" force and racking measurement ($CX_1$ and $CY_1$) procedures that were done before Test B above. Calculate and record the average of the two racking measurements ($Ave_1$). Remove force application and measurement equipment before testing.

Pre-test bed deck measurements: Measure and record the vertical distance from the bottom of each deck perimeter frame side rail to the floor and the horizontal distance between the left and right side rails. All three measurements shall be taken midway between the VES's.

Preparation of test apparatus. A 2667 N force shall be applied with a rigid test mass of 272 kg, maximum 455 mm wide by a minimum of 1065 mm long. Alternatively the mass may be applied on top of a 455 x 1065 mm "loading board" made up from 2 layers of minimum 12 mm thick plywood, reinforced with two pieces of angle iron along the long axis.

Test Procedure: Test the upper bed deck. Place the test mass midway between the VES's as shown in Figure 3 so that the 1065 mm dimension is positioned across the bed side rails/structure. Leave test mass in place for 30 minutes. After 30 minutes, remove test mass. Wait 30 minutes (recovery time) before performing post-test bed deck measurements.

Post-test bed deck measurements: Measure and record dimensions taken at the same three locations on the side rails as done before testing. Subtract and record the difference between the "pre-test" and "post-test" measurements at each of these three locations.

Post-test racking measurements: After testing is completed, perform the same force and racking measurement ($CX_2$ and $CY_2$) procedures that were done before testing. Calculate and record the average of the two "post-test" racking measurements ($Ave_2$).

Acceptance Level: The difference between bed racking measurements ($Ave_1$) and ($Ave_2$) shall be not more than 15 mm and shall be identified as the "C" racking measurement. The difference between the "pre-test" and "post-test" side rail measurements (deformation) at each of the three locations shall be not more than 7 mm. During and after testing, bed components shall not become disengaged. There shall be no loss of serviceability after performing the test or from performing bed racking measurements. Not meeting any one of these criteria shall be considered an "overall failure" for this test and be cause for rejection.

**Group 2 - Tests required to be performed on single bed versions of beds and select bed components.** Group 2 Tests may be conducted in any sequence on a series of units being tested.

D. Deck Durability Test - Cyclic (Figure 4).
Purpose: To evaluate the performance, durability and structural integrity of each offered bed deck type, with mounting hardware and VES's of a complete, assembled single bed per requirements in Table 1 when subjected to this test.

Preparation of unit being tested: Assemble bed as required in Table 1, Footnotes 3/, 5/, 6/ and Figure 4. Install the bed deck in the uppermost position in single bed configuration. Remove any floor glides and place bed on a smooth, rigid, level surface. Block the bed at the floor, on the inside edges of the VES's as shown in Figure 4. Blocking shall be securely attached to the floor and shall not come loose during testing. Blocking shall be of sufficient height but not over 100 mm high, so that during testing the bed does not bounce over the blocking.

Attach two separate sheets of cotton duck (minimum 24 oz/yd$^2$ Trade #4) insulator, at least 100 mm wider than the loading device diameter, to the top of the bed deck being tested, centered under where each of the loading devices will be positioned, see Figure 4. Attach two separate 52 ±5 mm thick, 45 ±5 IFD, foam pads, at least 100 mm wider than the loading device diameter, to the top of the deck

centered over each of the cotton duck insulator sheets. Attachment method(s) shall keep insulators and foam pads in position during testing but shall not damage or penetrate the deck. New cotton duck insulators and new foam pads shall be used for each bed deck that is tested. Insulators and foam pads shall not be reused.

Preparation of test apparatus: Test device shall apply a load of 100 kg through a 305 mm ± 13 mm diameter loading device.

Pre-test bed deck measurements: Measure and record the vertical distance from the bottom of each deck perimeter frame side rail to the floor, the horizontal distance between the left and right side rails and the vertical distance from the center of the horizontal deck surface (e.g. sinuous springs, plywood deck, steel deck) to the floor. All four measurements shall be taken midway between the VES's.

Test procedure: Place the loading device centered across the width of the bed and midway between the side-to-side center line of the bed and one VES in "Position A" as shown in Figure 4. Raise the loading device from the bed and lower completely, without impact to the bed so that it takes the entire load without any support from the cycling device, at a rate of 20 to 25 cycles per minute. Test for 75,000 cycles. One cycle is one downward and upward stroke. Reposition the loading device to "Position B" as shown in Figure 4 and perform the test for an additional 75,000 cycles. No parts or links may be replaced during the test. When test is completed raise load head off bed deck surface.

Note: Applying the loads in an alternating sequence to attain a total of 150,000 cycles is an acceptable method of performing this test.

Post- test bed deck measurements: Measure and record dimensions taken at the same four locations as done before testing. Subtract and record the difference between the "pre-test" and "post-test" measurements at each of these four locations.

Acceptance Level: The difference between the "pre-test" and "post-test" side rail measurements (deformation) at each of the three locations shall be not more than 7 mm. The difference between the "pre-test" and "post-test" measurements from the center of the horizontal deck surface to the floor shall be not more than 15 mm. During and after testing, bed components shall not become disengaged. There shall be no loss of serviceability after performing the test. Not meeting any one of these criteria shall be considered an "overall failure" and be cause for rejection.

Estimated time required to perform this test in series: 113.3 hours at 22 cycles per minute.

Estimated time required to perform this test in an alternating sequence: 56.8 hours at 22 cycles per minute.

E. Deck Frame Racking Test (Figure 5)

Purpose of this test: To evaluate the performance, durability and structural integrity of each offered bed deck type.

Preparation of unit being tested: Position the deck vertically or horizontally (on a flat surface). Restrain the deck along the length of one side rail.

Pre-test reference point: Establish and mark a reference point (1) at one end of the unrestrained side rail.

Test procedure: Apply an 892 N force to one end of the unrestrained side rail in a direction parallel to the length of the side rail. Maintain this force for 30 minutes. Remove test force. Wait 30 minutes (recovery time) before performing post-test measurement.

Post-test reference point and measurement: Establish and mark a second reference point (2) at the same end of the unrestrained side rail. Measure and record the distance between reference point (1) and reference point (2).

Acceptance level: There shall be no more than 3 mm deformation of the deck after testing as determined by the distance between the two reference points. Measurements exceeding this limit will be considered a failure and shall be cause for rejection.

F. Vertical End Support Drop Test (Figure 6).
Purpose of this test: To test the structural integrity of the largest vertical end support (headboard) from each bed type, after being dropped on a concrete floor. This test applies to VES's made from any material (e.g. steel, wood, plastic).

Preparation of unit being tested: Remove any glides.

Test procedure: Suspend VES (by itself) from one top corner so the opposite bottom corner (leg) is 300 mm above a concrete floor. Release vertical end support and allow it to free-fall to the floor. Repeat this test after suspending the VES from the other top corner.

Acceptance level: After testing, carefully inspect the VES. Any broken, open, loose, bent, distorted, cracked or damaged joints/welds will be considered a failure and shall be cause for rejection.

**Group 3 - Drawer Tests are required to be performed on each type of bed drawer unit.** Bed drawer unit types include beds with built-in drawers such as captain's beds, units with drawers that can be used under a bed or units with drawers attached underneath a bed. Group 3 Tests may be conducted in any sequence on a series of "drawer units" of one type.

G. Unit Strength Test.
Purpose of test: To evaluate the performance, durability and structural integrity of a bed drawer unit when subjected to this test.

Test: Test the worst case bed drawer unit of each type in accordance with ANSI/BIFMA X5.9, 4 Unit Strength Test, 4.2 Functional Load Test and 4.3 Proof Load Test. The worst case bed drawer unit is the unit within each type, containing the widest drawer(s). When testing a "stand alone" bed drawer unit designed to slide under a bed, the top of the unit shall be loaded as specified for a "unit top" in the test method. When testing a bed with built in drawers such as a captain's bed, the bed deck shall be loaded as specified for a "unit top" in the test method. When testing a bed drawer unit designed to be attached under a bed, the bed drawer unit shall be attached under a bed being offered and the top surface of the drawer unit shall not be loaded.

Acceptance Levels: Use 4.2.3 and 4.3.3 Acceptance Levels.

H. Drawer Rebound Test.
Purpose of test: To evaluate the performance, durability and structural integrity of the drawer(s) when subjected to this test.

Test: Test the worst case drawer(s) as defined below, in accordance with ANSI/BIFMA X5.9, 12 Rebound Test.

Acceptance Level: Use 12.4 Acceptance Level.

I. Drawer Out Stop Test.
Purpose of test: To evaluate the performance, durability and structural integrity of the drawer(s) when subjected to this test.

Test: Test the worst case drawer(s) as defined below, in accordance with ANSI/BIFMA X5.9, 13 Out Stop Test.

Acceptance Level: Use 13.4 Acceptance Level.

Estimated time per drawer, required to perform this test: 17.9 hours at 14 cycles per minute.

J. Drawer Cycle Test .
Purpose of test: To evaluate the performance, durability and structural integrity of the drawer(s) when subjected to this test.

Test: Test the worst case drawer(s) as defined below, in accordance with ANSI/BIFMA X5.9, Use the appropriate cycle test procedure as applicable for drawer(s) being tested.

15.2.1 "Cycle Test for Extendable Elements (Drawers) Deeper than Wide"
15.2.2 "Cycle Test for Extendable Elements (Drawers) Wider than Deep"

Acceptance Level: Use 15.2.1.3 or 15.2.3 Acceptance Level(s) as applicable.

Estimated time needed per drawer to perform this test on deeper than wide drawers: 69.4 hours at 12 cycles per minute.

Estimated time needed per drawer, to perform this test on wider than deep drawers: 104.2 hours at 12 cycles per minute.

Worst case drawer(s). If the same model and load capacity drawer suspension is used on all drawers within a unit, the “worst case” drawer is defined as the widest drawer in the unit. If different model/load capacity drawer suspensions are used, the “worst case” drawers are defined as the widest drawer(s) with each different model/load capacity suspension.

e.g. If a drawer unit has three different sizes of drawers and each drawer uses the same model/load capacity drawer suspension, only the widest of the three drawer sizes shall be tested. If a unit has three different sizes of drawers and each uses a different model/load capacity drawer suspension, each of the three drawer sizes shall be tested. If different “drawer units” are offered the unit(s) with the worst case drawers are required to be tested. The “drawer unit(s)” shall be selected so that all worst case drawers are tested. This could mean that more than one “drawer unit” will need to be tested.

e.g. Two types of “drawer units” are offered.

“Drawer unit” one has three sizes of drawers, each using the same “A” model drawer suspension. The widest drawer is 900 mm W.

“Drawer unit” two has three sizes of drawers using different model drawer suspension as follows:
800 mm W drawer – “A” model suspension,
500 mm W drawer – “B” model suspension,
330 mm W drawer – “B” model suspension.

In this case the following “drawer units” and drawers are required to be tested.
“Drawer unit” one, 900 mm W drawer – “A” model suspension.
“Drawer unit” two, 500 mm W drawer – “B” model suspension.

**Table 1 - Required bunkable/loftable bed testing**

| | Group 1 Test A 1/ | Group 1 Test B 1/ | Group 1 Test C 1/ | Group 2 Test D 1/ | Group 2 Test E | Group 2 Test F |
|---|---|---|---|---|---|---|
| | **Bed End Impact Test Figure 1** | **Deck Impact Test Figure 2** | **Deck Static Force Test Figure 3** | **Deck Durability Test - Cyclic Figure 4** | **Deck Frame Racking Test Figure 5** | **Vertical End Support Drop Test Figure 6** |
| **Bed Configuration/ Test Fixture** | Test complete bed in the worst case bed configuration 2/ | Test complete bed in the worst case bed configuration 2/ | Test complete bed in the worst case bed configuration 2/ | Test deck in single bed configuration 5/ | Test bed deck mounted in a test fixture | Test largest vertical end support (VES) |
| **Connection Method(s) ⟶ Bed Deck Types 3/ ↓** | Test with each type of connection method 4/ | Test with each type of connection method 4/ | Test with each type of connection method 4 | Test with "worst case" connection method 6/ | N/A | N/A |
| Sinuous spring deck | X | X | X | X | X | N/A |
| Helical suspended deck | X | X | X | X | X | |
| Other non-rigid deck | X | X | X | X | X | |
| Steel deck | X | X | X | X | X | |
| Plywood deck | X | X | X | X | X | |
| Steel mesh/ perforated deck | X | X | X | X | X | |
| Tubular deck | X | X | X | X | X | |
| Other rigid deck | X | X | X | X | X | |

1/ Bed type. One worst case version of each bed type shall be tested. A bed type is defined as a bed having one design of VES where the structural components (frame) are made with material of one type (e.g. hardwood, softwood, steel, composite, plastic), cross sectional dimension and gauge (when applicable). An "open frame" VES is considered to be the same bed type as the same "open frame" VES with decorative panel (e.g. HPL, wood) inserts. VES's made with two different hardwoods (e.g oak, maple) are considered to be the same bed type.

Worst case bed type. When bed types with VES's made with the same material but made with components with different cross sectional dimensions are offered, the VES made with the smaller dimension components shall be tested. (e.g. One VES has 50 x 50 mm posts and the other VES has 50 x 38 mm posts; the VES with the 50 x 38 mm posts shall be tested.) When bed types with steel VES's with components of the same cross sectional dimensions but with different gauges are offered, the VES made with the thinner gauge steel shall be tested.

2/ Worst-case bed configurations are listed below in descending order.

- High loft designed and marketed (as illustrated in the company pricelist/literature/website) to be configured with one stabilizer bar.
- Low loft designed and marketed to be configured with no stabilizer bar.
- Low loft designed and marketed to be configured with one stabilizer bar.
- Bunked bed
- High loft designed and marketed to be configured with two stabilizer bars.

Worst-case bed configuration examples: If an offered bed type is designed and marketed to be configured into a high loft (1 stabilizer bar), low loft (no stabilizer bar) and a bunk bed, the high loft configuration is the worst case bed configuration. The low loft bed (no stabilizer bar) is the 2nd worst case bed configuration.

3/ Each bed deck type shall be tested. When bed deck types are offered in different sizes the largest (widest and longest) version of the deck shall be tested. e.g. If a deck is available in 36 and 38" wide versions then only the 38" wide version shall be tested. If a deck is available in 76 and 80" long versions then only the 80" long version shall be tested.

4/ Each type of connection method offered shall be tested. Bed decks and connection methods may be tested in any combination on a test bed.

5/ Test shall be performed using any type of VES offered.

6/ "Worst-case" deck to vertical end supports connection methods are listed below in descending order.

- Hook plate lock/track lock. (Hook into flat plate attached to vertical posts punched to receive hooks).
- Hook with pins imbedded in wood vertical end supports
- Hook with pins in steel "u" channel in wood or integral pins in steel vertical end support.
- Through bolt
- Wedge lock

Deck Durability Test-Cyclic worst case connection method examples: If a bed type is offered with a sinuous spring deck with hook plate lock, through bolt and wedge lock connectors, the Deck Durability Test-Cyclic is only required to be performed on the spring deck with hook plate lock connectors. If a bed type is offered with a steel deck with through bolt and wedge lock connectors, the Deck Durability Test-Cyclic is only required to be performed on the steel deck with through bolt connectors.

**Known sources of supply.**

Cotton duck insulator:

McMaster Carr
P.O. Box 4355
Chicago, IL 60680-4355
PH: 630-833-0300
chi.ventas@mcmaster.com
http://www.mcmaster.com

Polyurethane foam:

Grand Rapids Foam Technologies, Inc.
West Michigan Fabrication Operations
1700 Alpine Avenue NW
Grand Rapids, MI 49504
PHh: 616-361-2722
Fx: 616-361-0465
info@grfoamtech.com
http://www.grfoamtech.com

G&T Foam Products Group of Michigan
1001 76th St SW
Byron Center, MI 49315
888.545.3626
PH: 616-583-1516
Fx: 616-583-1519
http://www.foamproductsgroup.com/main.htm

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**TEST REPORT FORMS**
**BUNKABLE AND LOFTABLE BEDS,**
**BEDS WITH DRAWERS AND DRAWER UNITS FOR USE UNDER BEDS**

This report provides results of testing conducted in accordance with General Services Administration Purchase Description 3FNE 99-582D.

**Test report #**: _____

**Date testing completed**: _____

**TEST FACILITY**

Test Laboratory Name: _____

Address: _____

_____

Test lab is accredited to perform these tests by: _____

**Name of person who performed the tests**

Printed _____

Signature_____

Phone Number: _____

Email Address: _____

**SAMPLE IDENTIFICATION**

Name of bed and/or drawer manufacturer: _____

Name of furniture line tested bed and/or drawer belongs to (If applicable):_____

Style/model number(s) of bed and/or drawer tested: _____

**CONSTRUCTION, MATERIAL AND DESIGN**

Attach drawing and component listing as required in Paragraph 5 under **General Test Requirements**.

**LABORATORY VERIFICATION OF UNIT BEING TESTED.**

Note any discrepancies in components as required in Paragraph 6 under **General Test Requirement**s.

_____

_____

_____

**TESTS PERFORMED**
Indicate “Yes” or “N/A” below if test was performed on model identified above that was tested.

| **Group 1 Bed Tests** | **Test Performed?** | ***Group 2 Bed Tests*** | **Test Performed?** | **Group 3 Drawer Tests** | **Test Performed?** |
|---|---|---|---|---|---|
| Group 1 Test A | | *Group 2 Test D* | | Group 3 Test G | |
| Group 1 Test B | | *Group 2 Test E* | | Group 3 Test H | |
| Group 1 Test C | | *Group 2 Test F* | | Group 3 Test I | |
| | | | | Group 3 Test J (Drawer deeper than wide) | |
| | | | | Group 3 Test J (Drawer wider than deep) | |

**TEST PHOTOGRAPHS**

Attach applicable test photographs as required in Paragraph 8 under **General Test Requirements**.

**TEST VIDEO(S)**

Attach applicable bed test video(s) as required in Paragraph 9 under **General Test Requirements**.

**Group 1 Test Report Form**

**A. Bed End Impact Test (Figure 1)** **Overall Pass ___ Overall Failure ___ N/A ___**

Bed racking measurements (A)

| Pre-test racking measurements | Pre-test racking measurements average $\frac{AX_1 + AY_1}{2} = (Ave_1)$ | Post-test racking measurements | Post-test racking measurements average $\frac{AX_2 + AY_2}{2} = (Ave_2)$ | Difference between $Ave_1$ and $Ave_2$ $Ave_x - Ave_x = \Delta$ | Requirement $\Delta \leq 10$ mm | Pass/Fail |
|---|---|---|---|---|---|---|
| ($AX_1$) | | ($AX_2$) | | | | |
| ($AY_1$) | ($Ave_1$) | ($AY_2$) | ($Ave_2$) | | ($\Delta$ = "A" racking measurement) | |

During and after testing, bed components shall not become disengaged. There shall be no loss of serviceability after performing the test or from performing bed racking measurements.

Note if unit failed and explain why it failed. If unit passed, note any pertinent observations.

_____

_____

_____

**B. Deck Impact Test (Figure 2)** **Overall Pass ___ Overall Failure ___ N/A ___**

Bed racking measurements (B)

| Pre-test racking measurements | Pre-test racking measurements average $\frac{BX_1 + BY_1}{2} = (Ave_1)$ | Post-test racking measurements | Post-test racking measurements average $\frac{BX_2 + BY_2}{2} = (Ave_2)$ | Difference between $Ave_1$ and $Ave_2$ $Ave_x - Ave_x = \Delta$ | Requirement $\Delta \leq 10$ mm | Pass/Fail |
|---|---|---|---|---|---|---|
| ($BX_1$) | | ($BX_2$) | | | | |
| ($BY_1$) | ($Ave_1$) | ($BY_2$) | ($Ave_2$) | | ($\Delta$ = "B" racking measurement) | |

Bed deck measurements (B)

| | Pre-test measurements | Post-test measurements | Difference between pre-test and post-test measurements ($\Delta$) | Requirement | Pass/Fail |
|---|---|---|---|---|---|
| Vertical distance from bottom of side rail 1 to the floor | | | ($\Delta$) | $\Delta \leq 7$ mm | |
| Vertical distance from bottom of side rail 2 to the floor | | | ($\Delta$) | $\Delta \leq 7$ mm | |
| Horizontal distance between side rails | | | ($\Delta$) | $\Delta \leq 7$ mm | |
| Vertical distance between bottom center of spring or platform to the floor | | | ($\Delta$) | $\Delta \leq 15$ mm | |

**B. Deck Impact Test (continued)**

During and after testing, bed components shall not become disengaged. There shall be no loss of serviceability after performing the test or from performing bed racking measurements.

Note if unit failed and explain why it failed. If unit passed, note any pertinent observations.

_____

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_____

**C. Deck Static Force Test (Figure 3) Overall Pass ___ Overall Failure ___ N/A ___**

Bed racking measurements (C)

| Pre-test racking measurements | Pre-test racking measurements average $\frac{CX_1 + BY_1}{2} = (Ave_1)$ | Post-test racking measurements | Post-test racking measurements average $\frac{CX_2 + CY_2}{2} = (Ave_2)$ | Difference between $Ave_1$ and $Ave_2$ $Ave_x - Ave_x = \Delta$ | Requirement $\Delta \leq 10$ mm | Pass/Fail |
|---|---|---|---|---|---|---|
| ($CX_1$) | | ($CX_2$) | | | | |
| ($CY_1$) | ($Ave_1$) | ($CY_2$) | ($Ave_2$) | ($\Delta$ = "C" racking measurement) | | |

Bed deck measurements (C)

| | Pre-test measurements | Post-test measurements | Difference between pre-test and post-test measurements ($\Delta$) | Requirement | Pass/Fail |
|---|---|---|---|---|---|
| Vertical distance from bottom of side rail 1 to the floor | | | ($\Delta$) | $\Delta \leq 7$ mm | |
| Vertical distance from bottom of side rail 2 to the floor | | | ($\Delta$) | $\Delta \leq 7$ mm | |
| Horizontal distance between side rails | | | ($\Delta$) | $\Delta \leq 7$ mm | |

During and after testing, bed components shall not become disengaged. There shall be no loss of serviceability after performing the test or from performing bed racking measurements.

Note if unit failed and explain why it failed. If unit passed, note any pertinent observations.

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**Group 2 Test Report Form**

**D. Deck Durability Test – Cyclic (Figure 4): Overall Pass ___ Overall Failure ___ N/A ___**

Bed deck measurements (D)

| | Pre-test measurements | Post-test measurements | Difference between pre-test and post-test measurements (Δ) | Requirement | Pass/Fail |
|---|---|---|---|---|---|
| Vertical distance from bottom of side rail 1 to the floor | | | (Δ) | Δ ≤ 7 mm | |
| Vertical distance from bottom of side rail 2 to the floor | | | (Δ) | Δ ≤ 7 mm | |
| Horizontal distance between side rails | | | (Δ) | Δ ≤ 7 mm | |
| Vertical distance between bottom center of non-rigid deck to the floor | | | (Δ) | Δ ≤ 15 mm | |

During and after testing, bed components shall not become disengaged. There shall be no loss of serviceability after performing the test.

Note if unit failed and explain why it failed. If unit passed, note any pertinent observations.

_____

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_____

**E. Deck Frame Racking Test (Figure 5) Pass ___ Fail ___ N/A ___**

| | Measured distance | Requirement |
|---|---|---|
| Distance between reference point (1) and reference point (2) | | ≤ 3 mm |

**F. Vertical End Support Drop Test (Figure 6) Pass ___ Fail ___ N/A ___**

After testing there shall be no broken, open, loose, bent, distorted, cracked or damaged joints or welds.

Note if unit failed and explain why it failed. If unit passed, note any pertinent observations.

_____

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_____

**Group 3 Test Report Form**

**G. Unit Strength Test (Drawer Unit)** **Overall Pass ___ Overall Failure ___ N/A ___**

ANSI/BIFMA X5.9, 4.2 Functional Load Test Pass ___ Fail ___

| | Pull force measurement | 20 Pull Force Test requirement | Pass/Fail |
|---|---|---|---|
| Drawer 1 | | ≤ 50 N | |
| Drawer 2 (as applicable) | | ≤ 50 N | |
| Drawer 3 (as applicable) | | ≤ 50 N | |
| Drawer 4 (as applicable) | | ≤ 50 N | |

Note any loss of serviceability.

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_____

ANSI/BIFMA X5.9, 4.3 Proof Load Test Pass ___ Fail ___

Note any sudden and major change in structural integrity of the unit or its components.

_____

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**H. Drawer Rebound Test** **Overall Pass ___ Overall Failure ___ N/A ___**

ANSI/BIFMA X5.9, 12 Rebound Test

| | Pull force measurement | 20 Pull Force Test requirement | Pass/Fail | Rebound position measurement | Rebound position requirement | Pass/Fail |
|---|---|---|---|---|---|---|
| Worst case drawer 1 | | ≤ 50 N | | | ≤ 38 mm | |
| Worst case drawer 2 (as applicable) | | ≤ 50 N | | | ≤ 38 mm | |
| Worst case drawer 3 (as applicable) | | ≤ 50 N | | | ≤ 38 mm | |

**I. Drawer Out Stop Test** **Overall Pass ___ Overall Failure ___ N/A ___**

ANSI/BIFMA X5.9, 13 Outstop Test

| | Pull force measurement | 20 Pull Force Test requirement | Pass/Fail |
|---|---|---|---|
| Worst case drawer 1 | | ≤ 50 N | |
| Worst case drawer 2 (as applicable) | | ≤ 50 N | |
| Worst case drawer 3 (as applicable) | | ≤ 50 N | |

Note any loss of serviceability.

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_____

**J. Drawer Cycle Test** **Overall Pass ___ Overall Failure ___ N/A ___**

ANSI/BIFMA X5.9
15.2.1 Cycle Test for Extendable Elements Deeper than Wide
15.2.2 Cycle Test for Extendable Elements Wider than Deep as applicable

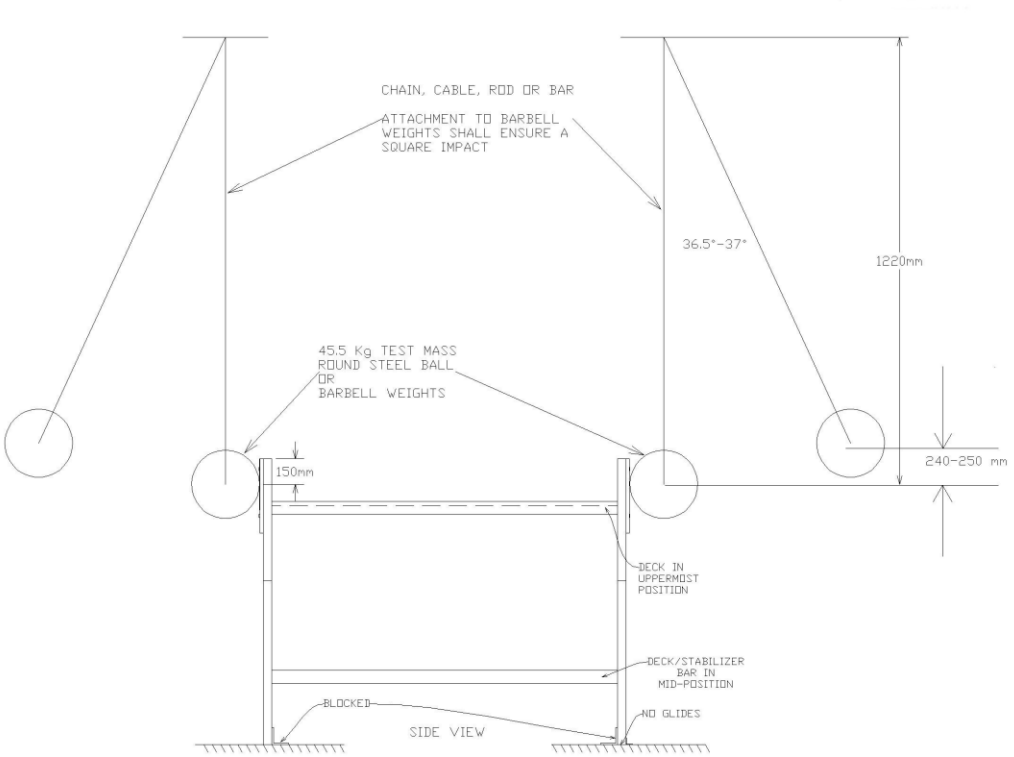
| | Test performed (15.2.1 or 15.2.2) | Pull force measurement | 20 Pull Force Test requirement | Pass/Fail |
|---|---|---|---|---|
| Worst case drawer 1 | | | ≤ 50 N | |
| Worst case drawer 2 (as applicable) | | | ≤ 50 N | |
| Worst case drawer 3 (as applicable) | | | ≤ 50 N | |

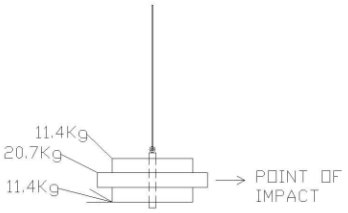
Note any loss of serviceability.

_____

_____

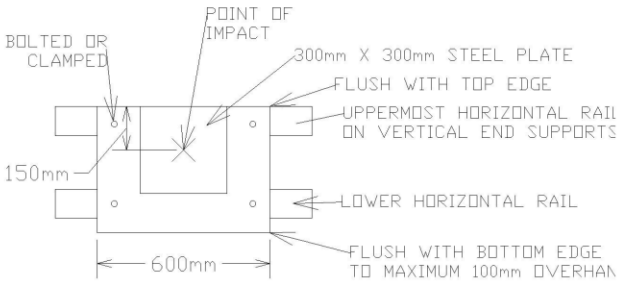
_____




EXAMPLE OF BARBELL WEIGHT ARRANGEMENT

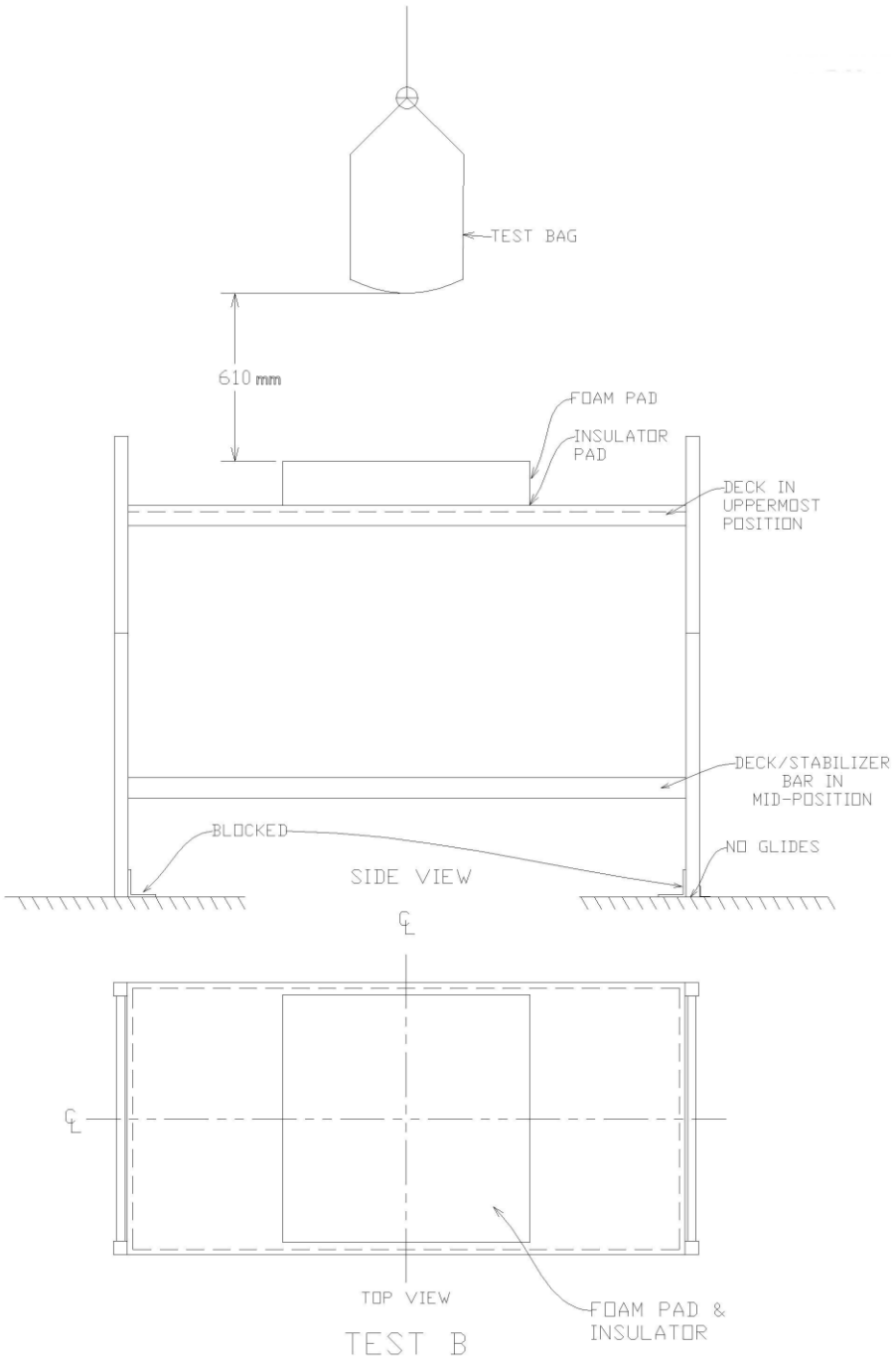
45.5 Kg BARBELL IMPACT TEST MASS




PLYWOOD SHIELD ON END VIEW OF BED

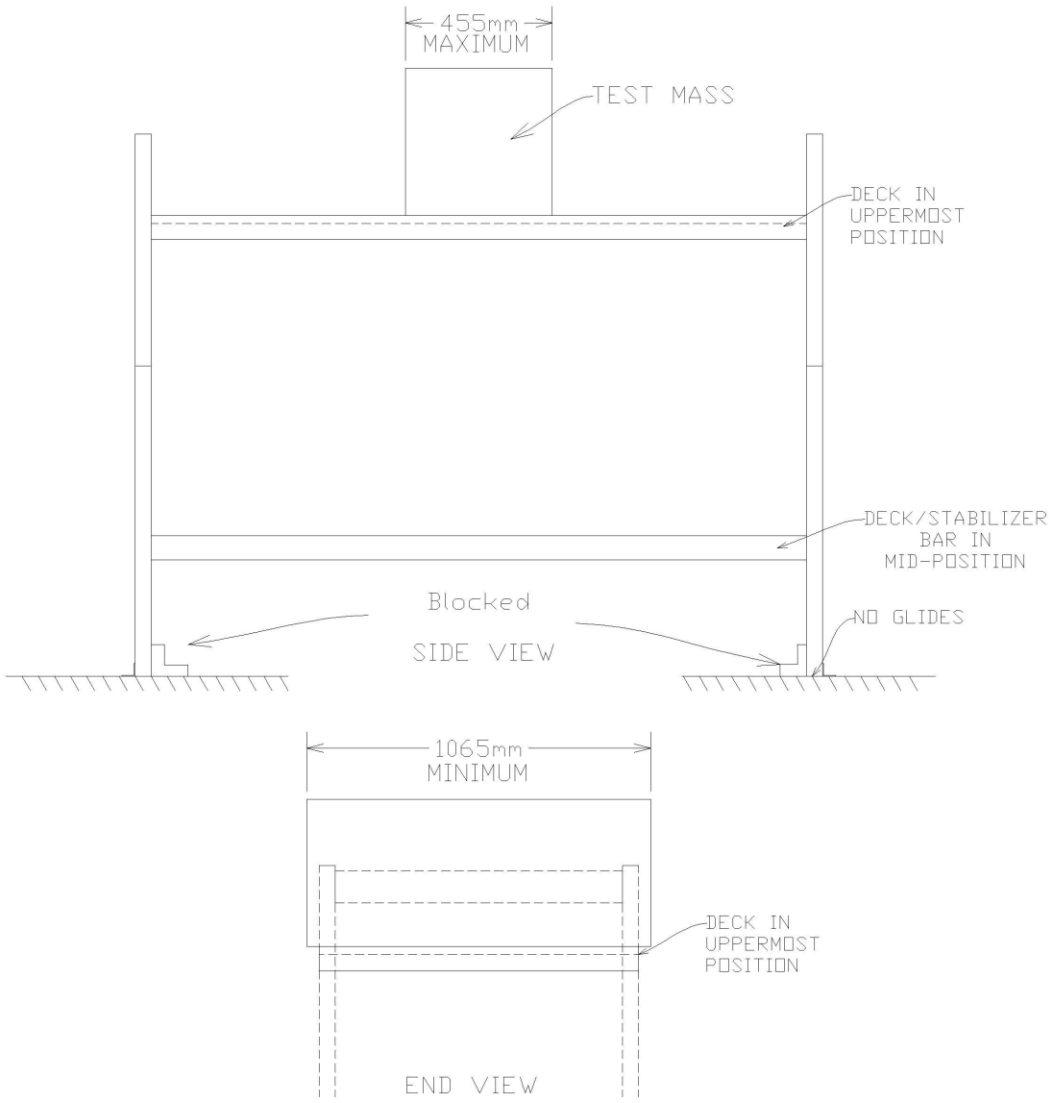
TEST A
BED END IMPACT

FIGURE 1



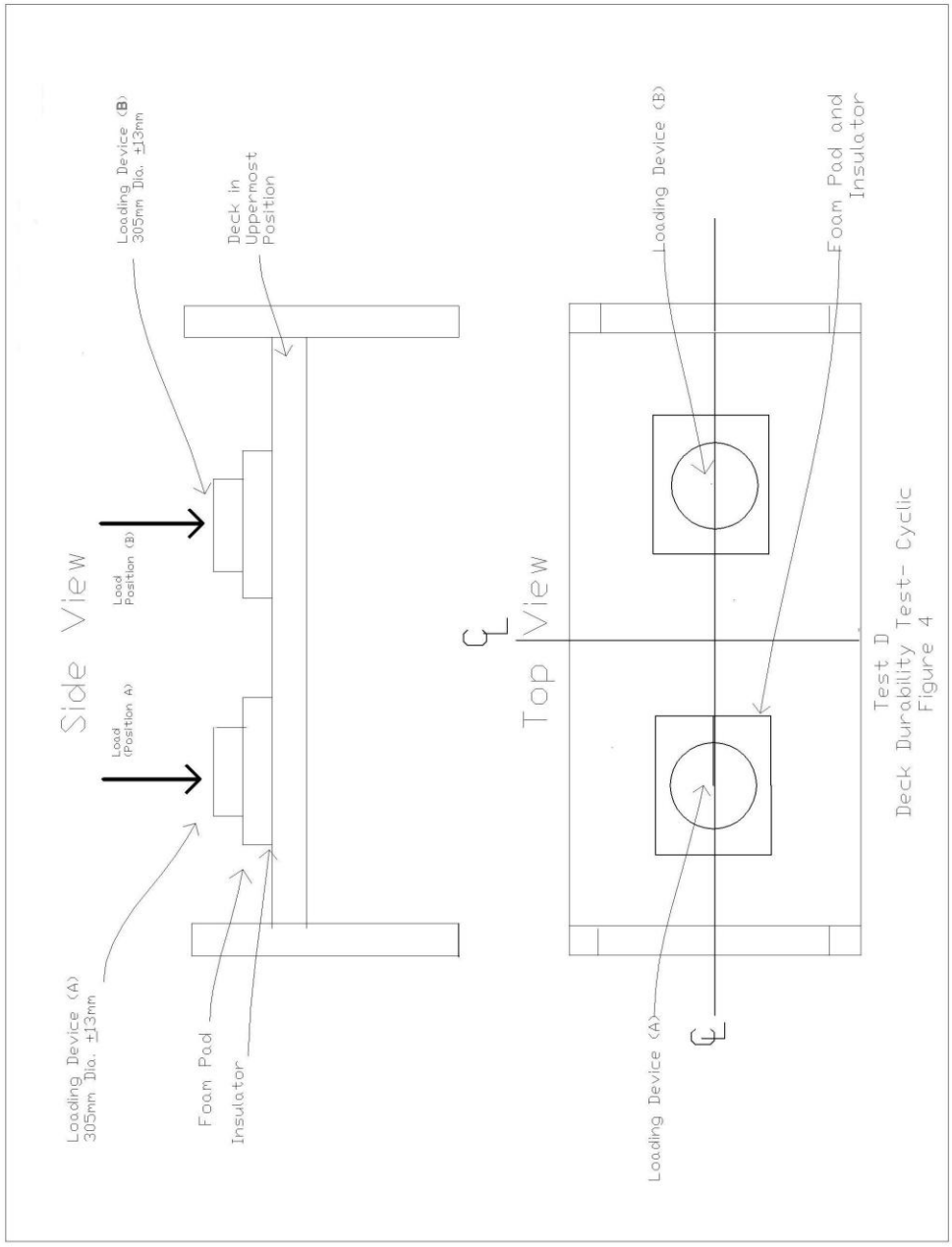

TEST B
DECK IMPACT

FIGURE 2

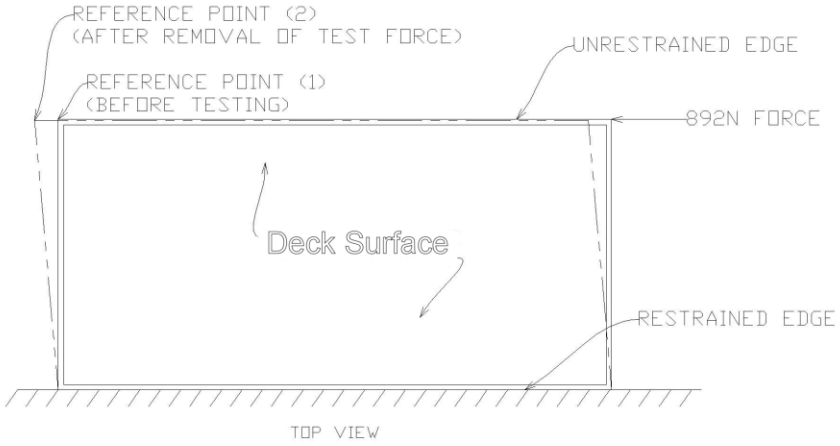



TEST C
DECK STATIC FORCE

FIGURE 3

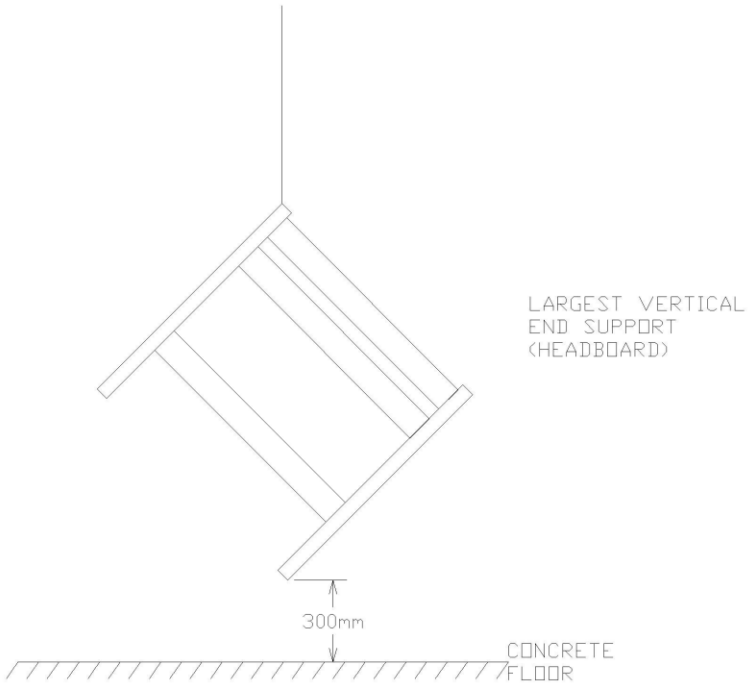



Test D
Deck Durability Test- Cyclic
Figure 4




TEST E
DECK FRAME RACKING

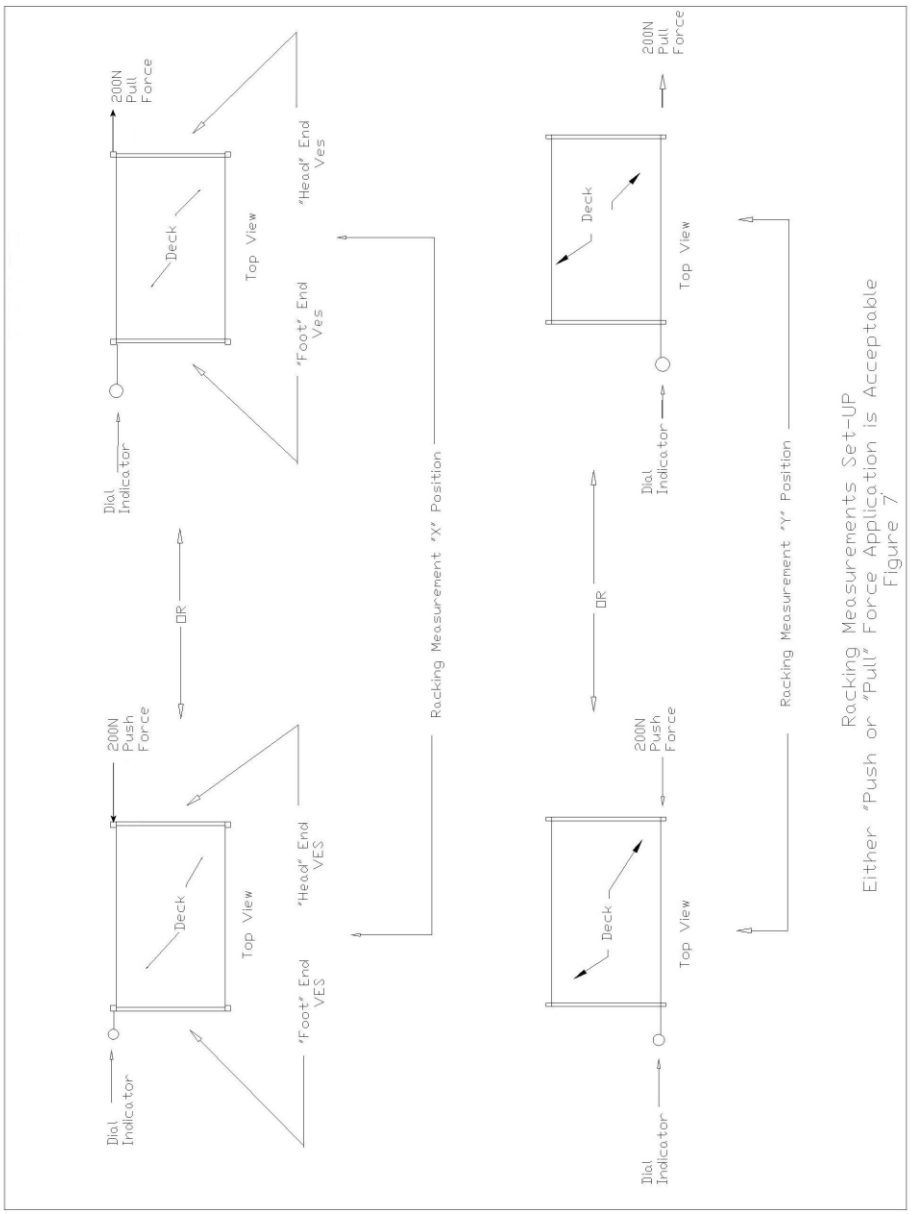
FIGURE 5



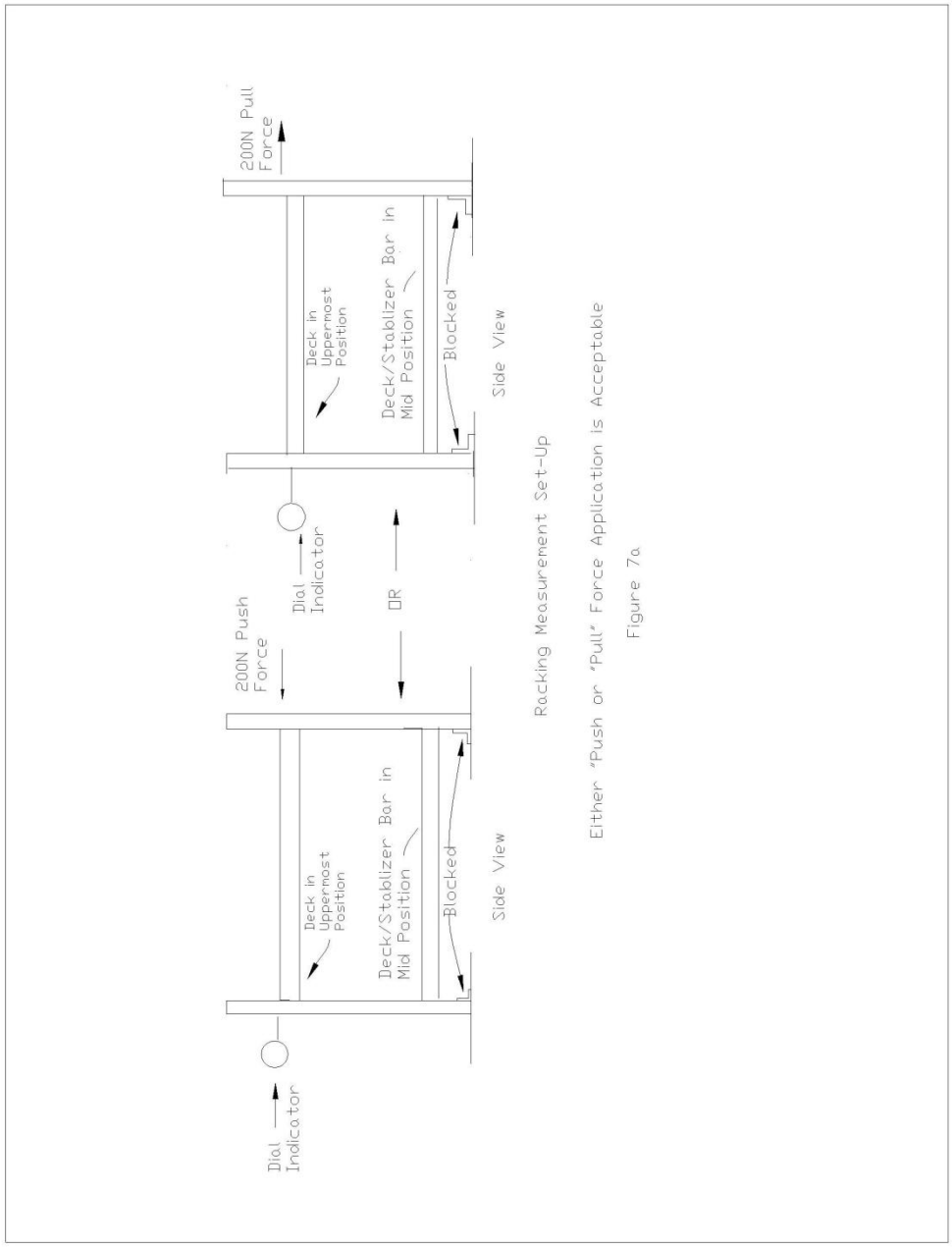

TEST F

**VERTICAL END SUPPORT DROP**

FIGURE 6




Racking Measurements Set-UP
Either "Push or "Pull" Force Application is Acceptable
Figure 7




Racking Measurement Set-Up

Either "Push or "Pull" Force Application is Acceptable

Figure 7a