

PURCHASE DESCRIPTION  
TEST REQUIREMENTS FOR BUNK AND LOFT BEDS

The contractor is responsible for conducting all applicable performance test requirements as specified herein. The contractor may use his own or any other facilities suitable for the performance of the tests. The Government reserves the right to witness any tests where such inspections are deemed necessary to assure that the beds meet all test requirements.

**General Test Requirements.**

1. The applicable tests below shall be performed on bunk, loft and bunk/loft bed models designed and marketed for adult dormitory/institutional use. If bed is designed such that more than one useable configuration is possible (e.g., bed can be bunked or set up as a loft), all applicable tests must be performed on each "worst case" configuration, as mutually agreed to between the GSA/NFC Engineering Division and the offeror **before** testing is begun. One factor in determining "worst case" is that the **upper** bed spring/platform be placed in its uppermost position. The **top** sleeping surface of both bunkable and loft units shall then be tested in accordance with Group 1 test requirements below. Any other questions regarding test procedures shall also be discussed with the GSA/NFC Engineering Division **before** testing is begun.
2. Tests may be performed in any sequence, however, all tests in Group 1 shall be performed on only one bed unit of each type being tested. Additional beds may be used for the Group 2, 3 and 4 tests.
3. All tests shall be performed without a mattress, unless otherwise specified.
4. Complete, passing test results, recorded on the Bunk and Loft Bed Test Report Form included within this document, shall be submitted with the offer in order for the bed to be considered for award. Test reports shall be signed and dated by both the person performing the tests and the person who is submitting the offer.
5. **One clear, original photograph** of each test being performed on the applicable bed shall also be submitted with the test reports. Photos shall be of the actual unit being tested, not a mockup of the tested unit.
6. Test reports shall be not more than three (3) years old at the time an offer is submitted. All performance test reports must be updated when they are five (5) years old, or sooner if any modifications are made to the bed design, construction or materials during the five-year period. It is the supplier's responsibility to track the age of test reports. When the five year age limit is approaching, the supplier shall retest his products and provide the new test reports to the contracting officer for approval, so that by the five year mark, updated test reports will be in place.

**Tests.**

**Group 1 - Tests required for all bunk and loft bed designs.** For each of the tests A, B, C and D below, bunkable beds shall be bunked, with the top sleeping surface placed in its **uppermost** position, and the **top bunk** shall be tested. Loft beds shall be set up with the top sleeping surface in its uppermost position, and the top sleeping surface shall be tested.

A. Roller deflection test.

Purpose: To evaluate the performance, durability and structural integrity of the uppermost sleeping surface **and** the entire bed/loft unit.

Procedure: A 455 mm diameter by 610 mm long cylinder, with a total mass of 100 kg, shall be placed across the springs/platform, and rolled along the length of the bed spring/platform (see figure 1). The cylinder shall be centered across the width of the bed. The bed spring/platform shall be in place as used in the bed, between the head and the footboard. In the event that the head and footboard interfere with set-up or operation of the testing equipment, the upper portion of the head and/or footboard may be cut off and removed.

The rolling motion shall start from one end of the bed and roll to the other end for 25,000 cycles. One cycle is completed by rolling the cylinder from one end of the spring/platform to the other and then rolling it back to the starting point. The connecting links may be replaced as necessary during the test.

Acceptance level: Upon removal of the test cylinder, the crown in the arc of the spring strands shall have changed not more than  $\pm 13$  mm. Failure of the test shall be cause for rejection. When a bed platform is tested, any failure, loosening of joints or distortion after testing that would affect safety or serviceability shall be cause for rejection.

B. Static force test.

Purpose: To evaluate the performance, durability and structural integrity of the sleeping surface side support rails/structure **and** the entire bed/loft unit.

Procedure: Remove any floor glides and place complete bunk bed/loft on a solid level surface. Measure and record the distance from the floor to the top of the side rails/structure on each side of the bed, midway between the bed ends. Place a test mass, 272 kg, 455 mm wide x 1065 mm long, midway between the bed ends (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, with test mass still in place, measure and record the distance from the floor to the top of the side rails/structure on each side of the bed, midway between the bed ends. Remove test mass. Measure and record the distance from the floor to the top of the side rails/structure on each side of the bed, midway between the bed ends.

Acceptance level: At the center, with test mass in place, the deflection of the side rails/structure shall not be more than 14.5 mm on either side of the bed. After removal of the test mass, the side rails/structure shall have no more than 1.5 mm permanent set deflection on either side of the bed and shall show no visible distortion. Failure of the test shall be cause for rejection.

C. End impact force test.

Purpose of test: To evaluate the performance and structural integrity of the vertical end frames, side rails/structure attachment to the vertical end frames **and** overall structural rigidity and durability of the bunk bed/loft unit.

Preparation of unit being tested: Place bunk bed/loft assembly on a smooth wood or concrete floor. Remove any adjustable glides. Block the bed assembly at the head and foot with 38 mm H x min. 1100 mm L x min. 3 mm thick steel angle securely attached to the floor. Securely clamp or bolt one 600 mm W x min. 19 mm thick piece of plywood shielding to the upper portion of each vertical end frame so that the shield spans between the two upper-most horizontal rails. Shield shall be of sufficient height to span between the two upper-most horizontal rails. Cover entire face of plywood shields with 1.9 - 2.5 mm thick sheet steel. 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/NFC Engineering Division **before** testing is started to discuss the best location for positioning the shield.

Preparation of test apparatus: Suspend two, 45.5 kg each, steel masses with chains, 2620 mm above the point of impact. Steel masses shall be either a solid round ball or a series of barbell weights symmetrically bolted together so that the center weight in the series is larger than the other weights (e.g. 20.5 kg., 2- 11.4 kg., 2-1.1 kg.). Position one mass and chain at each end of the bed. At rest, with the chains perpendicular to the floor, one mass shall touch the shield at the head and one mass shall touch the shield at the foot of the bed. These masses shall be located at the center (side to side) of the shield, 140 mm above the bottom edge of the shield. Masses made up of barbell weights shall be oriented so the larger diameter center weight strikes the shield when released.

Test procedure. Pull one mass out a distance of 1100 mm from its rest position and release so that the mass swings freely and impacts the shield on the end of the bed assembly. Repeat this procedure for the mass at the other end of the bed. Repeat this procedure so that alternate impacts are made on the bed assembly. Each mass shall strike the bed 25 times, 50 impacts total.

Acceptance level: Carefully inspect the entire bed assembly for damage. Bed components, parts, fasteners/connectors, joints and welds shall not be loose, bent, distorted, cracked or damaged in any way. Vertical end frames shall remain securely attached to the sleep surface(s). Bunk/loft beds shall remain securely joined together. Drawers (when present) shall continue to operate smoothly and quietly. Failure to meet any of the above criterion shall be cause for rejection.

D. Impact test on upper sleeping surface with mattress.

Purpose of test: To evaluate the performance, and structural integrity of the side rails/structure attachment to the vertical end frames **and** overall structural rigidity and durability of the bunk bed/loft unit.

Preparation of unit being tested: Place bunk bed/loft assembly on a smooth wood or concrete floor. Remove any adjustable glides. Block the bed assembly at the head and foot with 38 mm H x min.1100 mm L x min. 3 mm thick steel angle securely attached to the floor. Place a **160 mm maximum thickness mattress on the upper sleeping surface being tested. Mattress shall be innerspring or foam construction and shall not have features that add support or rigidity to the bed assembly.**

Preparation of test apparatus: Securely strap a bundle of 870 to 880 mm long steel rods together (or equivalent solid mass of the same dimensions) to make up a 100 kg mass. Test mass shall be bare and not covered with any material. Suspend the mass using two lines, one from each end of the mass to ensure stability, 1220 mm above the mattress on the top sleeping surface. Position the long axis of the mass parallel to both the long dimension and the horizontal surface of the bed. Center the mass over the upper bed unit.

Test procedure: Release the mass and allow it to free-fall onto the bed unit. Repeat this procedure for a total of four impacts.

Acceptance level: Carefully inspect the entire bed assembly for damage. Bed components, parts, fasteners/connectors, joints and welds shall not be loose, bent, distorted, cracked or damaged in any way. Vertical end frames shall remain securely attached to the sleep surface(s). Bunk/loft beds shall remain securely joined together. Drawers (when present) shall continue to operate smoothly and quietly. Failure to meet any of the above criterion shall be cause for rejection.

**Group 2 - Additional tests required for beds with spring unit.**

A. Bed spring rapid pressure impact test.

Purpose of test: To evaluate the performance, durability and structural integrity of the spring support surface.

Preparation of the unit being tested: The bed springs shall be mounted and secured to an accelerated pressure deflection machine. The load head shall be circular with profile as shown in figure 2.

Test procedure: Before testing, measure the height of the crown in the bed spring in the center of where the load head will be positioned. Center load head across the width and along the length of the bed spring. The deflection machine shall operate at 2,000 to 2,400 strokes per hour. Adjust the stroke to deflect the spring downward 51 mm ( $\pm 1$  mm) when

measured from the top of the spring strand (figure 2). Cycle the deflection machine 100,000 deflections (strokes). One stroke is one downward and upward cycle. Connecting links may be replaced as necessary during the test. Remove load head. Re-measure the height of the crown in the bed spring in the same place after the test is completed.

Acceptance level: Carefully inspect the entire bed spring for damage. Bed spring frame and bed springs, other parts, fasteners/connectors, joints and welds shall not be broken, loose, bent, distorted, cracked or damaged in any way. Height of the spring crown before and after testing, shall not have changed more than  $\pm 6.5$  mm. Failure to meet any of the above criterion shall be cause for rejection.

B. Spring unit racking test.

Purpose of this test: To evaluate the performance, durability and structural integrity of the spring frame assembly.

Preparation of the unit being tested: Place the spring unit horizontally and restrained along the length of one side rail. Establish reference lines to determine if any permanent distortion has taken place during the test.

Test procedure: Apply a 91 kg. mass to the end of the other side rail in the direction of the side rail and maintain this force for 30 minutes. Remove test mass.

Acceptance level: After testing permanent distortion of 3 mm or more shall be cause for rejection.

**Group 3 - Additional test required for beds with a wood headboard.**

Joint test. Purpose: To test the structural integrity of a wood headboard after being dropped on a concrete floor.

Preparation of unit being tested: Remove any glides. Suspend headboard (by itself) from one top corner so the opposite bottom corner is 300 mm above a concrete floor.

Test procedure: Release headboard and allow it to free-fall to the floor. Repeat this test, suspending the headboard from the other top corner.

Acceptance level: After testing, carefully inspect the headboard. Any broken, loose or open joints shall be cause for rejection.

**Group 4 - Additional tests required for beds with built-in drawers such as captain's beds, underbed drawer units and drawers designed to be attached underneath the bed.**

A. Drawer cycle test. Purpose of test: To evaluate the performance, durability and structural integrity of the drawer box itself, the drawer suspensions and attachment to the surrounding case.

Preparation of the unit being tested: Place the unit being tested on a flat, level surface and secure the unit to the floor to prevent movement during testing. Test the largest drawer in the unit. Secure two 11.25 kg. masses to the inside of this drawer. Center the masses front-to-back and side to side such that the the distance between the masses is the same distance of each mass from its respective drawer side. Attach a drawer cycling device to the center of the drawer front. The drawer cycling device shall not support or add additional weight to the drawer being tested. Ready to assemble (RTA) drawer units shall be assembled and installed following directions supplied with the unit being tested. If no assembly directions are provided with RTA units this shall be noted in the test report. Factory assembled units shall be tested as they come "out of the box". No lubrication shall be applied to any parts at the beginning or anytime during the test.

Test procedure: Open and close the drawer 25,000 cycles at a cycling rate of 10 ( $\pm$  2) cycles per minute. A cycle is one opening and closing of the drawer to within 5 mm of the out and in-stops.

Acceptance level: After testing, manually repeat the opening and closing cycle while inspecting for any impaired operation, misalignment, binding or damage of components. Failure of the drawer to operate smoothly and quietly without increased effort, and the positive drawer out-stop to function properly by retaining the drawer, shall be cause for rejection.

B. Static force drawer test.

Purpose of test: To evaluate the performance, durability and structural integrity of the drawer box itself, the drawer suspensions and attachment to the surrounding case.

Preparation of the unit being tested: Place the unit being tested on a flat, level surface and secure the unit to the floor to prevent tipping or other movement during testing.

Test procedure: Test the largest drawer in the unit. Pull the drawer out of the unit 125 mm. Slowly apply a 91 kg mass to the middle of the top edge of the drawer front and maintain this force for 30 minutes. The mass may be evenly distributed across the top edge, if necessary based on the configuration of the mass used. Remove the mass.

Acceptance level: Failure to operate smoothly, quietly and without binding after the mass is removed shall be cause for rejection.

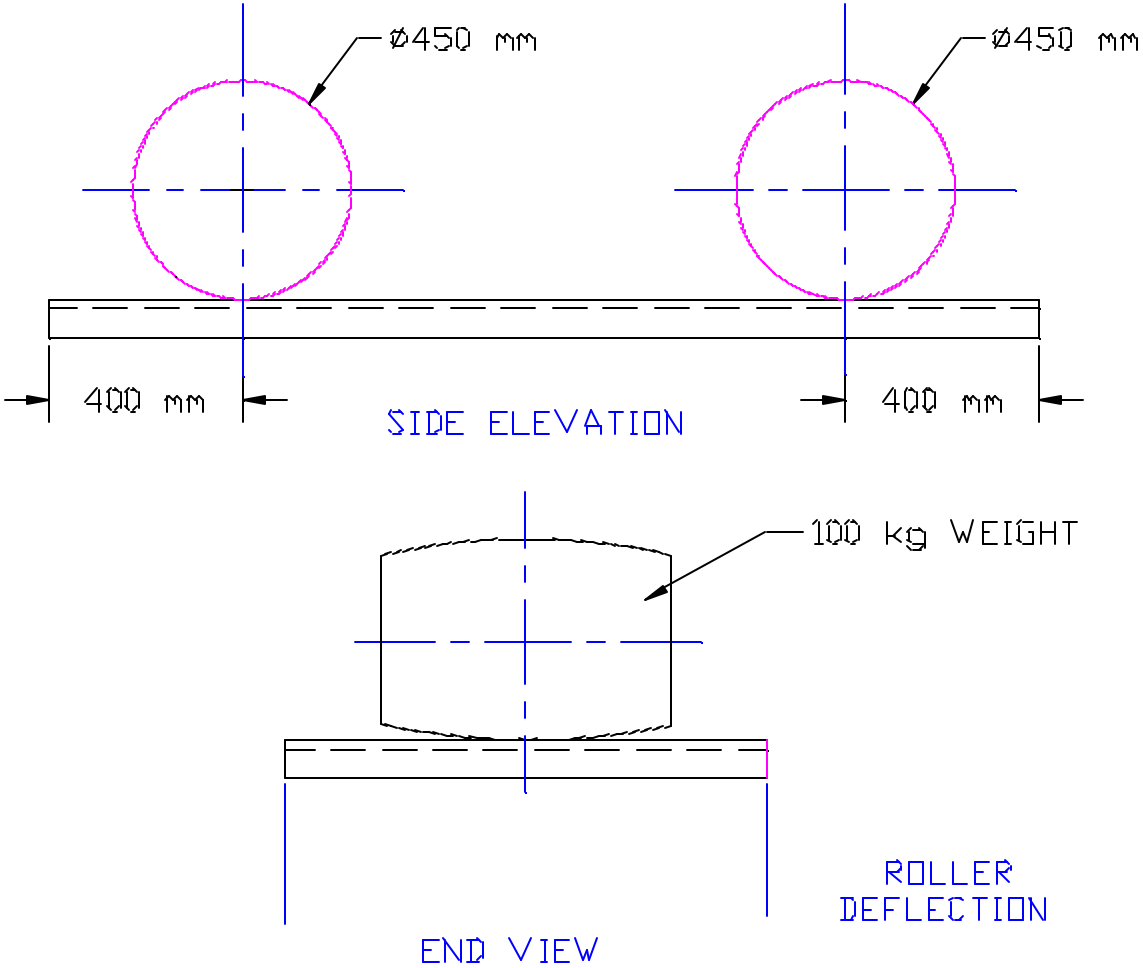
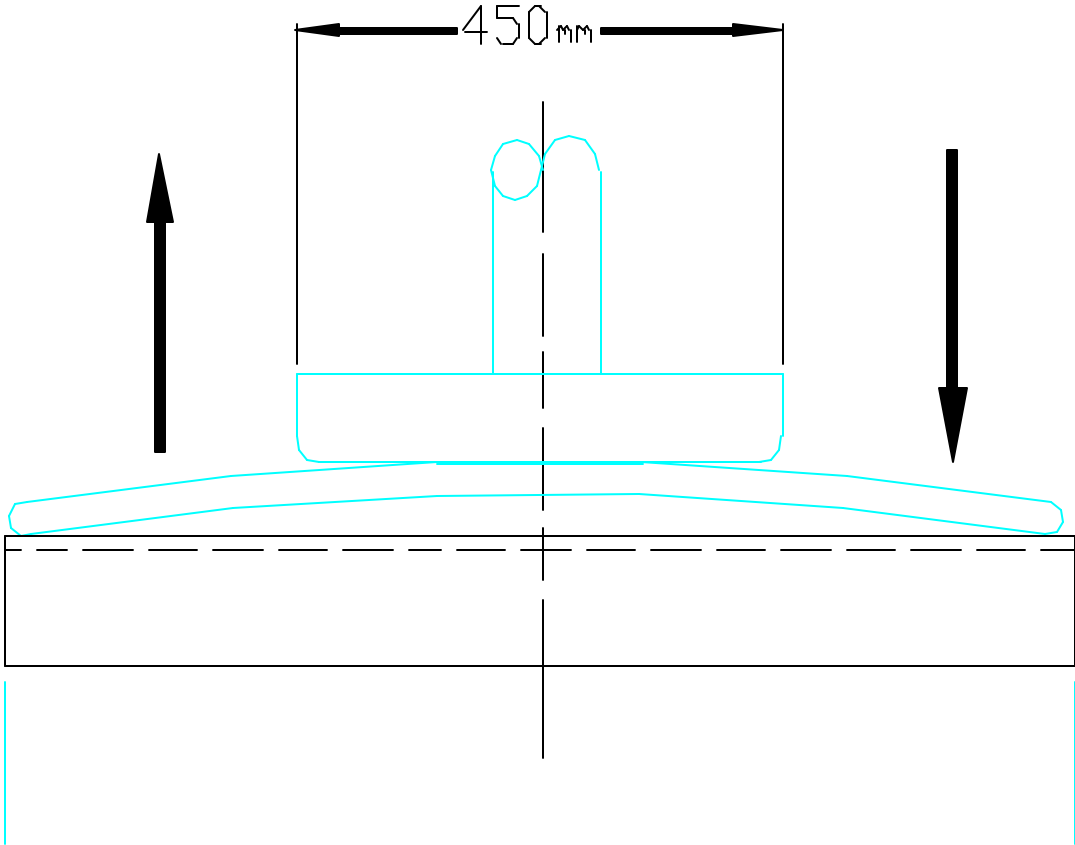
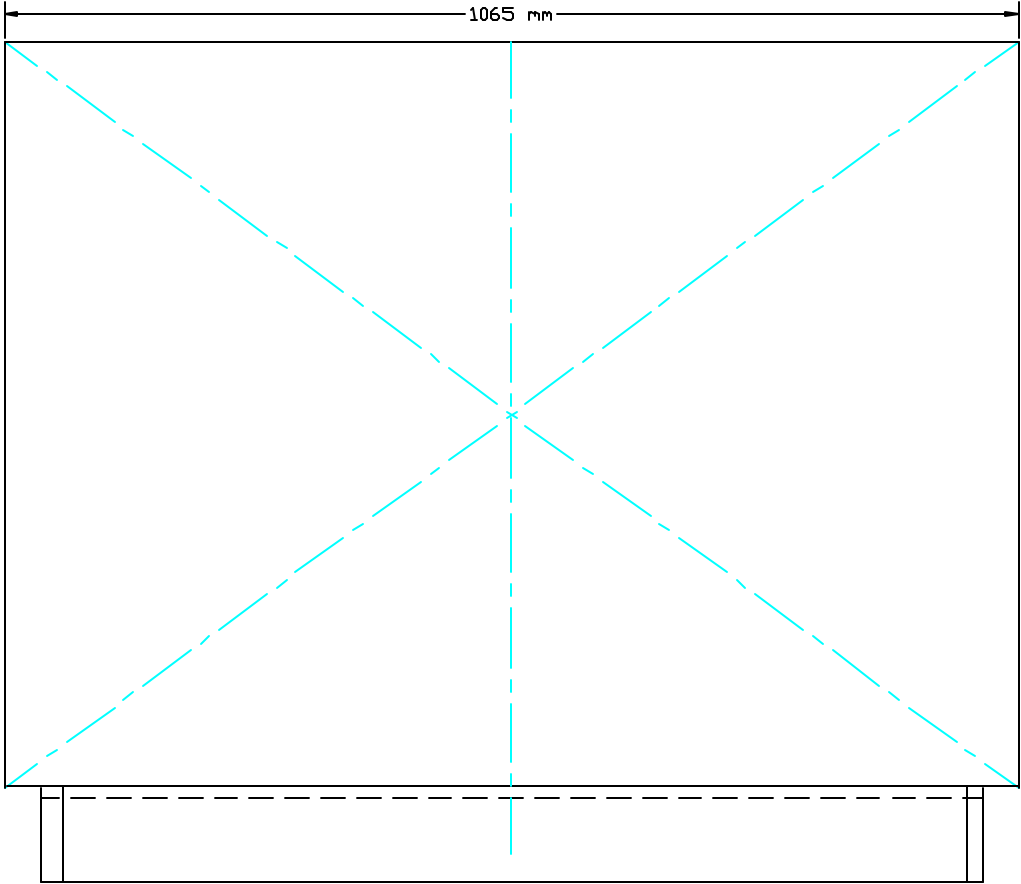


FIGURE 1



RAPID PRESSURE IMPACT DEFLECTION  
SIDE VIEW

FIGURE 2



STATIC LOAD  
SIDE ELEVATION  
FIGURE 3



BUNK AND LOFT BED TEST REPORT FORM

Test report # : \_\_\_\_\_ Date tests completed \_\_\_\_\_

Name of bed manufacturer: \_\_\_\_\_

Style/model number of bed tested: \_\_\_\_\_

Name of furniture line to which this bed belongs: \_\_\_\_\_

Type of bed: \_\_\_\_\_ (platform or spring type)

Built-in Drawers: \_\_\_\_\_ (yes / no)

<b>Group 1 Test Results</b>	<b>PASS</b>	<b>FAIL (explain reason for failure)</b>
<b>A. Roller deflection test</b>		
<b>B. Static force test</b>		
<b>C. End impact force test</b>		
<b>D. Top impact test</b>		

<b>Group 2 Test Results</b>	<b>PASS</b>	<b>FAIL(explain reason for failure)</b>
<b>A. Bed spring rapid pressure impact test</b>		
<b>B. Spring unit racking test</b>		

<b>Group 3 Test Results</b>	<b>PASS</b>	<b>FAIL(explain reason for failure)</b>
<b>Joint test</b>		

<b>Group 4 Test Results</b>	<b>PASS</b>	<b>FAIL(explain reason for failure)</b>
<b>A. Drawer cycle test</b>		
<b>B. Static force test</b>		

(form continued on next page)

Name of person who performed the tests (printed) \_\_\_\_\_

Signature \_\_\_\_\_

Name and address of test facility \_\_\_\_\_

\_\_\_\_\_

Phone number (for questions)\_\_\_\_\_

**Name of person who is submitting offer** (printed) \_\_\_\_\_

Signature\_\_\_\_\_ Date\_\_\_\_\_

Company name \_\_\_\_\_

Phone number (for questions)\_\_\_\_\_