

BIFMA

BUSINESS + INSTITUTIONAL FURNITURE MANUFACTURERS ASSOCIATION

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Stack Chair Tests

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This whitepaper should not be used, quoted or in any way referenced in a contract or bid specification.

Foreword and Acknowledgements

The material presented in this whitepaper was developed as a result of the efforts of members of the BIFMA Seating Subcommittee. A Task Team with an Educational Seating focus put together these tests during 2011 for consideration of manufacturers of Stackable Seating. This document was made available to BIFMA membership on August 17, 2012 for use and consideration in determining appropriate stacking of chairs. In 2015 the BIFMA Seating Subcommittee recommended making these tests available for broader use; thus this publication.

These tests are informative only and have not been approved by any formal vote, nor any consensus body.

Users of these tests do so at their own risk and caution should be observed when testing high stacks of chairs.

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Suggestions for the improvement of this Whitepaper are welcome. The suggestions should be sent to email@bifma.org or BIFMA, 678 Front Avenue NW, Suite 150, Grand Rapids, MI 49504. The BIFMA Seating Subcommittee will review suggestions.

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1 Scope

This whitepaper is intended to provide general guidance for manufacturers of stackable seating to determine how many chairs may be reasonably stacked.

2 Definitions

Users are encouraged to consider the definitions in the current edition of ANSI/BIFMA X5.1 General-Purpose Office Chairs – Tests.

3 General

Users are encouraged to consider the general guidance found in the current edition of ANSI/BIFMA X5.1 General-Purpose Office Chairs – Tests. This includes Testing Considerations, Manufacturer's Instructions, Figures, Measurements, Tolerances, Test Force Application, Pretest Inspection, Recommended Test Report Format, and any other guidance provided.

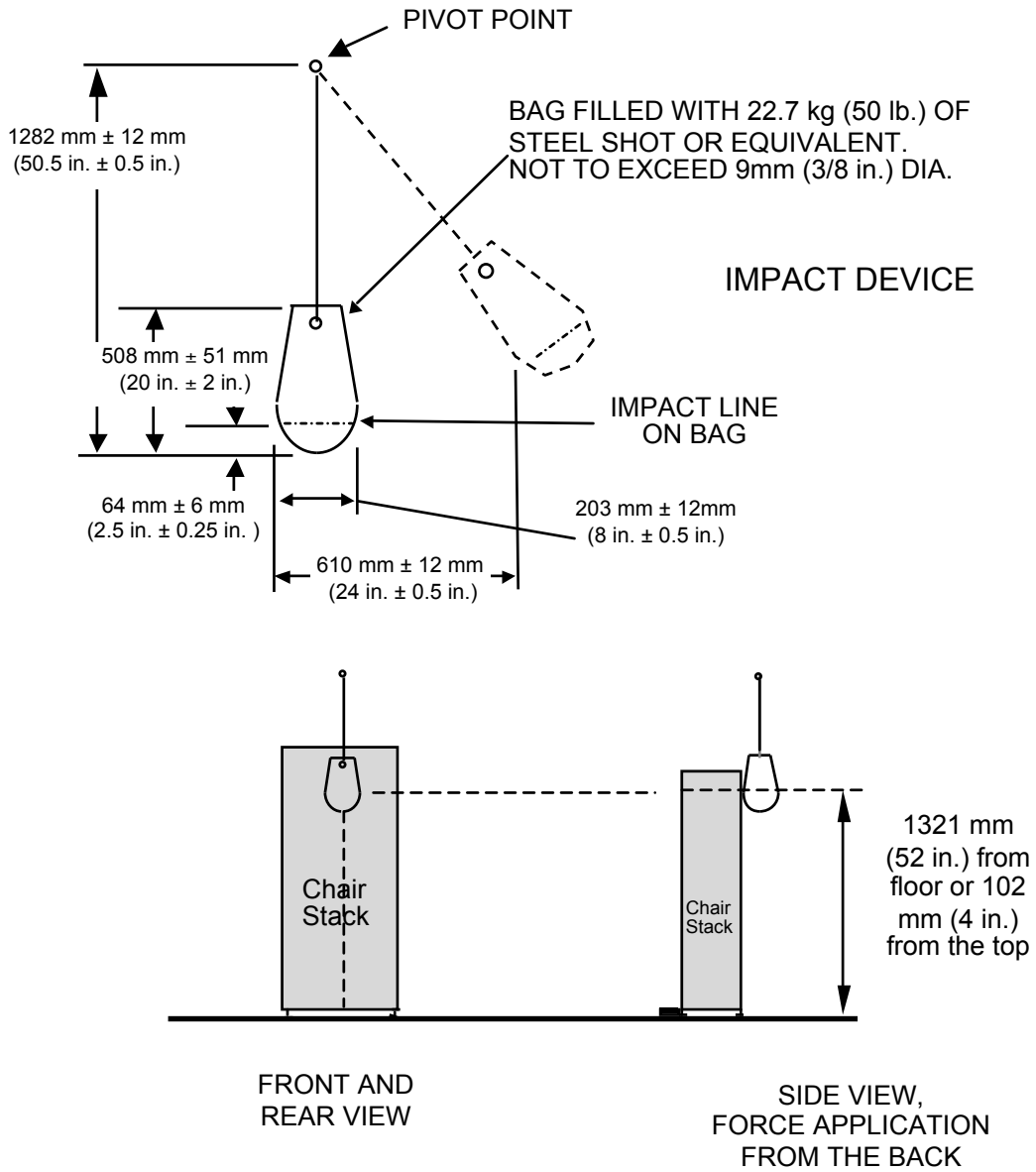


Figure 1 – Impact Stability for Freestanding Stacked Chairs

4 Impact Stability for Freestanding Stacked Chairs (See Figure 1)

4.1 Purpose of Test

The purpose of this test is to evaluate the stability of a freestanding stack of chairs to remain stable when subjected to impacts. This test does not apply to stacks of chairs less than 42 in. in height.

4.2 Test Setup

The test sample configuration shall be placed on a test platform. The glides, feet, or casters, shall be blocked or otherwise prevented from moving along the surface. The blocks shall not restrict the tilt of the product. Prepare a test bag that is 203 mm (8 in.) in diameter, weighing 22.7 kg (50 lb.). The bag shall be filled with steel shot or equivalent. The diameter of the fill material shall not exceed 9 mm (3/8 in.). The bag shall swing on a pivot that is 1282 mm (50.5 in.) from the pivot point to the bottom of the bag. (See Figure 1).

4.3 Test Procedure

- a) Swing the bag through a horizontal distance of 610 ± 12 mm (24 ± 0.5 in.). The distance from the pivot point to the bottom of the bag shall be 1282 ± 12 mm (50.5 ± 0.5 in.). (See Figure 1).
- b) Impact the stack along a line that is 1321 mm (52 in.) from the floor or 102 mm (4 in.) down from the highest point on the stack, whichever is lower. The impact shall be applied on the stack at a location such that the impact causes the configuration to be in its least stable condition. If necessary, repeat the impact from the front, back and side(s) to verify the least stable condition has been evaluated.

4.4 Acceptance Level

The chair stack shall not tip over as a result of any of the impact. Chair(s) shall not become dislodged from the stack.

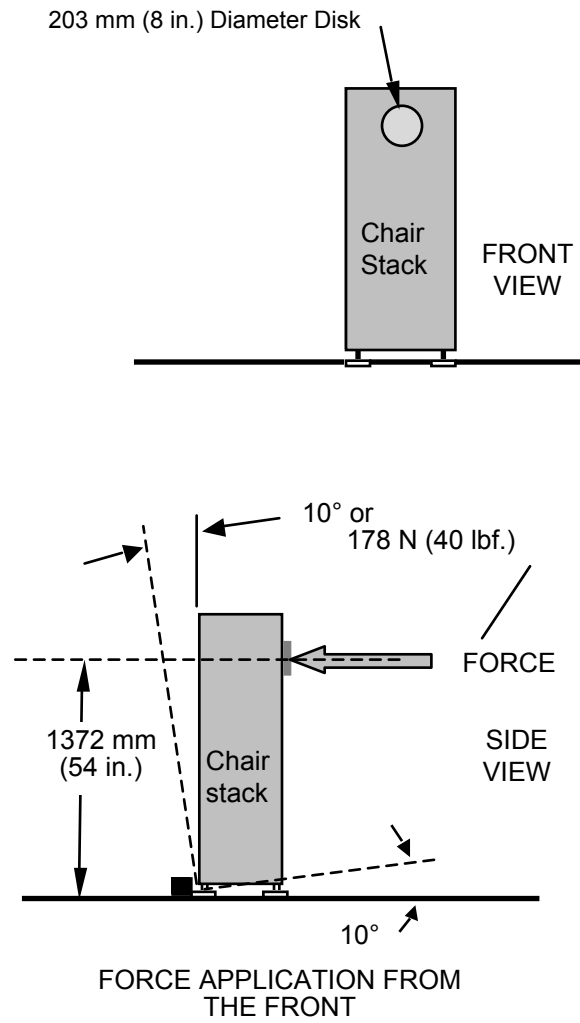


Figure 2 - Force Stability for Freestanding Stacked Chairs

5 Force Stability Test for Freestanding Stacked Chairs (See Figure 2)

5.1 Purpose of Test

The purpose of this test is to evaluate the stability of a freestanding stack of chairs to remain stable when subjected to horizontal static loads. This test does not apply to stacks of chairs less than 42 in. in height.

5.2 Test Setup

The chair stack shall be placed on a test platform. The glides, feet, or casters, shall be blocked or otherwise prevented from moving along the surface. The blocks shall not restrict the tilt of the product.

5.3 Test Procedure

- a) Apply a force perpendicular to the chair stack.
- b) The force shall be applied to the chair stack at a location 1372 mm (54 in.) from the floor or 102 mm (4 in.) down from the top edge, whichever is lower. The force shall be applied on the stack at a location such that the force causes the configuration to be in its least stable condition.
- c) Gradually increase the force until 178 N (40 lbf.) is reached, or the stack moves horizontally 250 mm (9.8 in.), whichever occurs first. Repeat the force application until all four sides have been tested.

5.4 Acceptance Level

The stack shall not tip over. Chair(s) shall not become dislodged from the stack.

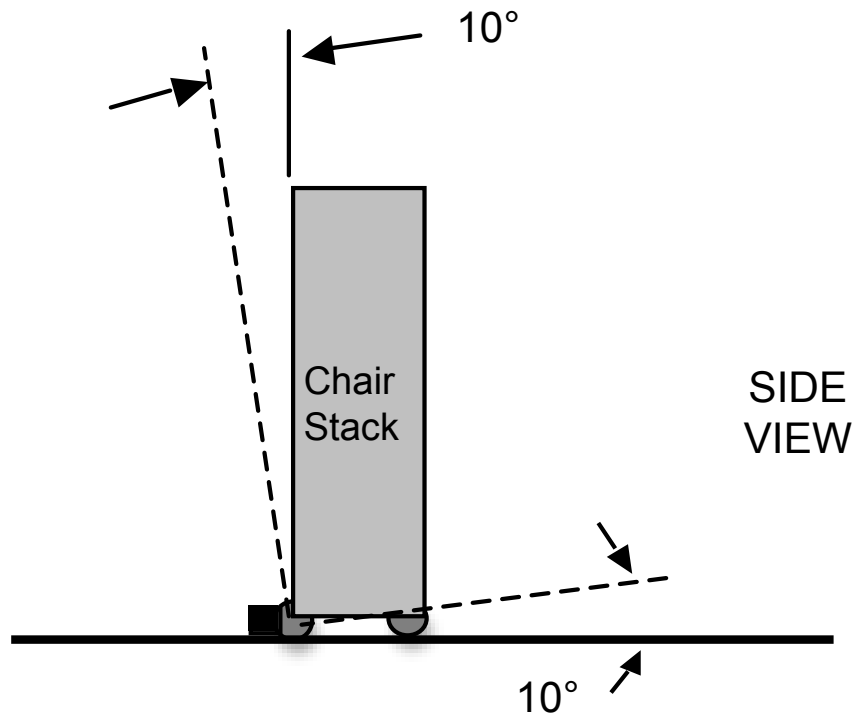


Figure 3 - Incline Stability Test for Stacked Chairs

6 Incline Stability Test for Stacked Chairs (See Figure 3)**6.1 Purpose of Test**

The purpose of this test is to evaluate the stability of a stack of chairs on a moving cart/dolly.

6.2 Test Setup

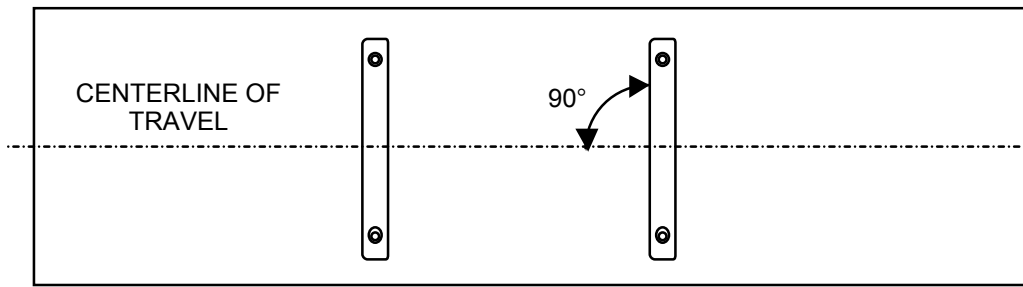
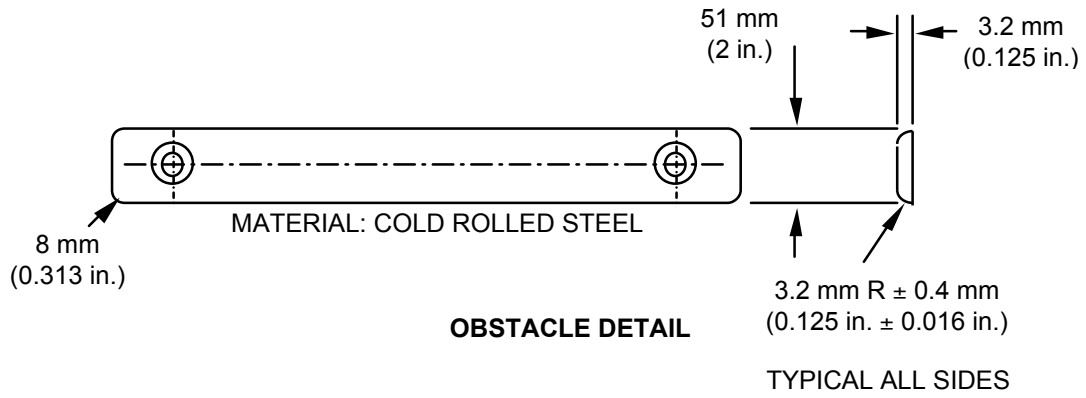
The chair stack shall be placed on a level test platform. The chairs shall be stacked on the movement cart/dolly to the maximum height (or number of units) in accordance with the manufacturers instructions. The casters shall be blocked or otherwise prevented from moving along the surface. The blocks shall be equal to the radius of the wheel/caster.

6.3 Test Procedure

- a) Incline the test platform to an angle of 10 degrees.
- b) Repeat the test until the unit has been inclined from the front, back and each side.

6.4 Acceptance Level

The chair stack shall not tip over. Chair(s) shall not become completely dislodged from the stack.



OBSTACLE LAYOUT

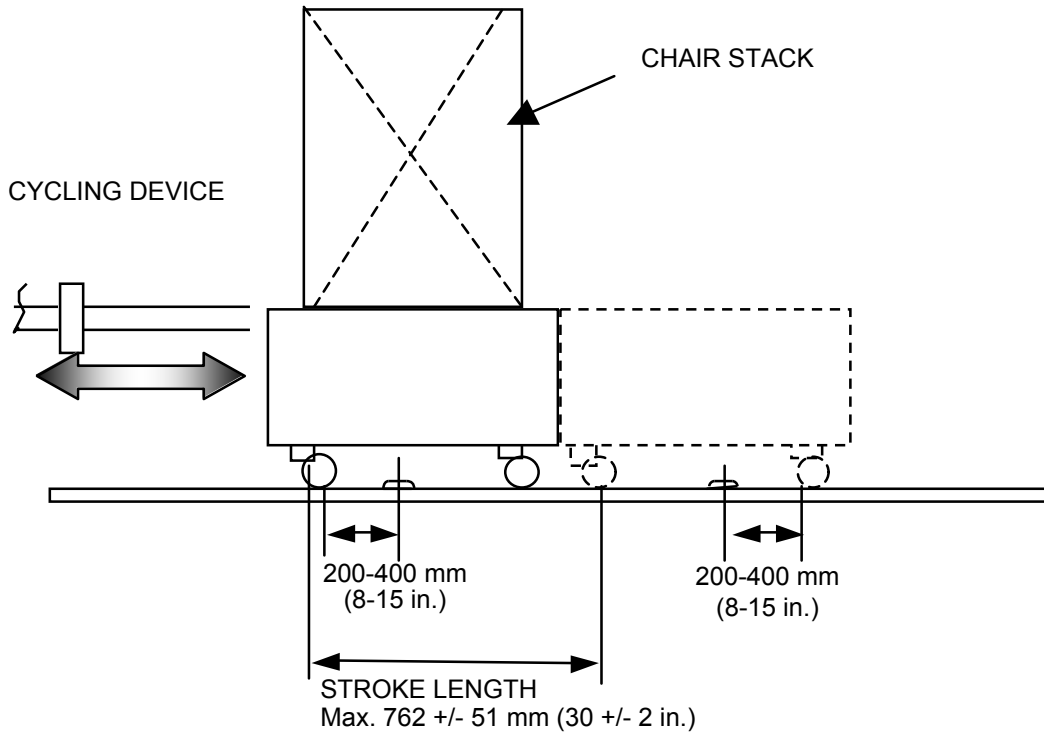


Figure 4 - Durability Test for Chair Carts/Dollies

7 Durability Test for Chair Carts/Dollies with Casters (See Figure 4)**7.1 Purpose of Test**

The purpose of this test is to evaluate the ability of chair carts/dollies to withstand fatigue, stress, and wear caused by moving the product.

7.2 Test Setup

- a) Place the chair cart/dolly on a smooth, hard surfaced test platform with obstacles.
- b) Attach the cycling device no lower than 51 mm (2 in.) from the top surface of the cart/dolly. The method of attachment shall not support the unit during the test. The load applied by the attachment device shall be removed from the amount of unit loading.
- c) Apply a load to the cart/dolly that is equal to the maximum loading allowed by the manufacturers instructions. The load shall be applied in a manner that simulates the weight distribution of the chair stack.
- d) Adjust the length of stroke to 762 ± 25 mm (30 ± 2 in.) and position the obstacles to ensure that all casters travel over an obstacle twice for each cycle (See Figure 4).
- e) After changing direction at each end of the stroke, provide 200 mm to 400 mm (8 in. to 15 in.) of travel before encountering an obstacle. Only two casters shall pass over an obstacle at one time.
- f) Set the cycling device to operate at a rate of 10 ± 2 cycles per minute. One cycle consists of a forward, then a backward stroke of the machine.
- g) The casters shall be free to rotate and swivel where applicable.

7.3 Test Procedure

Cycle the cart/dolly for 5000 cycles over a platform with obstructions.

7.4 Acceptance Level

There shall be no loss of serviceability to a caster or the cart/dolly.