

OFFICE & INSTITUTIONAL FURNITURE SEATING STANDARDS

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Agenda

- OVERVIEW OF BIFMA
- EXISTING COMMERCIAL SEATING STANDARDS
- SEATING TESTS
- ERGONOMICS GUIDELINE FOR FURNITURE
- THOUGHTS ON SEATING STANDARDS /ERGONOMICS FOR LARGE OCCUPANTS
- QUESTIONS?

BIFMA

- Founded in 1973.
- Over 300 members are producers, suppliers, and other service providers of office and institutional furniture.
- Develops voluntary product and industry standards.
- Advocates on behalf of the industry with legislators and regulators.
- Facilitate meaningful dialog and education to support our core services and the industry we serve.
- Publishes key industry statistics.



ANSI Process

- Consensus
- Openness
- Balance
- Due Process

BIFMA is an ANSI-accredited Standards Developer.



ANSI/BIFMA Seating Standards

- ANSI/BIFMA X5.1-2011 *General-Purpose Office Chairs*
- ANSI/BIFMA X5.4-2012 *Lounge & Public Seating*
- ANSI/BIFMA X5.11-2015 *General-Purpose Large Occupant Office Chairs*
- ANSI/BIFMA X6.1-2012 *Educational Seating*

ANSI/BIFMA X5.1 General-Purpose

- “... normally used in an office environment and may include, but are not limited to those seating styles typically referred to as: executive/management, task/secretarial, side/guest chairs, stacking chairs, tablet arm chairs and stools.”
- In reality, this standard is used for many other types of chairs in addition to those listed above. This is the workhorse of North American seating tests.
- The 95th percentile male weighs 253 pounds and was used as the basis for the test loads along with a 10-year life at single shift usage.
 - Note: This standard is currently undergoing final revisions. The next revision will use 275 pounds as the basis for test loads.

ANSI/BIFMA X5.4 Lounge / Public

- “... normally used in indoor public spaces such as waiting, reception, or gathering areas. Lounge and public seating products are generally not adjustable for personal use.”
- Where a product may be covered by more than one ANSI/BIFMA standard, the manufacturer shall determine which standard provides most appropriate test conditions.
- The 95th percentile male weighs 253 pounds and was used as the basis for the tests along with a 10-year life at single shift usage.
 - Note: This standard has just started the revision process.

ANSI/BIFMA X5.11 Large Occupant

- Similar scope to ANSI/BIFMA X5.1 General-Purpose, except it uses a 400 pound male as a basis for test loads.
- The test loads were developed in conjunction with Mississippi State University.
- The seat width must be 22 inches or greater for a chair to be tested to this standard.

ANSI/BIFMA X6.1 Educational Seating

- Pre-school, elementary, middle school, high school, adult education, trade school, and college.
- These tests are not intended to evaluate products used in living/dorm environments.
- Includes units with integrated desk or table surfaces.
- Size A: Seat Height < 13.9 inches / User Weight 75 lbs. (age 6)
- Size B: Seat Height 13.9-16.7 inches / User Weight 165 lbs. (12)
- Size C: Seat Height > 16.7 inches / User Weight 253 lbs. (adult)

Backrest Strength

The chair must withstand a force for one minute for the functional requirement and a greater force for the proof requirement.



Drop Test

The chair must withstand a weighted bag dropped into the chair for the functional requirement and a heavier bag for the proof requirement.



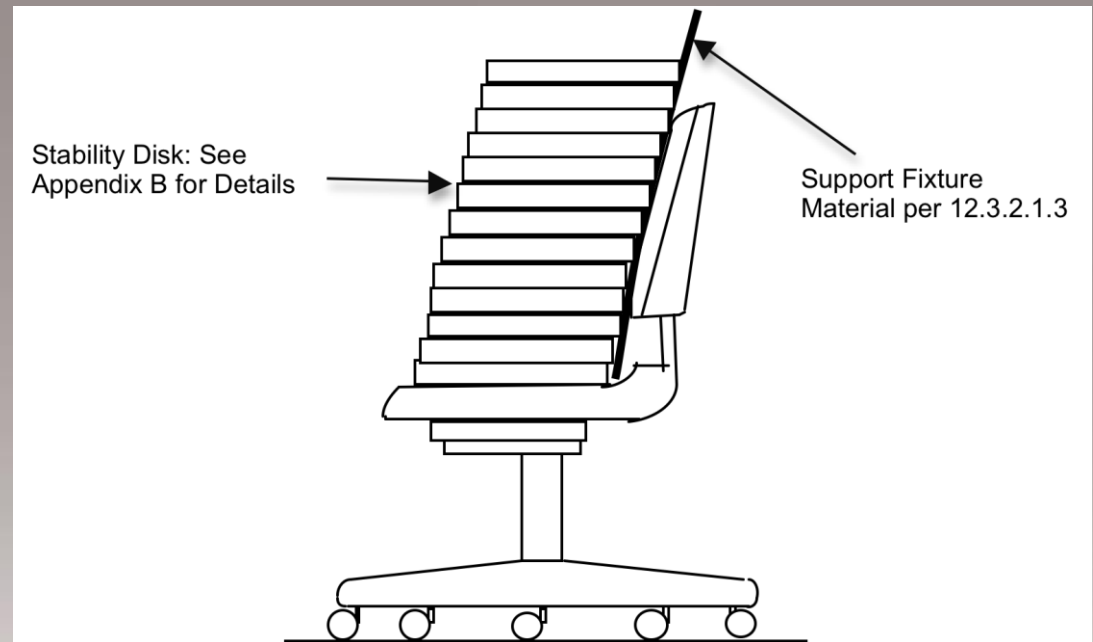
Seating Durability

The chair must withstand a weighted bag set into the center of the seat pan for 100,000 cycles; and again for 20,000 cycles each front corner.



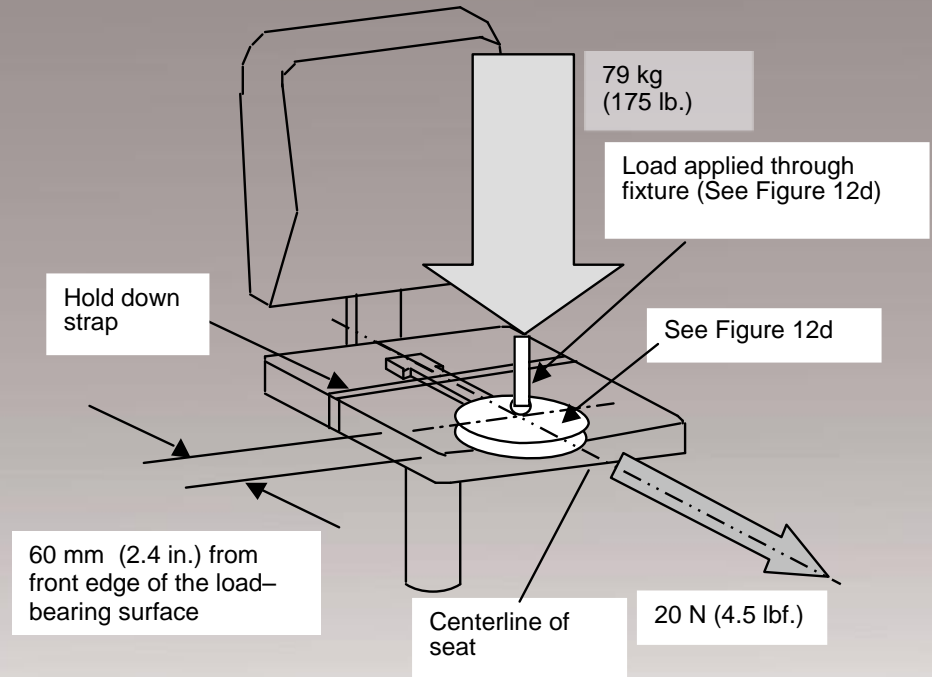
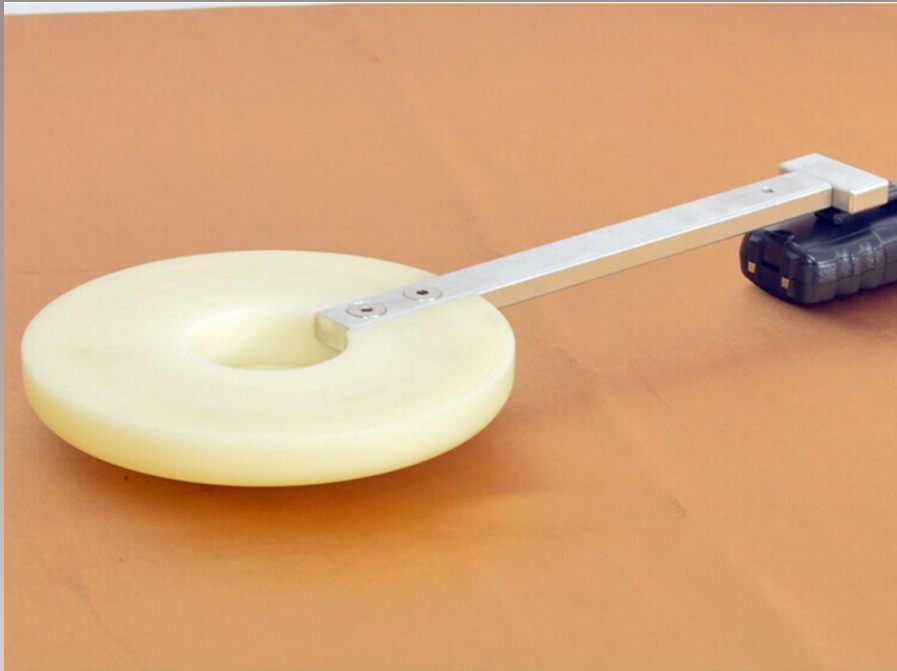
Rear Stability

Numerous disks representing a person leaning back are placed along the backrest. The chair must not tip over.



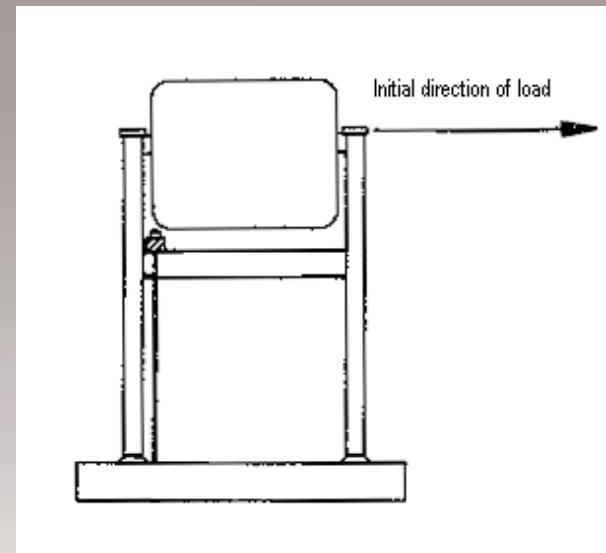
Front Stability

Test loads representing a person sitting on the front edge are applied very near the front of the seat pan. The chair must not tip over.



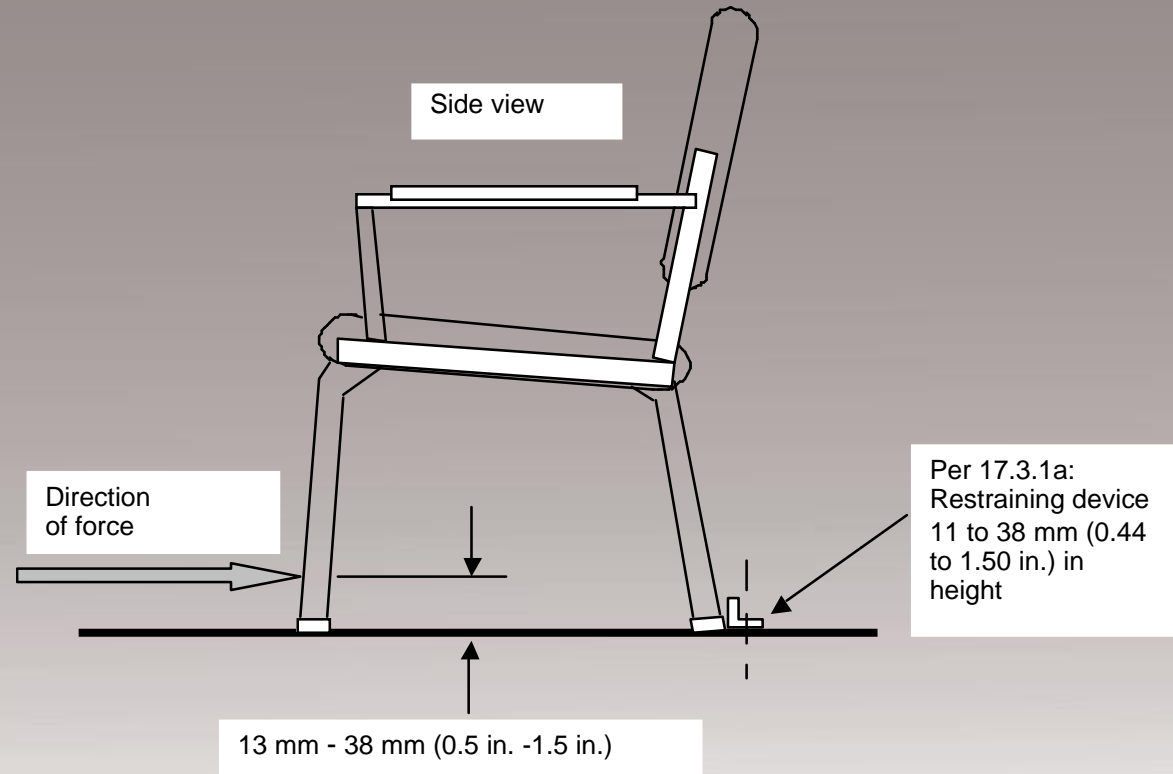
Arm Strength Tests

- The chair must withstand a force for one minute in the vertical direction for the functional requirement and a greater force for the proof requirement.
- The chair must withstand a force for one minute in the horizontal direction for the functional requirement and a greater force for the proof requirement.



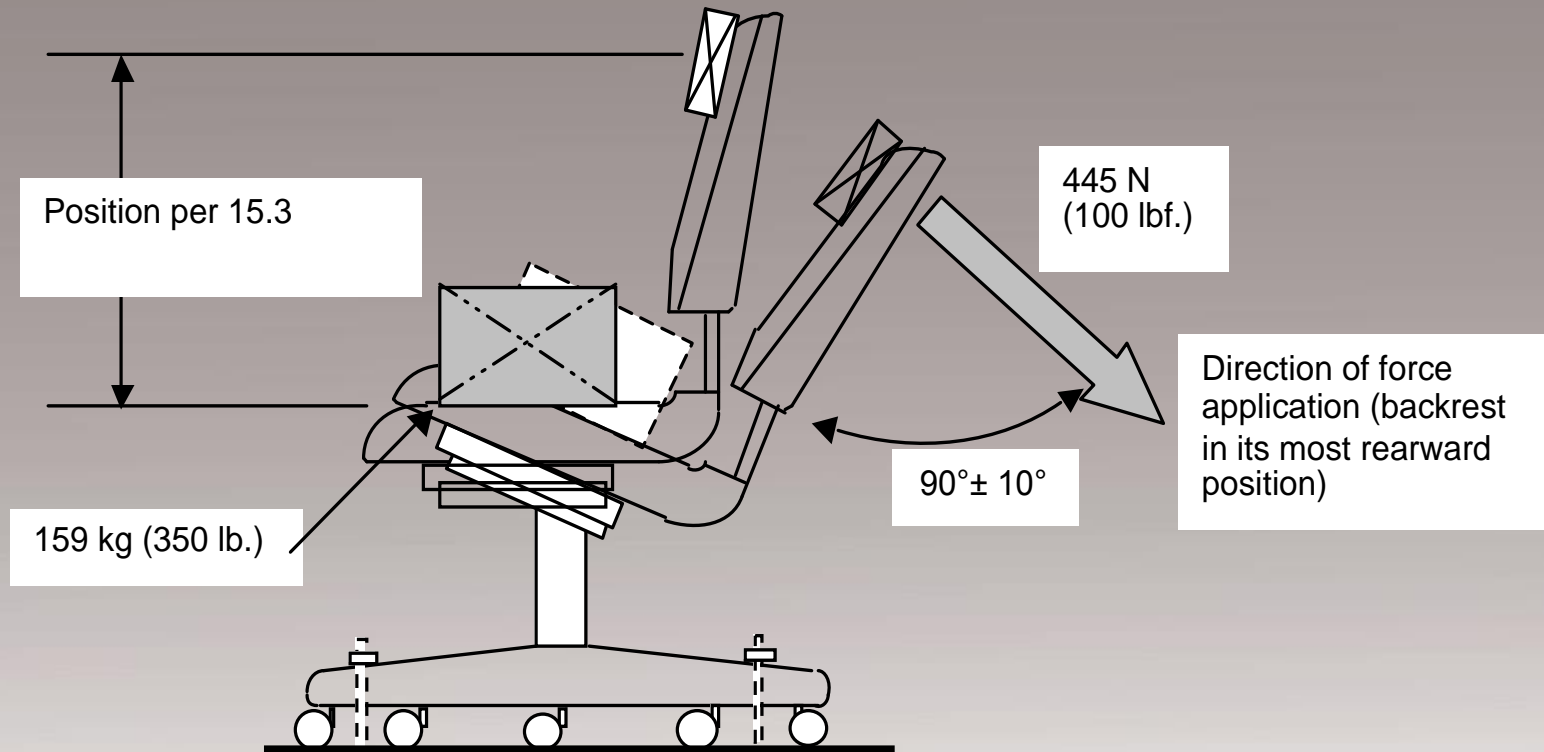
Leg Strength Tests

The chair must withstand a force for one minute in the horizontal direction at the front leg the functional requirement and a greater force for the proof requirement. Repeat for a side application.



Backrest Durability

The chair must withstand a force applied to the seat back for 120,000 cycles. Locations vary depending upon the size of the backrest.



Angular Armrest Durability

The chair must withstand forces applied to the armrests (each simultaneously) for 60,000 cycles.



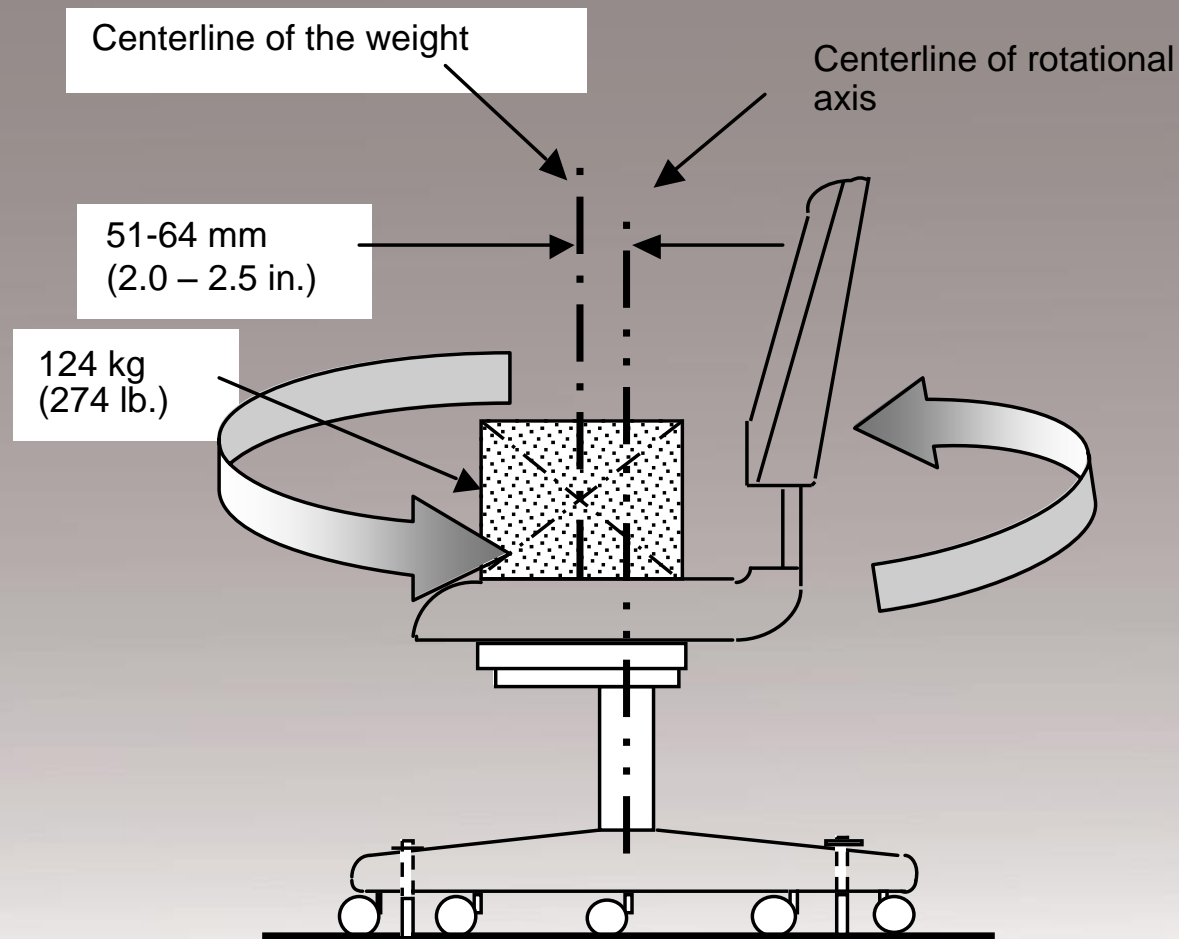
Structural Durability

The chair must withstand a horizontal force applied at seat pan level for 50,000 cycles.



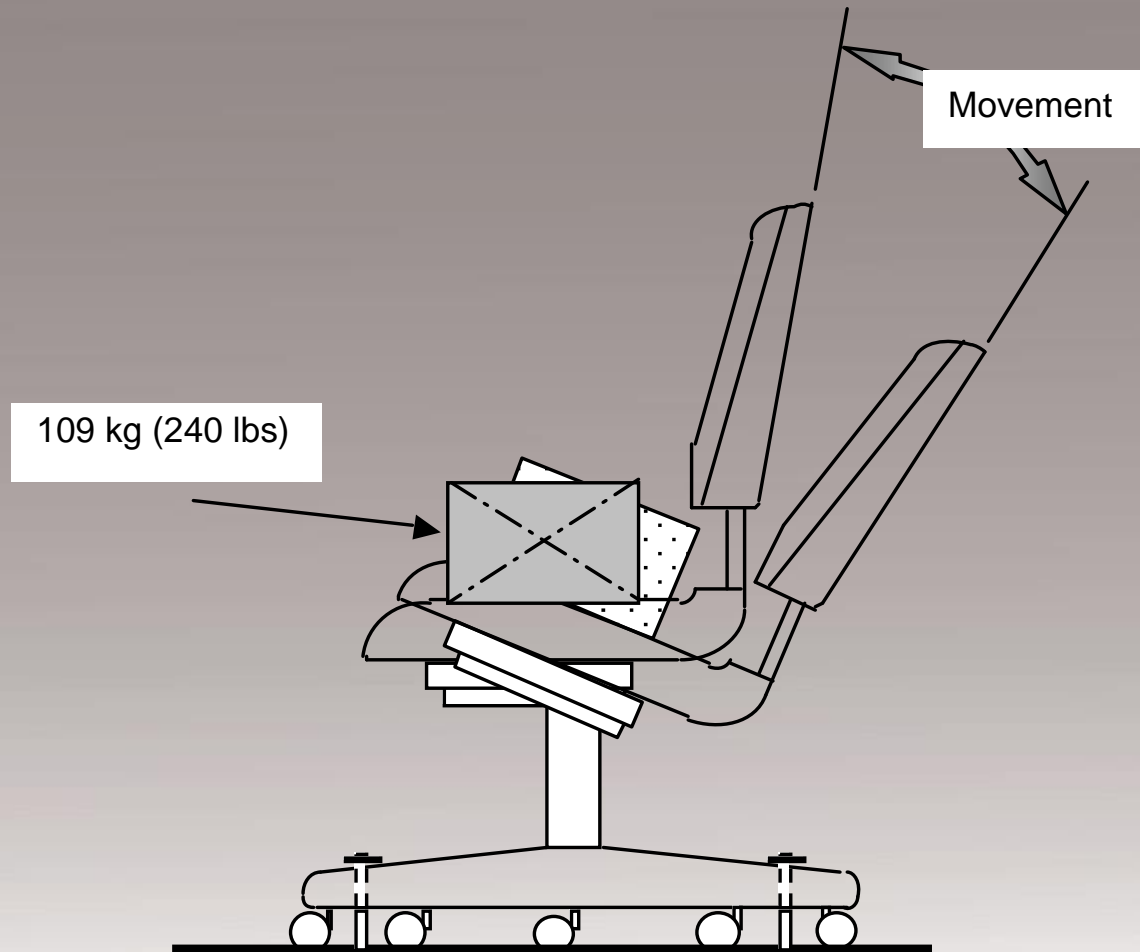
Swivel Test

The chair must withstand repeated swiveling of 360 degrees for 120,000 cycles (60,000 each at highest / lowest positions if applicable)



Tilt Mechanism

The chair must withstand the fatigue stresses and wear caused by repeated tilting of 300,000 cycles.



Caster Durability

The chair must withstand cycling a certain distance for 100,000 cycles including a specified number of cycles over obstacles.



Tablet Arm Tests

There are two Tablet Arm tests: one for static loading and one for repeated loading.



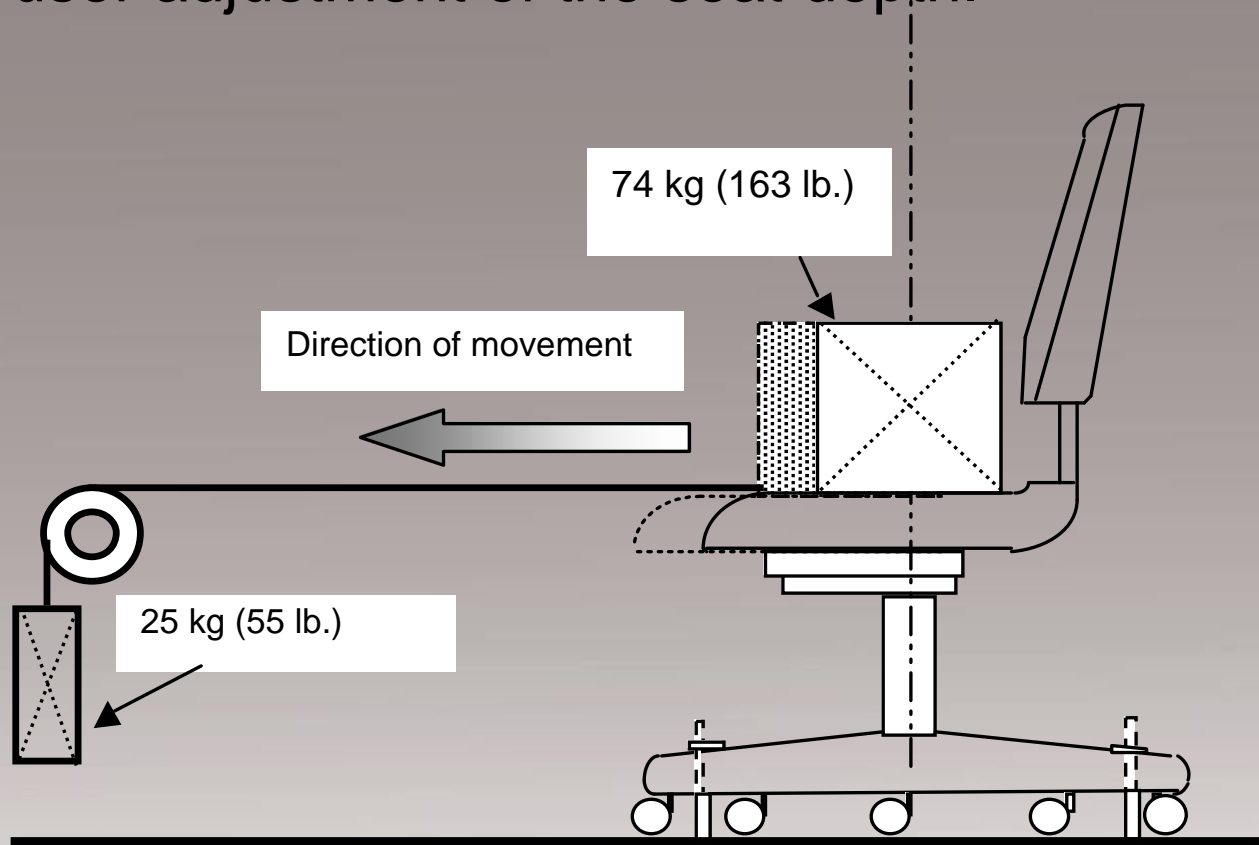
Footrest Tests

There are two Footrest tests: one for static loading and one for repeated loading.



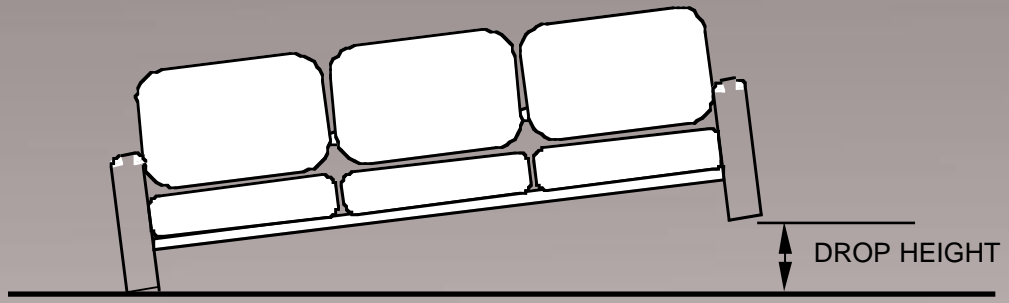
Out Stop Test

This test is to evaluate the ability of the seat slide out stops to withstand excessive impact forces that may result from user adjustment of the seat depth.



Unit Drop Test

Applies to Lounge Units (not small chairs as demonstrated by then Indiana University basketball Coach Bobby Knight).



Upholstered Furniture Flammability

- California Technical Bulletin TB-133 is a full scale burn test.
- Sometimes specified for un-sprinkled and limited egress occupancies.



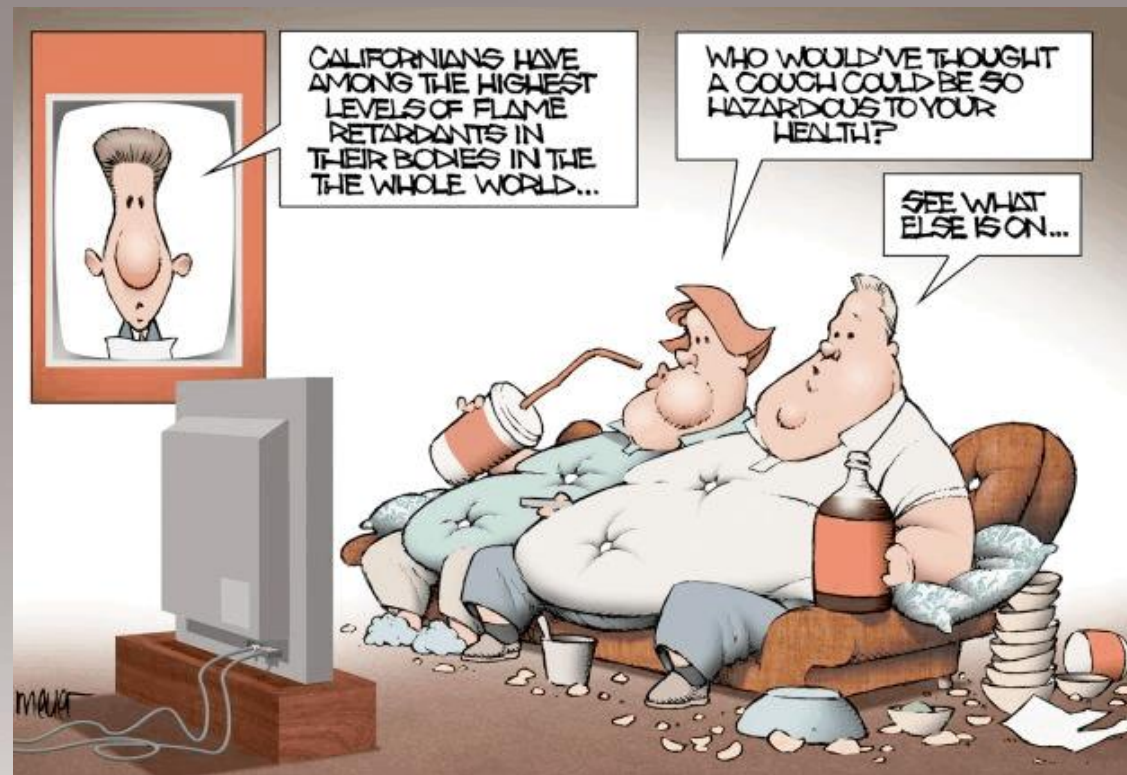
Upholstered Furniture Flammability

California Technical Bulletin TB-117-2013 is a cigarette smolder test. This is the most widely used specification for seating fire safety.



Upholstered Furniture Flammability

California and other specifiers have moved from open flame to cigarette smolder requirements given such low fire risk and concerns with the flame retardant chemicals.



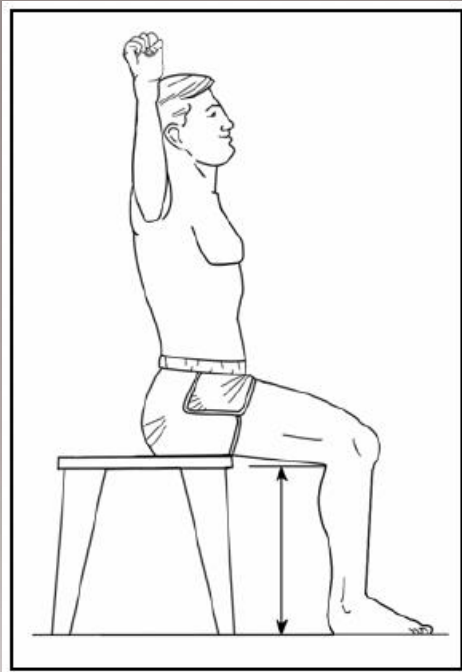
<http://toxicfreefiresafety.org/CaliforniansForToxicFreeFireSafety.php>

BIFMA G1 Ergonomics Guideline

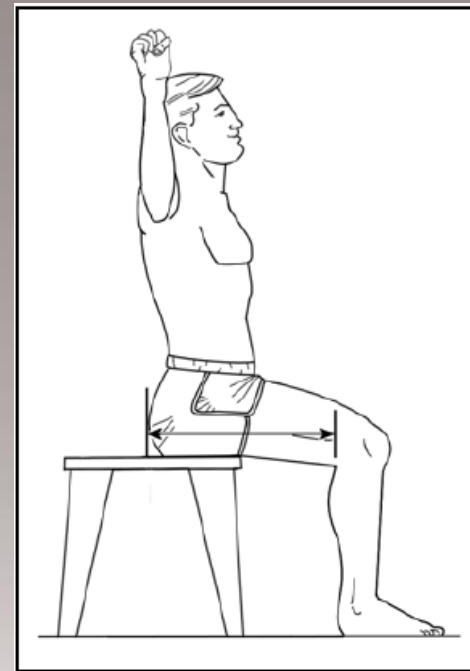
- For furniture used in office work spaces designed for computer use.
- Uses principles and design considerations from ISO.
- Focused on North America with data from the Civilian American and European Surface Anthropometry Resource (CAESAR).
- Intended to be recommendations, not requirements. Yet often the market requires strict conformance!

Anthropometric Measurements Used to Develop Ergonomic Seating Requirements

Popliteal Height

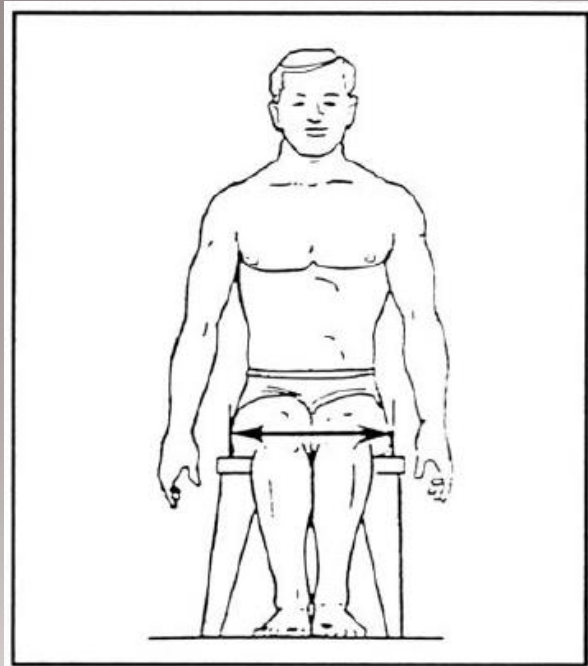


Buttock-Popliteal Length

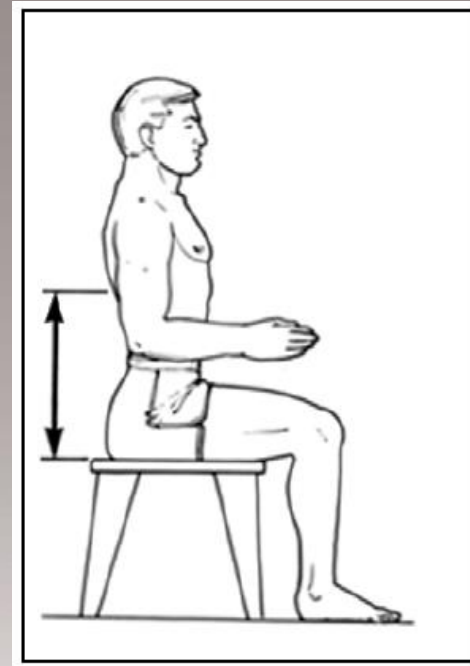


Anthropometric Measurements Used to Develop Ergonomic Seating Requirements

Hip Breadth, Sitting

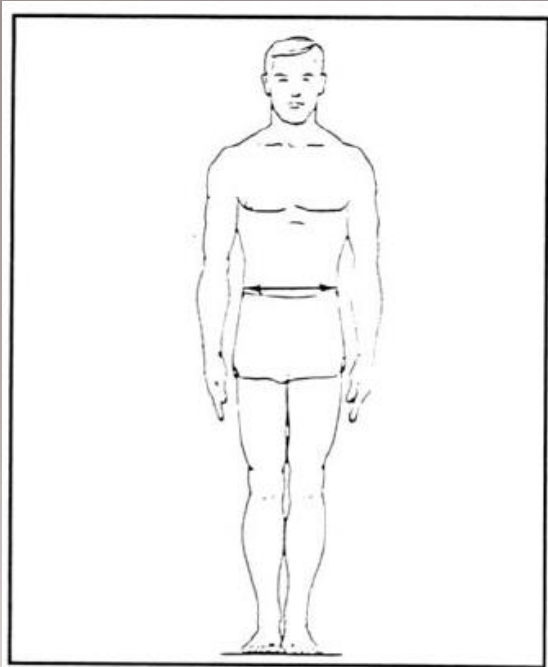


Tenth Rib Midspine, Sitting

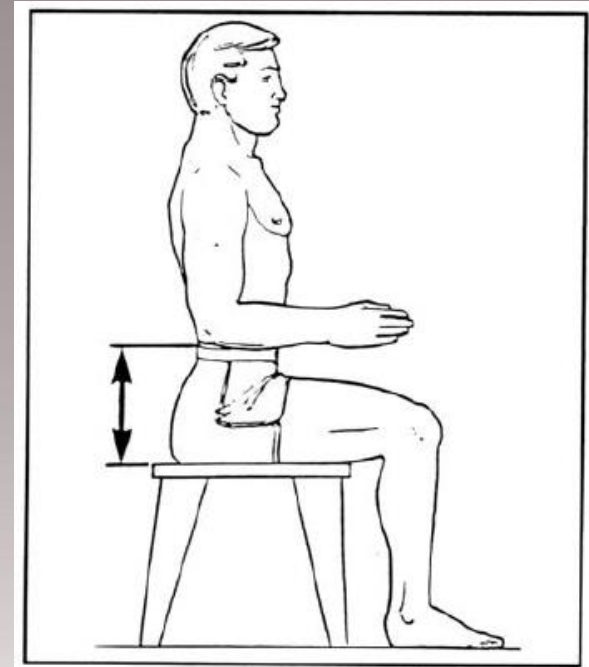


Anthropometric Measurements Used to Develop Ergonomic Seating Requirements

Bi-Cristale Breadth, Standing



Elbow Height, Sitting

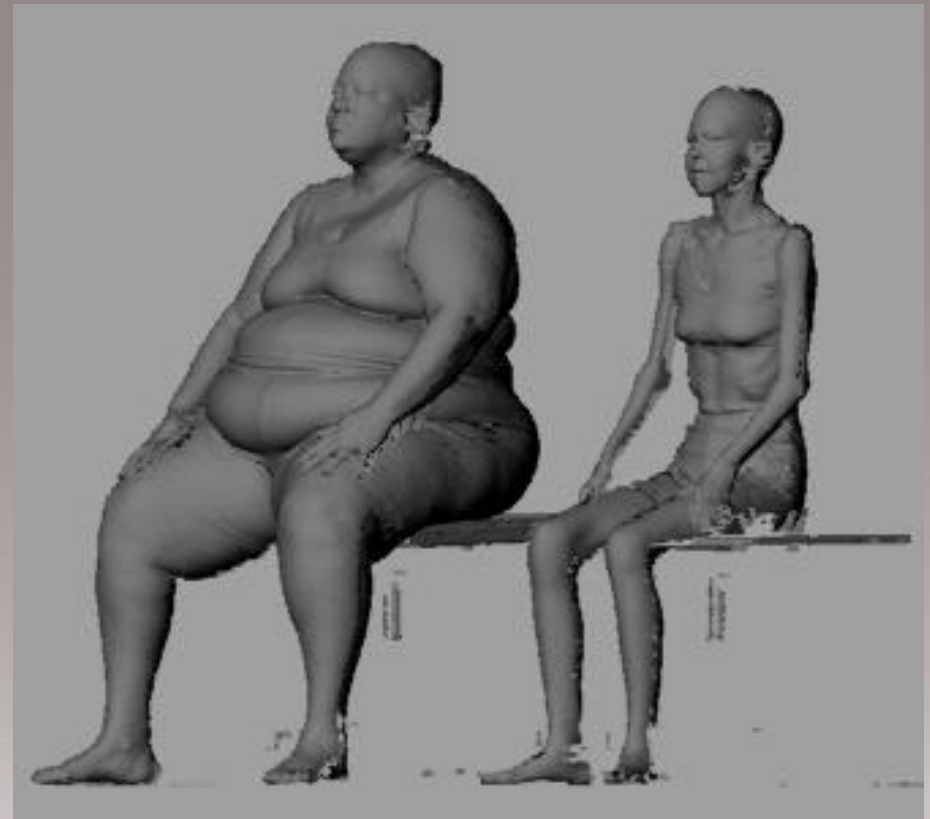
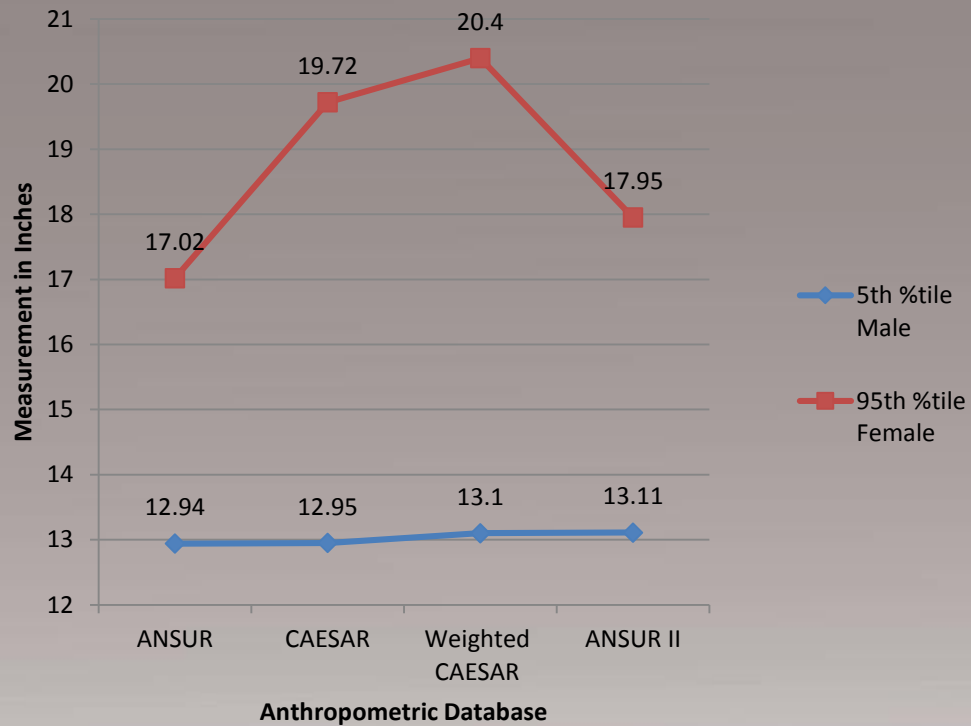


The Work Chair

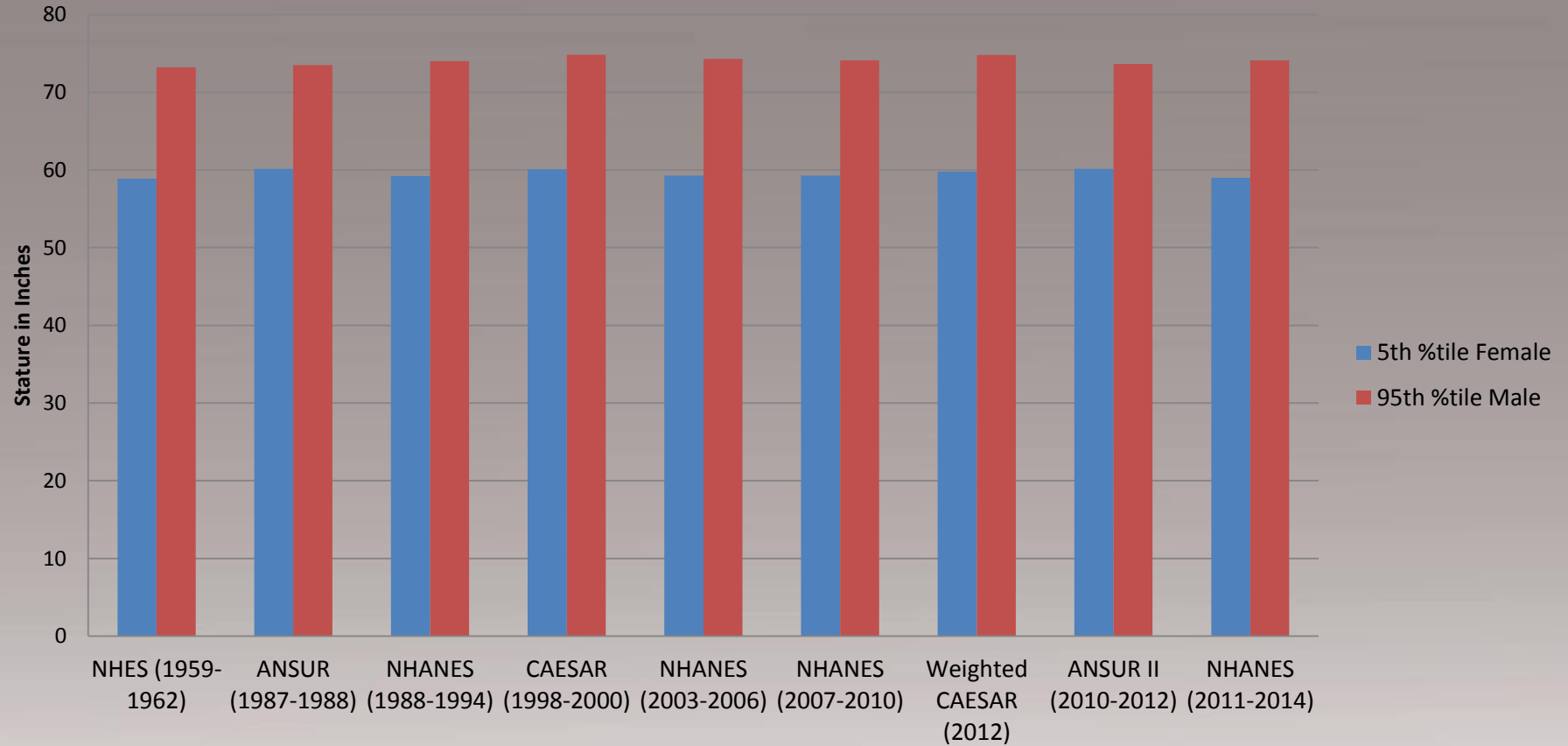
Changes G1 2002 vs 2013

Parameter	Change
Seat Height	Starts lower, ends higher
Seat Depth	↓
Seat Width	↑
Seat Pan Angle	Same
Backrest Height	↑
Backrest Width	Same
Lumbar Support (Height)	Same
Armrest Height	Starts & ends higher
Armrest Length and Position	N/A
Inside Distance Between Armrests	↑

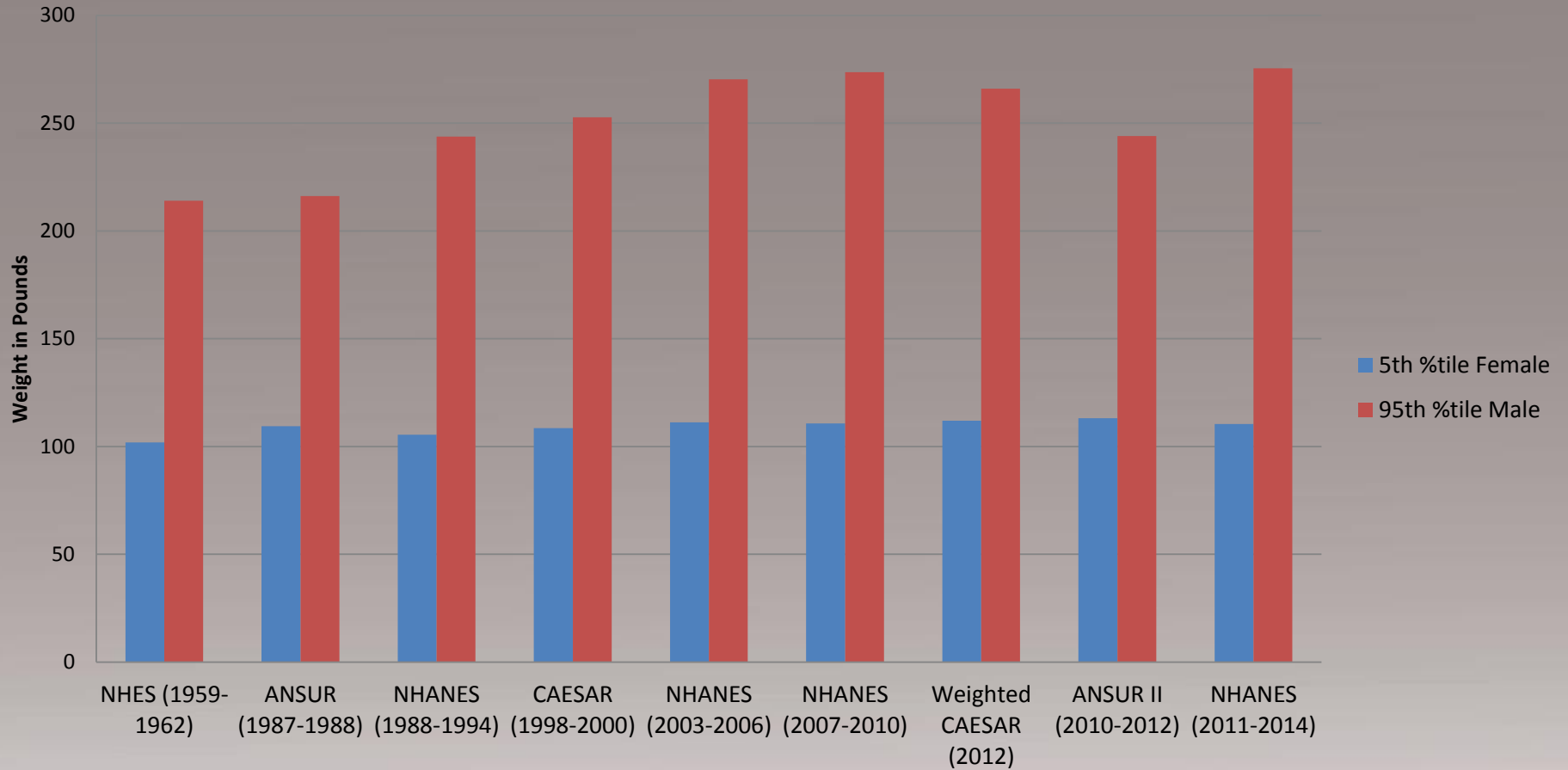
Hip Breadth Measurement



Comparisons of Stature

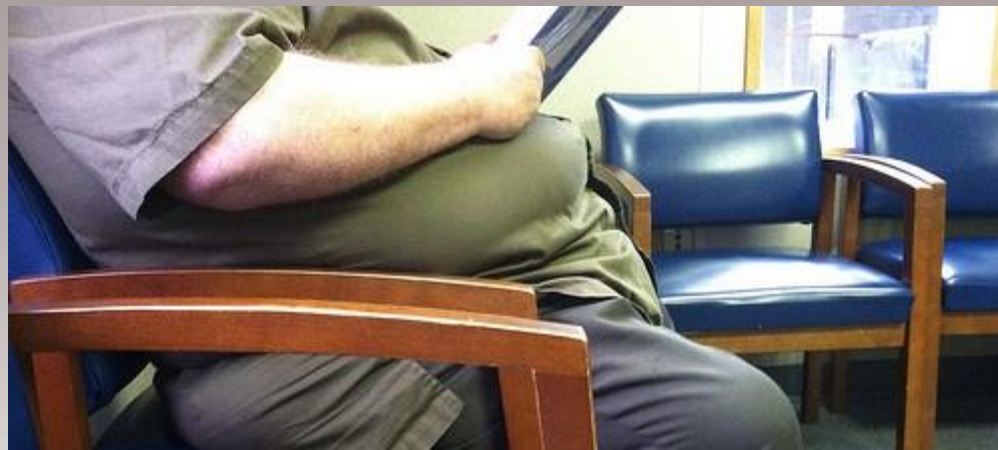


Comparisons of Weight



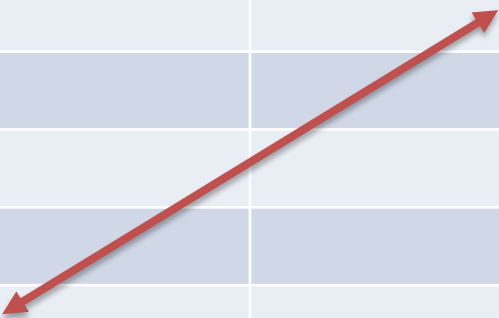
Problem Statement

- ANSI/BIFMA X5.1 and X5.4 cover occupants up to the 95th percentile male for safety and performance.
- BIFMA G1 Ergonomics Guideline provides recommendations for dimensions for fit and comfort for the 5th percentile female to the 95th percentile male.
- What about the large occupants?
 - Historically it was up to each manufacturer to respond to the large occupant market. This resulted in furniture that was stronger than necessary, resulting in excessive cost; or weaker than necessary resulting in breakage and/or injury.



Seat Width for Large Occupants: Comparison of Hip Breadth, Sitting

	Women's Hip Breadth	Women's Hip Breadth
Percentile	BIFMA G1*	Potential BIFMA G2**
5 th Percentile	13.9"	21.0"
25 th Percentile	15.1"	23.4"
50 th Percentile	16.3"	25.5"
75 th Percentile	17.8"	26.1"
95 th Percentile	20.4"	27.5"



*Data from Weighted CAESAR.

**Data from CAESAR of people over 300 lbs and Mississippi State Study on Large Occupants funded by BIFMA. This is initial data analysis and is subject to change.

Potential Armrest Height for Large Occupants: Comparison of Elbow Height, Sitting

	Elbow Height, Sitting	Elbow Height, Sitting
Percentile	BIFMA G1*	Potential BIFMA G2**
5 th Percentile Male	7.7"	9.0"
5 th Percentile Female	7.7"	9.2"
95 th Percentile Male	11.4"	13.2"

*Data from Weighted CAESAR.

**Data from CAESAR of people over 300 lbs and Mississippi State Study on Large Occupants funded by BIFMA. This is initial data analysis and is subject to change.

Potential Seat Depth for Large Occupants: Comparison of Buttock-Popliteal Length

	Buttock-Popliteal Length	Buttock-Popliteal Length
Percentile	BIFMA G1*	Potential BIFMA G2**
5 th Percentile Female	16.3"	17.1"
95 th Percentile Male	20.9"	22.1"
95 th Percentile Female	20.3"	23.5"

*Data from Weighted CAESAR.

**Data from CAESAR of people over 300 lbs and Mississippi State Study on Large Occupants funded by BIFMA. This is initial data analysis and is subject to change.

ANSI/BIFMA X5.11-2015 Seat Width Measurement

- The BIFMA G1-2013 Ergonomics Guideline suggests a minimum seat width requirement of **19.2 inches** (90th percentile female).
- ANSI/BIFMA X5.1-2011 General-Purpose Office Chairs does not require a seat width minimum.
- ANSI/BIFMA X5.11-2015, however, requires seat widths be at least **22.0 inches** wide.
- Considering developing dimensional measurements for larger users as a compliment to BIFMA G1.



Large Occupant Seating / Healthcare (in development)

- Considering expanding X5.4 Lounge/Public Seating up to 400 lbs.
- Considering a new Healthcare Seating Standard at 401 – 600 lbs.
- Estimated number of US people 400 lbs & over in 2011 between ages 20-79: **450,688** and is expected to increase.
- For 401 – 600 lbs. minimum seat width is expected to be **26.0 inches**.



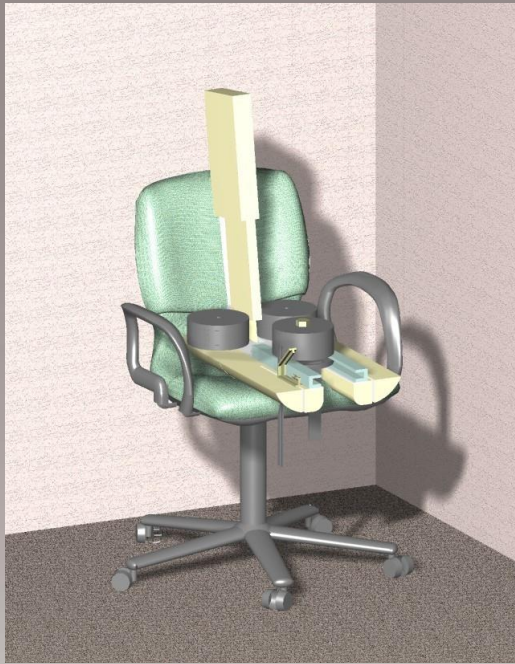
BIFMA Members Participate in Development of Other Ergonomic Standards

- ANSI/HFES 100-2007*
- CAN/CGSB-44.227-2008*
- CAN/CGSB 44.229-2008
- CAN/CGSB-44.232-2008*
- CSA Z412-2000 (R2011)*
- EN 1335, Part 1-2000*



***Currently being revised.**

BIFMA Members Participate in Development of Other Measurement Devices



BIFMA CMD Device



ISO CMD Device

Revisions to ANSI/BIFMA Standards

ANSI encourages updates as new technologies and test scenarios are considered.



Summary

- There are several ANSI / BIFMA standards for commercial seating.
- In recent years, there is market demand for seating standards for the larger / heavier segment of the population.
- Seating experts and ergonomists plan to respond to the market demand.
- Anyone may suggest revisions or propose new tests.
- Go to www.bifma.org for the full listing of commercial furniture standards.

Thank You

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