

The Importance Of Good Sitting

Ergonomic Seating Guide



A Chair is a Personal Choice

Ergonomic Seating Standards

Few things in the workplace evoke a stronger physical and emotional attachment than a person's chair. It's the center of work—and perhaps the single most important component of a healthy working environment.⁸ Good ergonomic seating enables concentration and minimizes the distractions that stem from being uncomfortable.

The purpose of this guide is to highlight seating features that help improve comfort, support, and well-being to enable worker performance and keep people engaged. But the human body comes in many different sizes and shapes. A design that's comfortable for one person may be inappropriate for another. Proper fit is imperative when people physically interact with their chairs for hours at a time.

To improve chair designers' abilities to meet the needs of users, several organizations have compiled standards with the help of Human Factors and Ergonomics experts. These standards represent the combined cumulative knowledge and expertise aimed at improving the accommodation of people and reducing the risks of injury in the office environment.



Haworth always considers global ergonomic requirements in our chair development process, in addition to the following North American standards:

- Business and Institutional Furniture Manufacturer's Association: BIFMA G1-2013 and BSR/BIFMA 10.1-202x
- Canadian General Standards Board: CGSB-44.232-2018
- Canadian Standards Association: CSA-Z412-2017

These chair standards are intended as a reference and starting point for design. They are updated periodically to reflect accepted research and best practices. The standards provide design guidance to meet minimum requirements in addition to adjustability ranges to increase the percentage of the population accommodated.



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⁸ healthycomputing.com, 2007.

The standards propose dimensional specifications based on body dimensions of the 5th percentile (small) female to the 95th percentile (large) male. This range covers approximately 95 percent of the population and is intended to meet the minimum requirements of users. Haworth's ergonomic seating products are based on state-of-the art research and are designed to exceed standards, meeting the needs of a broad range of users.



Source: US Department of Health and Human Services. "Anthropometric Reference Data for Children and Adults: United States, 2015-2018." National Health and Nutrition Examination Survey, Jan. 2021, www.cdc.gov/nchs/data/series/sr_03/sr03-046-508.pdf.

Design of Chair Controls

By design, ergonomic seating incorporates a range of adjustability. People need to be able to get into comfortable postures easily and make adjustments over time. To achieve this, accessible, responsive design and consistency in control placement and function are essential. In our chair development process, our research focuses on the user, resulting in intuitive controls that require minimal force to operate—if they're not easy to use, people won't use them.

Desirable control features include:

- Low hand and finger forces to operate
- Majority of adjustments achievable while seated
- Control motion intuitive and indicated by feel
- Control location consistent

The importance of control design and consistency increases as chairs are shared between people. This is a common requirement in multi-shift situations, such as customer support operations or call centers.







Adjustability Features

Back Support

Made up of 24 vertebrae, the human spine forms an S-shape when viewed from the side. The spine's four curves—cervical (neck), thoracic (upper back/ rib cage), lumbar (lower back), and sacrum (pelvis)—are designed for shock absorption, balance, and movement. It's been said that the shape of the spinal column is as unique as a fingerprint, including variations in curvature and length. True height can vary throughout the day by up to two percent.⁹

On top of that, the level of back support required when a person is seated varies. The thoracic spine is different from the lumbar spine, so it's important to consider these needs in seating design—especially in the backrest to accommodate postural differences among people.





⁹ Martin and Richards, 2017.

Total Back Support

Total back support enhances the sitting experience for people by giving them the ability to move with natural freedom, comfort, and support—from the neck and thoracic spine all the way down to the pelvis.

Wave Suspension[™]

Wave Suspension is a new paradigm derived from research advising the need for total back support. Available only on Haworth's Fern[®] task seating, Wave Suspension allows the spine to serve as the pivot point of movement, providing highly customized support for each region of the back, independently undulating with the body's movements without the need for adjustment by the user. Much like the human body's spinal anatomy, Wave Suspension includes a centralized Stem[™] that supports a series of Fronds[™]. Overlaying the Fronds and Stem, the Cradle[™] works in concert with them for effortless support, cradling and suspending the user's body.



Lumbar

The lumbar vertebrae provide some motion but are designed to support the weight of the upper body. Since every back is different, it's important to provide lumbar support with different levels of performance.



Independent university research has indicated that over 74 percent of individuals tend to prefer more support on one side of their lower back than the other.¹⁰



Performance of Lumbar Support

- Minimum Fixed Support Based on seating standards, a curvature is designed into the lower seat back to support the lumbar spine. Unfortunately, one size does not fit all.
 - Good Height-Adjustable Lumbar Support The lower back seat curvature is adjustable in at least one direction.
 - Better Dual-Axis Adjustable Support The lower back seat curvature is adjustable in two directions. This would include height adjustment as well as support of the lumbar curve.
 - Best Asymmetric Adjustable Support This offers the highest available performance. Comfort is greatly enhanced by allowing users to adjust the height as well as independently adjust support on either side of the spine.

Asymmetric Adjustable Support

Armrests

The arms represent approximately 10.2 percent of our total body weight, which can result in considerable exertion in the muscles of the upper back, shoulders, and neck.¹¹ Static exertions (exertion maintained for extended durations in a fixed posture) dramatically increase the risk of muscle fatigue and are often considered the first threshold to injury. Most people experience fatigue as soreness or discomfort in their muscles.





Supporting arm weight reduces the stress on the spine. However, in order to work, armrests must fit. It is also preferable that they are adequately padded.

> Armrests that do not adjust can produce contact stress in the vulnerable areas of the elbow and forearm, increasing the risks of injuries to these areas. To meet the size range of users, armrests need a considerable range of adjustment so users can adjust arms differently.

11 Winter, 2009.



Height

There is considerable variation in the resting seated elbow height. North American standards specify approximately 4" of vertical armrest adjustment.

Front-to-Back Adjustability

To fit the variations in body size, task requirements, and workstation layout, front-to-back armrest adjustability is essential. This can be accomplished through front-to-back movement.



Front-to-Back



Width and Pivot

To accommodate variations in girth, width and pivot adjustments ensure a proper fit.



Seat Depth

Good ergonomic seating incorporates several inches of adjustable seat pan depth to accommodate a wide variety of body types. Typically, a taller person will require more seat pan length to reduce contact pressure under the thighs; a shorter person will require less seat pan length to avoid pressure behind the knees or prevent sitting on the edge without the proper back support. A mismatch in the dimensions of a chair impairs the ability of the postural muscles to support the body and can lead to strain on the neuromuscular system. Chairs with adjustable seat pans will help to mitigate and prevent this.¹² A minimum of 2" of adjustability is recommended, and 3" is preferred.



Seat Depth

Seat Recline

Movement is healthy. Reclining in a chair with proper support can stimulate blood flow and relieve pressure on the spine. By reclining just 20 degrees (from 90 to 110 degrees), it can reduce stress on the spinal discs by approximately 40 percent.¹³

There are different types of seat recline mechanisms, and some provide advantages over others. The preferred designs incorporate multiple pivot points, integrate movement of the seat pan and seat back, and provide adjustable recline effort as well as stoppable/lockable settings.

Tension control is also important, as it allows users of different body types to adjust the ease of recline for individual comfort, and a variety of workstyles.

Back Adjustment Options

- No lock

- Back stop Multi-position; allows adjustment of the recline to the preferred angle
- Upright back lock Helps maintain an upright position for people who prefer not to recline

Seat Recline Mechanism Types and Performance

Single-Point Pivot – There are two different types of single-point pivot mechanisms. In one type, the seat and the back recline together, which tilts the front edge of the seat upward to the same degree. This can cause the feet to lift off the floor and create unwanted pressure under the thighs. In another type, only the back reclines, and the seat stays in place. However, this will naturally pull the seat back away from the body, decreasing lumbar support. For these reasons, the single-point mechanism can make it difficult to offer universal support and comfort for all sizes and shapes of people.

Weight-Activated Mechanism – This mechanism uses the weight of the person to recline and doesn't always have an adjustment, meaning it may not support a wide range of sizes and shapes. As with the single-point pivot, the weight-activated mechanism causes the feet to rise from the floor when the front edge of the seat rises, creating unwanted pressure under the thighs. The weight-activated mechanism, however, tends to be more intuitive for the user, as less adjustment is required. Weight-Sensing Mechanism – This mechanism automatically senses the person's weight, automatically adjusting the chair accordingly. This allows individuals of all shapes and sizes to experience the appropriate recline support for their body type without requiring manual adjustment. However, some weightsensing mechanisms have an additional adjustment feature that allows users the ability to fine-tune the recline support to their individual preferences.

Synchronous Tilt – With this mechanism, the motion of the seat back is linked with partial motion of the seat pan to maintain proper lower body and lumbar support throughout the recline motion. For every two degrees of back recline, the rear edge of the seat pan lowers one degree. For example, if the back reclines 15 degrees, the rear of the seat lowers 7.5 degrees. This minimizes the front-edge seat rise and helps maintain a more open angle between the back and legs, for greater comfort and easier breathing. Minimizing the front edge seat rise allows the user to keep their feet flat on the floor, for a relaxed sit with less pressure on the underside of the thighs.

3-Point Pivot – This mechanism (shown right) has all the benefits of synchronous tilt but refines the location of the mechanism's pivot points so they are aligned with the pivot points of the body-at the hip, knee, and ankle. Once the tension is adjusted correctly for an individual, little effort is needed to recline, allowing the user to stop the recline at any point while keeping the feet flat on the floor. This provides a balanced recline experience for people of all sizes and shapes. Additionally, as the user reclines, their back will not lose contact with the chair's backrest, which is important in helping maintain the natural lumbar curvature. This is achieved, as the mechanism lowers the rear of the seat pan by one degree for every 2.5-3.0 degrees of recline. For example, if the user reclines 15 degrees, the seat pan only drops 5–6 degrees. This feature, combined with the location of the pivot points, also reduces or eliminates the occurrence of "shirt-pull," so that the user's shirt is not pulled up in the back when they recline.

¹³ van Niekerk, Louw, and Hillier, 2012.



Pricing Information

All finishes in black and include plastic base

Delivery fee calculated at purchase.

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Fern \$860.00

All Black, Plastic Base

Features: 4D Arms Pneumatic Base Back Stop Adjustable Seat Hard Casters



Zody \$725.00

All Black, Plastic Base

Features: 4D Arms Lumbar Back Lock Adjustable Seat Hard Casters



Very \$585.00

All Black, Plastic Base

Features: 4D Arms Lumbar Back Lock Hard Casters



Soji \$495.00

All Black, Plastic Base

Features: Height Adjustable Arms Lumbar Back Lock Fixed Seat Plastic Base Hard Casters







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