# A Guide to Wheelchair Selection

## How to Use the ANSI/ RESNA Wheelchair Standards to Buy a Wheelchair

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# Incorporating Personal Body Characteristics



## Body Size

Just knowing your height and weight is not enough to determine the appropriate dimensions of your wheelchair. In order to achieve the best fit, you also need to know the dimensions of your body in a seated position. When measuring your body size, it is helpful to sit in a wheelchair that is as close to the correct size as possible. If you are ordering a wheelchair with sling upholstery, you should be measured while sitting in a chair with sling upholstery. If you are ordering a wheelchair with rigid seat and back surfaces, you should be measured sitting in a wheelchair with a rigid seat and back, or at least on a surface with similar characteristics. If you will be using a seat cushion, sit on the same type and size of cushion you will use in the new chair. Be sure to consider the seat cushion as part of your body while making the measurements. If you sit on a cushion that is lower or higher than the one you will be using in your new chair, the measurements will be incorrect.

The measurements you will use are:

- Seat width
- Seat depth
- Seat surface height
- Backrest height
- Footrest-to-seat distance

If you use armrests and/or a headrest you will need:

- Armrest height
- Front of armrest to backrest distance
- Armrest length
- Front location of armrest structure
- Distance between armrests
- Headrest height

Until now, figuring the dimensions of a wheelchair to fit an individual was a bit of a nightmare, because there was no standard measurement method. Each manufacturer had its own way of making measurements. Also, all manufacturers measured their chairs empty, although the size of the chair may change when a person sits in it. The fabric seat and back upholstery may give, pulling the two sides of the chair together, thus changing its size.

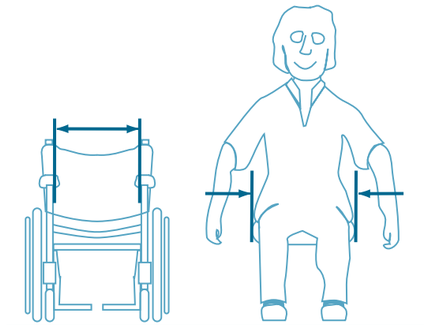
The ANSI/RESNA test procedures require that the wheelchair be measured "loaded" with a weighted test dummy. The test dummy sizes represent the size and weight of the intended rider: large adult (220 lbs/100 kg), adult (165 lbs/75 kg), small adult (110 lbs/50 kg), and child (55 lbs/25 kg). Specifying a chair to fit you will be much more accurate when working with dimensions that represent the size of an occupied chair. Although figuring out the dimensions of a wheelchair can still be pretty challenging, you will find that the test procedures provide more accurate information and that measurements from different manufacturers can be compared.

# SEATING

## *Seat Width*

Generally, to enhance accessibility, the width of a chair should be as narrow as possible without causing pressure on the rider's hips. An increase in seat width usually results in an increase in the overall width of the chair. You might select a wider wheelchair if you wanted a chair that was more stable sideways.

Another consideration is the type of clothing that you will be wearing. If you generally wear a suit or jacket, you may want a little extra room for tucking in your clothing on the sides.

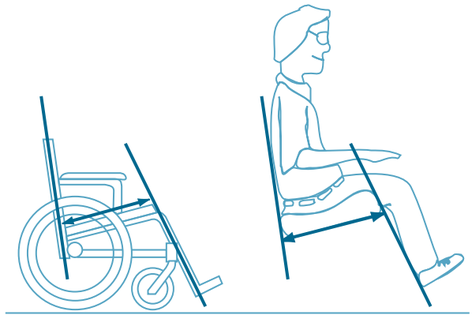


Seat Width

## *Seat Depth*

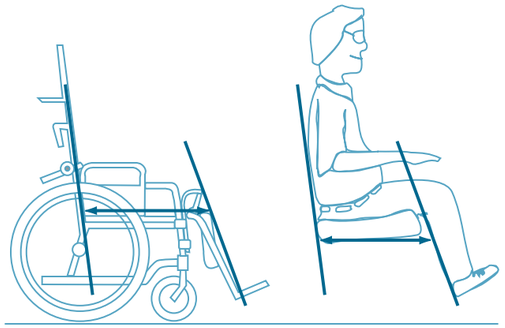
The seat should be long enough to provide adequate leg support, which creates better weight distribution. If your legs can support weight, a longer seat depth will spread your weight out more over your thighs. This means that the amount of weight on your bony prominences will be decreased, thus decreasing the risk of pressure sores. If the seat is too long, however, the front edge will catch the back of your knees. The effective seat depth of a chair with a fabric backrest will measure longer than one with a rigid back support surface.

If you will be adding a rigid back support to a wheelchair with sling upholstery, the seat depth of your chair may change. It is a good idea to install the back support on a wheelchair similar to the one you will be ordering to determine how much the seat depth will change.



Seat Depth

The seat depth is increased even more when a chair is equipped with legrests that have calf supports. Calf supports hold the legs forward of the front edge of the seat. If this is not taken into consideration when ordering the wheelchair, this may prevent you from positioning your buttocks against the backrest and would then cause you to sit in a slumped sitting posture.

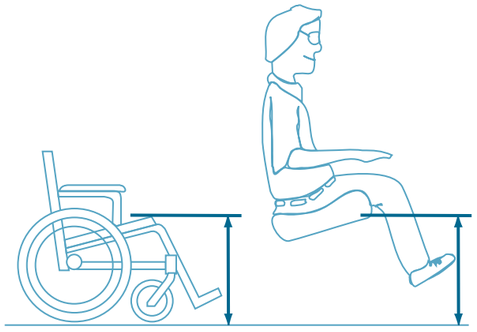


Calf Supports

### *Seat Surface Height*

The wheelchair seat must be high enough to accommodate the length of your legs and yet low enough so that your legs will fit under tables. Some users prefer to sit up higher so they are more eye-to-eye with people sitting or standing next to them.

If the chair has a fabric seat, the seat surface height will measure a bit lower than one with a rigid seating surface. The distance disclosed by the manufacturer will not include the height of a seat cushion. If you will be using a seat cushion, determine your appropriate wheelchair seat height while sitting on that seat cushion. Sit in a similar wheelchair and then measure to the bottom of your seat cushion.



Seat Surface Height at Front Edge

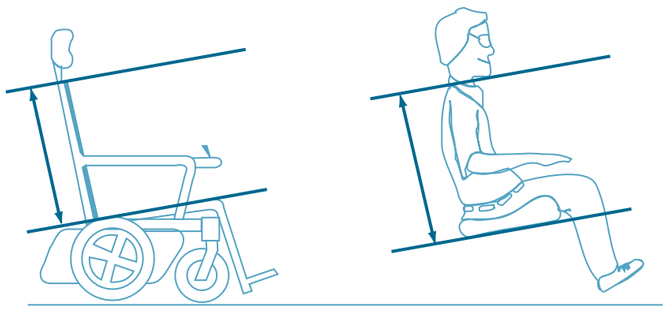
If the seat height is too low and you use footrests, the footrests may not have enough ground clearance and may scrape the ground at curb cuts. A seat that is too high may make transferring into and out of your chair more difficult. Manual wheelchair users should keep in mind that changing the seat height will also change your body's relationship to the drive wheels and may affect your ability to push your chair. A higher seat will make it harder to reach the pushrims, while a lower seat will allow you to reach more of the pushrims.

The seat height is very important for people with hemiplegia or others who propel their chairs using their feet. If you propel the chair with your feet, you might need a lower seat.

### *Backrest Height*

The height of the backrest depends on the rider. Some wheelchair riders want a low backrest for enhanced upper body movement or because they like the way it looks. Higher backrests help support riders who have less upper body balance. Regardless of the backrest height, be sure that the back posts or push handles do not interfere with your arm movements while you are wheeling.

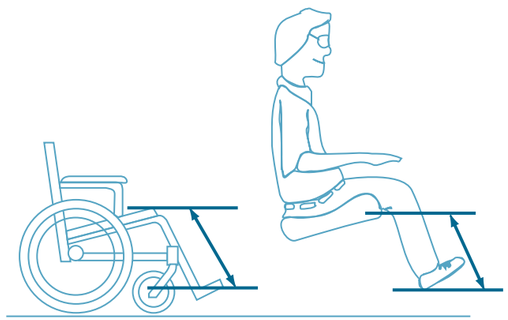
The backrest height disclosed by the manufacturer will not include the thickness of the seat cushion. The backrest height is measured from the seat surface of the wheelchair. When determining your backrest height, make sure you are seated on the seat cushion that you intend to use. Measure from the surface on which the seat cushion is resting. Since this measurement is made from the wheelchair upholstery surface, the backrest height measurement will be slightly higher for a wheelchair with sling upholstery than for a chair with a rigid seat.



Backrest Height

### *Footrest-to-Seat Distance*

The manufacturer will measure and report the footrest-to-seat distance without a seat cushion on a loaded wheelchair. To determine if the wheelchair will accommodate your leg length, sit on your cushion in a wheelchair with a similar seating surface. Measure from the bottom of the shoes that you normally wear to the front edge of the seating surface just beneath your cushion.



Footrest-to-Seat Distance

If the footrest length is adjustable, the manufacturer will indicate the range available for a particular chair and footrest. If the range does not meet your needs, remember that footrests are usually available in a variety of styles; a different footrest may provide the range of adjustment necessary to accommodate your leg length. Sometimes changing the footrests is not enough. If you have very long or very short legs, you may need to look for a different frame style. Tall or short frames, for proportionately taller or shorter people, are available in some models. To accommodate long legs, you might also need a higher seat or a greater seat-to-leg angle.

Once the footrest is adjusted for you, you should have at least two inches of clearance under your foot pedals to save you from hitting the bottom of curb cuts with your foot pedals. Footrest clearance and leg length must be considered before selecting a seat height.

Footrests are available in a wide variety of styles and variations. The type of footrest that is appropriate for you will depend on your size, needs, and preferences. The following features may be available from the manufacturer.

| FOOTRESTS | DESCRIPTION |
|---|---|
| Adjustable length | • Usually a standard feature<br>• Accommodates a range of leg lengths |
| Swing away, detachable | • Necessary for some riders to be able to transfer or to put the chair in the car |
| Flip-up | • Required for folding wheelchairs<br>• Facilitates some types of transfers |
| Folding footplate | • Non-flip-up<br>• Folds for storage |
| Impact guard | • Hard plastic, wheel-shaped bumper on the outer front edge of the footrest<br>• Useful for pushing open doors<br>• Prevents the footrest from catching on obstacles, such as curb cuts and doors, and from digging into floor surfaces<br>• Required for indoor basketball wheelchairs |
| Elevating | • Usually an optional feature<br>• Usually enables elevation of one leg at a time |
| 90°-90° platforms | • Accommodates shorter leg lengths<br>• Usually used for children |
| Rigid single unit | • Usually found on rigid-frame wheelchairs<br>• Generally much stronger |
| Calf support strap | • Prevents the feet from falling back underneath the chair |
| Calf support | • Usually provided with elevating leg rests<br>• Prevents the legs from slipping back underneath the wheelchair |

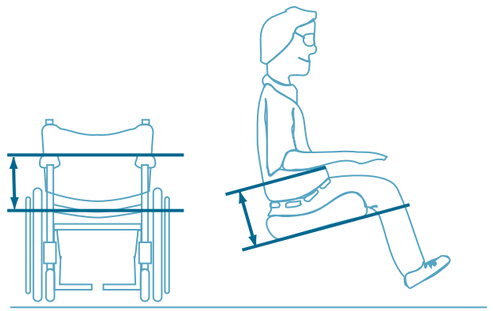
## ARMREST AND HEADREST

If you use armrests, several measurements in the test procedures may be of interest to you: armrest height, front of armrest to backrest distance, and the armrest length.

### *Armrest Height*

The armrest height is an important dimension to consider. The manufacturer reports the distance from the top of the armrest to the top of the loaded seating surface of the wheelchair. The measurement for a wheelchair with sling upholstery will be different than for one with a rigid seating surface. To determine the armrest height you need, sit on your seat cushion in a chair with a seating surface like the one you will be purchasing. Hang your arm down at your

side, bend your elbow 90 degrees, and measure the distance from the bottom of your elbow down to the seating surface of the wheelchair beneath the cushion.



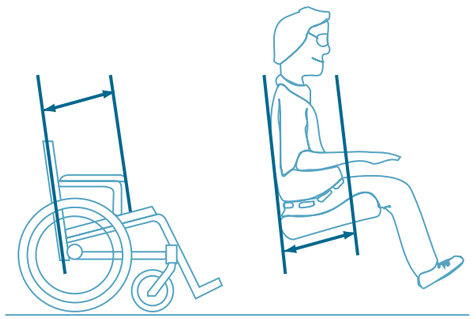
Armrest Height

The armrest height of a wheelchair with a fixed-height armrest is given as a single value. For wheelchairs with adjustable-height armrests, a range of heights is given. Some adjustable armrests have infinite adjustments within the range, while others have a limited number of preset height adjustments.

Armrests that are too high can cause your shoulders to be elevated; armrests that are too low can contribute to a slumped posture or even shoulder subluxation in riders without good shoulder muscles. Make sure your armrest height is appropriate to prevent shoulder problems and further complications caused by poor posture. If you use armrests, you may find the following additional measurements helpful.

### *Front of Armrest-to-Backrest Distance*

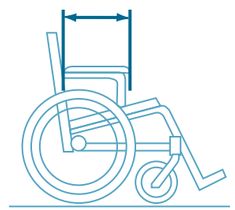
The distance from the backrest to the front of the armrest is important if you use the armrests to transfer into or out of your chair. If the armrests do not extend far enough forward, they may not provide the support you need. If the armrests are too far forward, they may prevent you from getting close to a desk or table. This measurement will be slightly longer for a wheelchair with sling upholstery.



Front of Armrest-to-Backrest

### *Armrest Length*

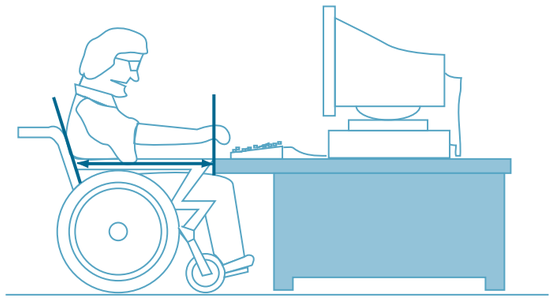
The length of the padded part of the armrest is the armrest length. When you sit back in the chair, the armrest pad should reach far enough forward from the backrest to support your arm in a comfortable position. If you use a lap tray, the length of the armrests should provide enough support for the tray.



Armrest Length

### *Front Location of Armrest Structure*

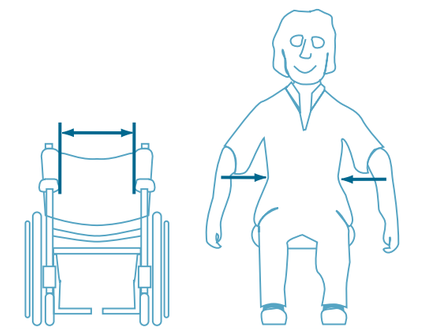
The front location of the armrest structure is the distance from the backrest to the most forward part of the armrest. This distance is measured at a height of about 27 inches from the ground and thus indicates how close you will be able to pull up to a desk or table. The distance from the backrest to the front location of desk-style armrests is shorter because they are specifically designed to enable you to pull up closer to a desk, writing surface, or table.



Front Location of Armrest Structure

### *Distance Between Armrests*

The distance between the innermost edges of the armrests is only measured on wheelchairs with fixed armrests. Armrests welded directly to the frame of the chair tend to limit the maximum available seat width at the height of the armrest pads because of the width of the support pads.



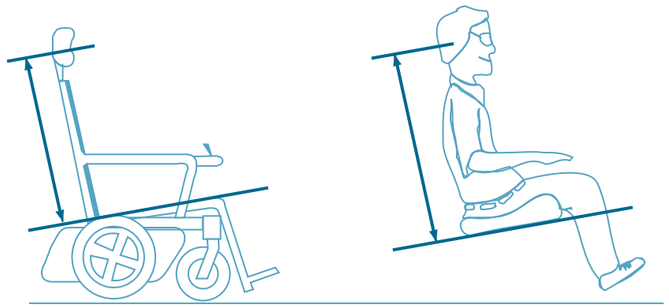
Distance Between Armrests

Armrests are available in many styles and sizes. Armrest measurements may vary if you change the type of armrest on the wheelchair. The type of armrest that is best suited for you depends on your size, your needs, and your preferences. The following armrest features may be available from the manufacturer.

| Armrests | Description |
|---|---|
| Adjustable-height | • Desirable for setting the armrests at the height you need<br>• The height can vary to facilitate transfers |
| Clothing guard | • Prevents your clothing and your body from touching the wheel<br>• Available in either a fabric or rigid style |
| Desk-style | • Shorter armrests that enable you to pull up close to a desk, writing surface, or table |
| Fixed | • Cannot be removed from the wheelchair |
| Full-length | • Extend at the same height from the backrest forward |
| Pivoting | • Can be pivoted into another position (usually behind the back posts)<br>• Can be pivoted out of the way for transfers |
| Removable | • Can be removed to facilitate transfers |
| Sloping | • Slope downward toward the front of the wheelchair<br>• Reduced profile for approaching a desk, writing surface, or table |
| Wraparound | • Often create a narrower overall wheelchair width without significantly decreasing the width between the armrest panels<br>• The rear lock on the armrest may be farther back on the chair and more difficult to reach |

### *Headrest Height*

If a chair comes with a headrest, the standards require that the manufacturer disclose how high the center of the headrest is above the seat upholstery. If the headrest is adjustable, the test results will indicate the range of heights at which it can be positioned. To determine your headrest height, sit on your seat cushion in a chair with a seating surface like the one you will be purchasing. Measure from the back of your head down to the seating surface beneath your cushion.




Another measurement that may be of interest to you is the distance the headrest is in front of the backrest. Manufacturers are not required to disclose this measurement in the pre-sale technical product literature, but you can request it. This measurement will indicate if the headrest is directly in line with the backrest or if it can be positioned in front of or behind the backrest. It may be a single value or, if the headrest position is adjustable, a range of values.

# JOINT FLEXIBILITY

In addition to your size, the flexibility of your joints (how far your arms and legs bend and straighten) will influence the fit of your chair. Your ability to maintain your sitting balance will also affect your choice.

The flexibility of your hips affects the seat-to-backrest angle you need. In the standards, the seat-plane angle refers to the slope of the seat. Some riders have found that wedged or squeeze frames (chairs with a rearward slope to the seat) help with balance and stability. If you keep your backrest upright (not reclined) and increase the rearward slope of your seat, you will need to bend your hips more to fit into the chair. If you do not have good hip flexion, too much squeeze can cause pressure problems because your body cannot bend enough to fit into the chair.

If you are not very flexible, you may want to look for a chair with an adjustable backrest angle. If you recline the backrest just a little, the angle between the seat and the backrest will more closely match the angle between your thigh and your trunk.

Some powered wheelchairs are available with a power recline feature. This option may be necessary if you must perform independent weight shifts and repositioning for increased sitting tolerance and cannot shift weight by yourself. A power recline feature can also eliminate the need for transfers to bed for rest or catheterization. Quick position changes can help reduce spasticity, your body's response to low blood pressure, and dysreflexia.

It is also important to know the flexibility of your knee and ankle joints. Many wheelchair manufacturers offer chairs with the foot pedals closer to the front edge of the seat. These "tighter" footrests reduce the overall length of the chair and make it easier to get closer to things in your environment. To fit into these tighter wheelchairs, you need good knee flexion.

## *Leg-to-Seat Surface Angle*

The smaller the leg-to-seat surface angle, the more flexion or bend you will need at your knees. If you have limited knee movement, look for the angle that most closely matches the angle between your thigh and lower leg.

Note: Many wheelchair manufacturers used to measure this angle using a different method. They were not measuring the leg-to-seat surface angle as illustrated here. When this angle is measured correctly, it will almost always be greater than 90 degrees.