

Powered wheelchair

Powered mobility device. Powered wheelchairs can be categorized by their structure. There are two primary structures available for powered wheelchairs, traditional and platform.

Traditional structures are based on the configuration of manual wheelchairs. Typically, motors drive rear wheels in traditional powered wheelchairs.

Platform chairs consist of a powered base with a separate seating system. There are three configurations for the drive system of platform wheelchairs. The drive systems of platform-powered wheelchairs can be classified as either Rear Wheel Drive (RWD), Mid Wheel Drive (MWD), or Front Wheel Drive (FWD). The location of the drive wheels with respect to the user's center of gravity determines the specific configuration. Each configuration has its pros and cons. Rear-Wheel Drive is the traditional configuration for powered wheelchairs. This configuration is generally considered to be stable, maneuverable with good balance in most terrains. The chairs tend to have relatively high maximum speeds. Turning radius tends to be larger than other configurations. Mid-Wheel Drive (MWD) wheelchairs locate the drive wheels directly under the user. This provides exceptional maneuverability and tight turning radius, particularly for indoor environments. Stability is provided by casters in the front and the back. MWD chairs have difficulty maneuvering outdoors, particularly over hills and rough terrain, and are best configured for indoor use. Front-Wheel Drive wheelchairs offer particularly good maneuverability both indoors and outdoors. The design consists of 2 large wheels in front of the seating area. This configuration is suitable for outdoor use but may be limited in their maximum speed.

Every powered wheelchair has a control interface the individual uses to control the speed and direction of the chair. Typically, powered wheelchairs utilize a joystick as a control interface. The direction of the chair will coincide with the direction the joystick is moved. The further the joystick is moved from the center or neutral position the faster the chair will move. The battery used in most power wheelchairs is a (deep cycle) lead acid battery that is either a wet cell, a gel cell, or an AGM (absorbed glass mat) battery. Powered wheelchairs can be configured to provide various functionalities.

- **Product Classification**
 - APL (WHO Assistive Product Priority List): 49 (Wheelchairs, electrically powered)
 - ISO 9999:2022: 122306 (Electrically powered wheelchairs with electronic steering)
- **Possible configuration variants**
 - Stand-up system (to allow standing up and extending the reach ability of the user).
 - Back reclining and tilt-in-space features (to address seating and postural needs).
 - Elevating seat (to extend the reach ability of the user).
 - Foldability (to facilitate transport).
 - Bariatric or heavy-duty wheelchair (to accommodate obese and larger users).
 - Joystick controls.
 - Sip and puff controls (commands are given by inhaling or exhaling with an attached tube).
 - Head controls (switches are added to the sides of the headrest).
 - Foot controls (pedals and buttons are added to the footrests of the wheelchair).
 - Chin controls (the controller is mounted near the chin).
 - Speech controls (the controller uses a simple speech recognition program).
 - Assistant controls (controls placed near the push handles to allow the assistant to drive the wheelchair).
 - Special seating system (which can be classified within category 18 09 39 of the ISO classification).
 - Configuration for use by children.

- Possible accessories or optional components

- Attachments for amputees.
- Elevating leg rests.
- Anti-tip bars.
- Bags and totes.
- Foam filled tires.
- Solid rubber tires.
- Wheelchair umbrella.
- Attachments for oxygen.
- Wheelchair tray.
- Rearview mirrors.
- Phone and tablet holder.
- Clothing guards.
- USB mobile device charger.
- Control of other assistive technology devices.

- Product goals

Activities or functions the product is mainly intended to support, according to WHO ICF Classification:

- Moving around using equipment [\[d465\]](#).
- Moving around in different locations [\[d460\]](#).

- Indicated impairments

Difficulties the product is mainly intended to address, according to the WHO ICF Classification:

- Walking [\[d450\]](#).
- Heart functions [\[b410\]](#).
- Blood pressure functions [\[b420\]](#).
- Respiration functions [\[b440\]](#).
- Changing body position [\[d410\]](#). *Only if used with variants: Back reclining and tilt-in-space features, Stand-up system*

- Contraindicated impairments

Difficulties for which the product may be inappropriate:

- Cognitive difficulty that may impact safe use and wayfinding. *Unless used with variants: Assistant controls*

- Indicated environments

Specific environments in which the product should be used:

None specified.

- Contraindicated environments

Environments in which the product may be inappropriate:

- Adverse weather conditions (such as excessive rainfall or snow, which may affect the performance of power packs)

- Other indicated factors

Other factors or situations the product is intended to address:

- Moving around with the help of an assistant. *Only if used with variants: Assistant controls*

- Other contraindicated factors

Other factors or situations in which the product may be inappropriate:

None specified.

- Points to be considered in product selection

- The physical, sensory, and cognitive abilities of the user to operate the control interface.
- The need to navigate curbs, footpaths, tram and railway crossings, street crossings, etc.
- The need for portability and transport of the powered wheelchair.
- Seat requirements e.g. as described in ISO 18 09 39.

- The need for armrests, e.g. adjustable height, foldable.
- Means of transfer.
- Wheels, e.g. size, pneumatic.
- Controls, e.g. traditional joystick versus alternative control interface.
- The need for brakes.
- Load capacity.
- Maximum speed.
- Maximum range.
- Type of charger, e.g. separate or integral.
- Need for suspension.
- The need to consider the environment where the wheelchair will be used, e.g. winter conditions.
- The need to consider such things as the ground conditions that will be encountered (dirt, mud, asphalt, etc.)
- Some people will be able to transfer independently to the powered wheelchair while others may need assistance in transferring.
- Users with progressive disorders may require adjustments to seating and control interfaces over time.
- **Points to be considered in product fitting**
 - Maximum speed of wheelchair e.g. user's ability to handle speed.
 - Programming of control interface.
 - Seat features e.g. as described in ISO 18 09 39.
 - The initial seating system must meet the postural support and comfort needs of the user; consideration should be given to the future seating needs of the user.
 - Consideration should be given to the future seating needs of the user.
 - Capacity of wheelchair, e.g. weight of user.
- **Points to be considered in product use**
 - Batteries must be maintained and charged.
 - The control interface should be properly programmed and positioned.
 - Ease of transport.
 - Turning radius of the wheelchair is appropriate for the environment.
 - Turn off the power when getting in and out of the chair.
 - When appropriate, brakes should be set when getting in and out of the chair.
 - Care should be observed when operating on rough terrain outdoors and on slopes.
- **Points to be considered in product maintenance / follow-up**
 - Batteries must be maintained.
 - Check tires regularly, e.g. inflation.
 - Keep moving parts lubricated.
 - The wheelchair should regularly be serviced by a professional, to check e.g. control module, castors and steering, frame, batteries, motors, final drive, charger, accessories.
 - The wheelchair should be kept clean.
 - Repair seat upholstery.
- **Examples of products available on the market**
 - Live product search in the EASTIN website <https://www.eastin.eu/en/searches/products/list?iso=122306>

Source

This Fact Sheet was compiled in 2021 by an international team of experts, to provide the initial knowledge base for a project ("An online system to assist the selection of assistive product") supported by the World Health Organization in 2020-2021 within the GATE Initiative (Global collaboration on Assistive Product). Fact Sheets were compiled for each of the 50 types of products included in the WHO APL (Assistive Product Priority List).

The team was composed of Renzo Andrich (Italy, group leader), Natasha Layton (Australia), Stefan von Prondzinski (Italy), Jerry Weisman (USA), Silvana Contepomi (Argentina) and Hasan Minto (Pakistan).

The project led to a prototype online tool called ASPREX (ASsistive PRoduct EXplorer). At the end of the project, it was transferred to a WHO collaborating center (the Global Disability Hub in the UK), in view of possible future developments.