# The ASPREX Fact Sheets

The ASPREX project (**Assistive Product Explorer)** investigated the feasibility of a machine-reasoning system which can help identify the assistive products that can best meet the individual needs by considering each person's goals, circumstances, type of difficulties, level of ability, and life environment. The project was conducted in 2020-2021 within the GATE (Global Collaboration on Assistive Technology) of the WHO (World Health Organization).

The assumption was that such a system - if well designed and driven by reliable data - could greatly favor informed and responsible choices of assistive products, by increasing task-shifting of AT provision to the non-specialist workforce at community level; and by increasing awareness about the complexity of the AT assessment and selection process, the risks associated to wrong choices and the competences needed case by case. The project led to the development of an AI-based prototype called "Assistive Product Explorer" (ASPREX). The ASPREX has been kept live on the Web for three Years (2022-2024) for testing purposes; now it is no longer online and will be probably resumed within future projects.

Within the ASPREX project, an innovative model was developed to represent knowledge about assistive products. Based on this model, a knowledge base was generated for the ASPREX system, including over 2400 knowledge rules related to 65 product categories belonging to the APL (Assistive Product Priority List) of the World Health Organization.

The knowledge base can be also read as a set of fact-sheets that can useful in clinical practice and for educational purposes. Each product fact-sheet is composed of 15 chapters (each related to a knowledge-rule cluster as established by the model):

1) product identification data and overall description;
2) possible configuration variants;
3) optional components;
4) product goals;
5) indicated impairments a
6) contraindicated impairments;
1. indicated environments
7) contraindicated environments;
8) other indicated factors
9) other contraindicated factors;

and points to consider in:

10) selection;
11) fitting;
12) use;
13) maintenance/follow-up;

The model has shown able to represent knowledge about any categories of assistive products. All the fact sheets are available for download from the SIVA and the EASTIN Web Portals.

This document includes all Fact Sheets produced within the project.

## INDEX

*ASPREX Fact Sheet*

# Alarm signaler with light or sound or vibration

Battery-powered portable or desk top device, with a signal receiver (sensor) and a signal transmitter (built-in flashing or strobe light, vibrating device or sound amplification), that transforms a signal (e.g., from telephone, doorbell, baby's call, alarm systems) into a visual, acoustic or mechanical output (vibrotactile), and alerts or inform people who are deaf and/or hard of hearing about changes within their environment. The alarm signaler can be added to existing fire alarm systems, or alarm clocks (if they make use of the same frequency) to provide the necessary warning signal. The product may be also called alerting device or signaling systems.

Possible variants concern the signal transmitter (which can be also a strobe or a flashing light, a vibration, or an amplified acoustic signal with lower frequency sounds, that may be different for different receivers), the signal receiver (which may be also a smoke sensor, a heat sensor, a gas sensor, a sound sensor, a water sensor, a pressure sensor, or a weather alert), the stand-alone device (which can be also coupled to an existing alarm system), the signal receiver placement (which can be also a WIFI or radio frequencies connected external receiver of an environmental emergency alarm systems device), the amount of signal receivers that can be received (which can be also multiple, integrated in an alert system receiver unit), the type of the transmitter signal output (which can be also different for different signal receivers, e.g. different kinds of vibration or different kinds of colored light), the batteries (which can be also rechargeable), and the power supply (which may be also electric power supply).

- Product Classification
  - APL (WHO Assistive Product Priority List): 1 (Alarm signallers with light/sound/vibration)
  - ISO 9999:2022: 222903 (Signaling devices)
- Possible configuration variants
  - Signal transmitter: strobe.
  - Signal transmitter: flashing light.
  - Signal transmitter: vibration.
  - Signal transmitter: amplified acoustic signal with lower frequency sounds (that may be different for different receivers).
- Possible accessories or optional components
  - Alert system monitor receiver (which indicates the different types of alarm).
  - Alarm clock with built-in strobe lights.
  - Alarm clock with an external vibrotactile transmitter (also called vibration pad, bed-shaker or bed-vibrating alarms, that goes under the pillow or the mattress).
  - Rechargeable batteries.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Using communication devices and techniques [d360].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Hearing [b230]. *Only if used with variants: Signal transmitter: strobe, Signal transmitter: flashing light, Signal transmitter: vibration, Signal transmitter: amplified acoustic signal with lower frequency sounds*

- Seeing [b210]. *Only if used with variants: Signal transmitter: vibration*

- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Blindness. *Unless used with variants: Signal transmitter: vibration, Signal transmitter: amplified acoustic signal with lower frequency sounds*
  - Deafblindness. *Unless used with variants: Signal transmitter: vibration*

- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Areas where the product might cause harmful interference (to adjacent devices, products or electrical equipment).

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Notify household events needing attention (such as doorbell rings, phone rings, or a baby cry).

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Check what kind of signal receiver (sensor) the user needs to control environmental events (fire, smoke, telephone ring, doorbell, baby crying, security breach, weather alert, water leakiness), that he does not hear due to his hearing loss.
  - Check how many signal receivers (sensor) the user needs to control in the environment where he is living or working; in case of two or more events to control, select an alert system connectable to the number of sensors the user needs.
  - Ensure that exiting signal receivers are connectable and compatible with the alarm signaler.
  - Check what kind signal of transmitter is preferred by the user (light, vibration, amplified sound).
  - For 24-hours control (also during nighttime), select an alarm signaler with an integrated alarm clock, flashlight, and bed vibration alarm (that can be placed under the pillow or the mattress).
  - For maximum freedom of movement in the environment where the alarm signaler will be used, it is recommendable a body wear signal transmitter; in case of wireless connection to the signal receiver, the signal must be strong enough to be received anywhere in the user's environment.
  - Ensure that the alarm signaler uses different light, acoustic o vibration signals for the different sensors, in the way that the user may distinguish what alarm it is.
  - An alarm signaler with a light signal transmitter (flashlight, strobe) is suitable also for outdoor use.
  - If you want to be alerted of an incoming message on your smartphone when you are sleeping, choose a light sensor to place on the smartphone and a bed-shaker to place under the pillow.
  - An alarm signaler with a vibration signal transmitter is suitable also for deafblind users.
  - An alarm signaler device can be added to existing alarm systems, to alert them of imminent danger (such as smoke, fire, or a security breach), or be added to alarm clocks, to provide the necessary warning signal.

- Points to be considered in product fitting
  - Ensure that the user can switch on/off the alarm signaler.
  - Ensure that the device correctly captures and transmits the signal, and that the user receives it his or her preferred mode (light, vibration, amplified sound).
  - In case of external wireless sensors, ensure that the sensor is installed close to where it captures the signal (alarm), is powered adequately (batteries or electric power supply) and sends the signal to the alarm signaler; in case of a portable device check if the alarm alert can be received anywhere in the room, house or working place.
  - If the alarm signaler is connected to an existing alarm system, the installer should ensure that it is compatible with the alarm system.

- For installation and maintenance of sensors with electric supply, a qualified installer is needed.
- In case of an alert system with multiple sensors, ensure that every alarm can be correctly associated to the cause of the alarm; an enlarged legend may be helpful if the person has difficulty seeing the symbols of the different alarms.
- For battery powered sensors and transmitters, ensure that user can replace or recharge the batteries.
- When moving around your home, make sure that the light transmitter is visible from anywhere you are.
- Make sure that the bed vibration transmitter is easily perceptible when you are lying on the bed; under the mattress, the vibration can be less intensive than under the pillow or in the lining of the pillow.

- Points to be considered in product use
  - Switch off your battery powered alarm signaler when you leave your home and turn it on, when you get home.
  - It is important to wear your portable vibrating transmitter when you are moving in your house, so you can be alert in case of alarm.
  - Before you go to bed, check if the bed-shaker is in the right position.
- Points to be considered in product maintenance / follow-up
  - Regularly check the sensors functioning, especially the gas and heat sensors: if any sensor shows malfunction, repair should be carried out immediately. It is important that you often replace the batteries of smoke and fire alarm sensors, to ensure they are working properly; it is recommendable to note the date when the batteries have been changed.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222903

## 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.*

*ASPREX Fact Sheet*

# Audio player with DAISY capability

Battery operated stand-alone digital device, with an internal speaker and memory, with an integrated CD player that can play/show audio, text, and pictures, and make them accessible to individuals with difficulties that affect their ability to read printed material (print disability). The Digital Accessible Information SYstem (DAISY) is a technical standard for digital audiobooks, periodicals, and computerized text, designed to be a complete audio substitute for print material. General features of an audio player with DAISY capabilities are voice recording facility (recorder), variable speed playback (faster or slower listening without distortion), easy text navigation facility while reading DAISY books, support for listening through headphones, facilities for searching, precisely navigate line by line, placing bookmarks and resuming playback from the last position; DAISY also provides aurally accessible tables, references, and additional information.

Possible variants of DAISY audio players concerns the size (which can also be pocket-size for mobile use, including outdoor), the CD player (which can be also not integrated), the numeric keyboard for navigation (which can also be without numeric keyboard), the dimensions (which can also be pocket-size and handheld), the electric power (which can also be a power supply), the batteries (which can also be rechargeable), the internet connectivity to online libraries (which can also be without internet connectivity), the facility to read content from external memory (which can also be a memory card, a USB memory stick), the compatible audio formats, and the number of control buttons (which may be fewer to make the player easier-to-use).

- Product Classification
  - APL (WHO Assistive Product Priority List): 2 (Audio players with DAISY capability)
  - ISO 9999:2022: 221803 (Sound recording and playing devices)
- Possible configuration variants
  - Simplified keyboard (keyboard with a smaller number of control buttons to increase ease of use).
- Possible accessories or optional components
  - Built-in text-to-speech facility (to enable speech output of text documents and menu in different formats, such as e-Pub, DOC, HTM, PDF and TXT files).
  - External microphone.
  - USB connectivity to PC.
  - CD-R/RW or memory card drive (which may be used when connected to a PC without CD drive).
  - Book creator mode (that enables the user to create a fully structured DAISY book).
  - Protected audiobooks.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Reading [d166].
  - Listening [d115]. *Only if used with variants: Simplified keyboard*
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Reading [d166].
  - Seeing [b210].
  - Intellectual functions [b117]. *Only if used with variants: Simplified keyboard*

- Fine hand use [d440]. *Only if used with variants: Simplified keyboard*

- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe hearing loss.
  - Profound hearing loss.
  - Difficulty in understanding spoken language (decoding spoken messages to obtain the meaning).

- Indicated environments

  *Specific environments in which the product should be used:*
  - Audiobook libraries (where DAISY material is available in open or protected format such as Learning Ally, Bookshare, National Library Service for the Blind and Print Disabled).
  - Indoors.
  - Outdoors.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - In the rain.

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Use by children. *Only if used with variants: Simplified keyboard*
  - Early stage of dementia. *Only if used with variants: Simplified keyboard*
  - Audio substitution for printed material.
  - Listening to audiobooks (including magazines, newspapers, journals, encyclopedia, or computerized texts).
  - Literacy difficulties.

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Ensure that the audiobooks are available in the user's language.
  - Ensure that the recorder is equipped with color contrasted function buttons raised, shaped and tactile, with big letters or with symbols easy to read.
  - A table model is suitable for those who use the DAISY audio player mostly at home, or at workplace, placed on a fixed place.
  - An integrated CD, DVD player, card or USB stick reader may increase the variability of books that users can read or listen.
  - A DAISY audio player with USB connectivity and a CD-R/RW or a memory card drive, is suitable for users who want to connect the audio player to a PC without CD drive or without memory card reader.
  - The desktop version, placed on a fixed place, can be used indoor (e.g., at home, school, work, library).
  - A small pocket-size DAISY audio player is suitable for mobile reading and mobile listening.
  - Devices with Internet connectivity and access to online DAISY books libraries are suitable for voracious readers: ensure that the user can get Internet access.
  - Ensure that the DAISY audio player can also read newer and protected audiobooks and that an appropriate decryption key is installed on the device if the user wants to read (listen) both open and copyright protected audiobooks.
  - A DAISY audio player that can memorize many bookmarks is indicted for intensive book readers.
  - A DAISY audio player with text-to-speech features is suitable for users who want to get access to digital documents in different formats (DOC, PDF, HTM, TXT, e-PUB).
  - A simple DAISY audio player, without numeric keyboard, is suitable for children and for users with learning disabilities.
  - An additional headphone set is needed for private reading and in order not to disturb cohabitants.
  - Specialized DAISY audio players are available with an appropriate decryption key installed (for protected DAISY books that can only be opened using a key and can only be read through).

- Points to be considered in product fitting
    - Ensure that the user can switch on/off the DAISY audio player.
    - For a DAISY audio player with power supply, ensure that the user can plug the device to the electric socket.
    - Ensure that the user correctly locates and manages the principal function buttons: play, stop, forward, backward, up volume and down volume.
    - If the user encounters difficulties in understanding, increase volume and slow down the speech speed; if the user likes to listen faster, increase the speed.
    - For private listening, ensure that the user can find the headphone output and can plug and unplug the personal headphones.
    - Check if the user can place, replace, and find a bookmark.
    - In case the DAISY audio player is equipped with a numeric keyboard, ensure that the user correctly locates and manages the numeric keyboard for book reading navigation.
    - In case the DAISY audio player is equipped with an integrated CD drive, ensure that the user can correctly open the drive, insert the disc, close the drive, and remove the disc from the player at the end of the reading; tactile markers on the disc case may facilitate the audiobook CD management.
    - In case the DAISY audio player is equipped with an integrated memory card drive, ensure that the user can find the card slot, and correctly insert and remove the memory card.
    - In case the DAISY audio player is equipped with an USB connection, ensure that the user can find the USB slot, and correctly insert and remove the USB memory stick or USB cable.
    - In case the DAISY audio player is equipped with internet connectivity, ensure that user can get access to internet and to the libraries that may offer DAISY material.
    - In case of users who want to read copyright protected DAISY material, make sure that the DAISY device has an appropriate decryption key is installed.
    - Show and explain to the user how to start and stop a recording, and how to cancel a recording.
    - In case the DAISY audio player is equipped with an external microphone, ensure that the user can find the microphone slot, and correctly insert and remove the microphone jack.
    - Ensure that the user can replace or recharge the batteries; if USB recharging is required, make sure that user can connect batteries to USB charging point or station.
- Points to be considered in product use
    - Always switch off the DAISY audio player when not used.
    - Never leave the CD drive open; when the reading is finished, put the CD back in the case.
    - If the internal memory is full, delete records, change memory card, or transfer records to another device.
    - In case of a pocket-size DAISY player, check batteries power and take extra batteries for mobile use out of home.
    - If using a pocket-size Daisy player in movement, use a neck strap or hand strap.
    - In case of a pocket-size DAISY audio player, it is recommended to choose a fix place to store the device when it is not used.
    - Never use a DAISY audio player with headphones at the maximum volume, exposure to extremely loud sounds can produce hearing damage.
- Points to be considered in product maintenance / follow-up
    - Ensure that that batteries are fully charged or have enough power for use.
    - Remove the batteries from the device when it is not expected to be in use for a long time.
    - It is recommended to clean the function buttons frequently, especially in case of a portable DAISY audio player and mobile use out of home.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=221803

## 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.*

*ASPREX Fact Sheet*

# Portable note-taker with Braille display (Braille memo)

Battery-powered portable digital device for writing information with the use of braille keyboards and storing the information on an internal memory. The stored information can be accessed (read) through an 8-dot refreshable braille display.

Possible configuration variants concern the keyboard (which may be also a QWERTY typewriter keyboard, a braille touch screen without keys, or which can be also be missing, in which case the device only works as a braille display connected to a PC), the type of braille cells (which may be also with integrated cursor routing keys), the number of braille-elements on the braille display (which can range from 14 cells to 40 cells), the dimensions (which may be also large and not easily portable in case of braille displays whose cells number range from 40 to 84), the information output (which may be also speech with a built-in speech synthesizer output, or both braille display and speech output), the storage medium (which can be also an expandable memory, a SD card, or an external digital support), the connectivity (which may be also USB, WIFI, or Bluetooth, to connect the braille note taker to a smartphone, tablet, or PC), the navigation keys (which may be also a joysticks or and scroll wheels), and the operation system (which may be also a Microsoft Windows CE operating system, or an Android operation system, that permit to use the braille note-taker as an Windows or Android device).

- Product Classification
  - APL (WHO Assistive Product Priority List): 3 (Braille displays (note takers))
  - ISO 9999:2022: 221336 (Portable note-taking devices for Braille)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - VGA interfaces (connectable to a monitor for visual output).
  - Multi-language support (for writing in different braille languages).
  - Word processor.
  - Mail client.
  - Internet browser.
  - MP3 player (for listening to music or audio files).
  - E-books reader (to get access to e-books).
  - Daisy player (to get access to open or copyright protected books in Daisy format).
  - Watch.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Using communication devices and techniques [d360].
  - Writing messages [d345].
  - Writing [d170].
  - Reading [d166].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (blindness or severe low vision).
  - Hearing [b230] (deafblindness).

- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in fine hand use.
  - Difficulty in organizing thoughts into a written text.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Underwater.
  - Dusty places.
  - Sandy places.
  - In the rain.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Assisting personal organization (taking notes, storing information, keeping track of appointments).
  - Notes taking.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Unfamiliarity with writing and reading braille.
- Points to be considered in product selection
  - Ensure that the user can adequately write and read braille, if not, ensure that training of braille reading, and writing is available.
  - For braille writers with reduced finger sensibility and for braille writers with braille reading difficulties, a portable note-taker with speech output may be suitable; an additional headphone is recommended for privacy.
  - Simple and robust braille note-takers, with a simple navigation and very clear braille display, are suitable for people who are new to braille, for people who have decreased feeling in their fingers, or for users with learning difficulties.
  - A portable note-taker with braille display and a QWERTY keyboard is suitable for deafblind person who knows the typewriter keyboard; the note-taker can be used also used by a sighed for the communication with the deafblind person.
  - If the user prefers braille and speech output, select a note-taker with braille display and build-in speech synthesizer.
  - A braille display with 40 or more braille elements will be more comfortable for reading if the note-taker is for home-use only.
  - Select a portable note-taker with wireless connectivity (WIFI, Bluetooth), if the user is interested to use the note-taker as an external Braille display to a mobile phone, a tablet, and a computer.
  - Ensure that the braille note-take is available in your language.
  - A multi-language support is suitable, if the user like to read and to write in different languages.
  - A note-taker with an expandable memory, a SD card, or an external digital support is suitable for intensive use (at school, at work).
  - Note-takers with integrated Daisy reader may be a solution for those who are interested in both, note-taker, and Daisy audio player.
  - For one-handed users, select a device that run also in one-handed mode.
  - For mobile use, a case that offers all-around protection is recommendable.
  - Functions such as advanced word processing, web browsing, and other functions to assist personal organization (such as watch, timer, calendar, and calculator) are only available in the electronic note takers of the latest generation.
- Points to be considered in product fitting

- Ensure that the user is well trained and can switch on/off the note-taker with braille display.
- Show and explain the function, navigation, and braille input keys on the device, and let the user familiarize with them.
- Ensure that user correctly locates and manages the different slots (e.g., USB, headphones) on the device.
- Ensure that the user knows the 8 dots braille symbols, if he knows only 6 dots braille show and explain the use of dot 7 and dot 8.
- Show and explain the different programs installed on the device (e.g., word processing, watch, calculator, calendar), and let the user familiarize with them.
- Ensure that the user can write, read, store, organize, search, and find the information on his device.
- Ensure that user can recharge the batteries; if USB recharging is required, make sure that user can connected to USB charging point or station.
- In case a note-taker with wireless connectivity, ensure that a connection to the user's mobile phone, tablet or computer can be established.
- In case of a note-taker with SD card, ensure that user can change and replace the memory card.
- A braille printed manual is recommendable, especially for deafblind users.

- Points to be considered in product use
  - Switch off your device if you do not use it.
  - Do not use excessive pressure when you read braille, the braille cells may be damaged.
  - Charge the device when batteries are low.
  - Before you leave home, make sure that your device is charged.
  - If you are going to charge your note-taker overnight, just make sure it is out in a safe place.
  - You may always use an all-around protection (fall, water) for mobile use; do not expose your device to water.
  - If the memory is full, delete records or, if possible, change memory card, or transfer records to another device.
  - Never use the note-taker with dirty or greasy fingers: dirt can damage the braille cells.
  - Do not expose the note-take to heat and cover it for dust protection if not used.
  - Never leave your device unattended in public places and lock it in a safe place.
- Points to be considered in product maintenance / follow-up
  - Regularly clean the note-take, especially the braille display.
  - To extend battery life, do not charge batteries for too long.
  - In case of installed software on the device, ensure to up-date your software.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=221336

## 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.*

*ASPREX Fact Sheet*

# Braille writing equipment

Manual device for writing Braille on embossed paper. It is composed of a slate and a stylus. The slate is a metal or plastic surface with evenly spaced rectangular holes representing the dots of braille characters; its size may vary from four-lines or six-lines, for small portable slates; a higher number of lines can be achieved by using slates that can be moved down a wood or metal or plastic clip board.

The stylus is available in different shapes and sizes to accommodate different users. Braille can be described as a tactile writing system designed for people with visual impairment; it is a combination of raised dots in different patterns, where each pattern represents an alphabet character or a number, which people with blindness or low vision can touch with their fingers to read and understand.

- Product Classification
  - APL (WHO Assistive Product Priority List): 4 (Braille writing equipment/braillers)
  - ISO 9999:2022: 221327 (Manual Braille writing equipment)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Wooden eraser.
  - Case for the slate (including a pocket for the stylus).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Writing [d170].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (blindness).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in fine hand use.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Situations where writing short notes in Braille as fast as possible is required.
  - Writing in Braille.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Unfamiliarity with writing and reading braille.
  - Writing books (as it would take too long).

- Points to be considered in product selection
  - The product is unsuitable for producing graphics.
  - The product is unsuitable for writing mathematical or scientific expressions.
  - Braille transcription services are limited as trained professionals are required who know braille and are also able to use braille writing devices.
  - Consider intellectual property issues when transcribing books to braille in the field of education.
  - Consider if an embosser would be more helpful than a manual Braille writing device; embossers are faster and more efficient than Braille press.
  - The product is not suitable for mass production of braille. This can be best achieved by means of braille press or embossers; both techniques are used to print two-sided braille documents and books on large scale. The braille press is an expensive method, as plates must be developed for each side of a document, and skilled personnel is needed. Conversely, embossers work by receiving input from computer software and can print on pages of different weights (nearly one thousand pages within an hour).
- Points to be considered in product fitting
  - Braille writing devices are difficult to use for people who lost their vision at a later age.
  - Users need a comprehensive training to learn braille; even though they can benefit of screen readers that can read the braille to them, they still need to learn using notetakers to be able to write first.
  - Braille backward writing (right to left) may be hard to learn for some people.
  - A well-structured training should be provided to users to learn writing braille.
- Points to be considered in product use
  - A comprehensive training is required when teaching people, especially children, how to manage their braille equipment.
  - Users must understand learn how to insert paper in the frame, how to hold the stylus, how to move the paper over the board, and how they can locate the braille cell with the tip of the stylus to punch it.
  - In order to write braille, a special paper is needed that may not be easily available everywhere.
  - Users must keep the equipment safe from falling.
- Points to be considered in product maintenance / follow-up
  - Due to their portability, the braille slate and stylus may get lost during movement, or get damaged after falling, especially if the equipment is made of plastic.
  - The maintenance and repair of braille writing equipment is expensive and requires trained technicians.
- Examples of products available on the market
  - Live product search on the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=221327

## 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.*

*ASPREX Fact Sheet*

# Brailler

Mechanical device, designed like a typewriter, used to write braille. The most popularly known and most widely used device is the Perkins Brailler that has been in use since 1951. It has only six keys that represent the 6-dot cell of braille code. In addition to the 6 keys, it also has a space key and the keys to insert new line and going backward. It also has two side knobs, like a manual typewriter, to move paper through the machine, a lever for carriage return and adjustable margin stops. The rollers of the device that advance the paper, are specially designed with grooves to save the raised dots created by the brailler, from getting crushed. The casing of the brailler is of metal. The paper used by the braillers varies as some use a standard A4 or A5 size paper while others need a special Braille paper. The braille produced on special braille paper is much more durable compared to that produced on standard paper.

- Product Classification
  - APL (WHO Assistive Product Priority List): 4 (Braille writing equipment/braillers)
  - ISO 9999:2022: 221330 (Typewriters)
- Possible configuration variants
  - Perkins SMART Brailler (electronic device that has a small video screen at the front of the device that displays braille in large print; it also provides an audio feedback; the device allows users to edit, save and transfer their documents electronically via USB; in addition, the device also has a built-in software that provides braille writing lessons for beginners).
  - Mountbatten Brailler (electronic braille writer, notetaker and embosser, all in one; it has been built like computers with software to support functions like embossing, text reading and data storage; the built-in audio feature helps users in managing all its operations; the device is ideal for students with blindness and visual impairment, greatly helping them in their education).
  - Embosser (device that generates braille output on paper; users can read text on monitor screen either by using screen reading software or through refreshable braille displays; users can use a special software that allows the six keys on the computer keyboard to be used as a braille entry device, just like the Perkins Brailler).
  - Unimanual brailler (helpful for people who are able to use only one hand to write braille).
  - Light touch brailler (helpful for children or adults with weaker hands, to type easily,).
  - Large-print brailler (helpful for people with tactile challenges).
- Possible accessories or optional components
  - Braille paper.
  - Soft carry bag.
  - Dust cover.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Writing [d170].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (blindness).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in organizing thoughts into a written text.
  - Difficulty with fine hand use.

- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Places where electricity is not available to maintain battery charge.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Writing in Braille.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Unfamiliarity with writing and reading braille.
- Points to be considered in product selection
  - Braillers are not suitable for producing graphics, nor for writing mathematical or scientific expressions.
  - Braille transcription services are limited as trained professionals are required who know braille and are also able to use braille writing devices.
  - Intellectual property rights should be considered when transcribing books or articles into braille.
  - In the field of education, experienced and trained teachers are required who can use the braille writers effectively.
  - Mass production of braille is a challenge that can be better solved by using braille press or embossers connected to computers. Both techniques are used to print two-sided braille documents and books on a large scale. However, the embossers are faster and efficient as compared to the braille press. The embossers work by receiving input from computer software and can print on pages of different weights, printing nearly one thousand pages within an hour. The braille press in comparison is an expensive method, as plates have to be developed for each side of a document. Trained personnel are required to operate the press throughout the process.
- Points to be considered in product fitting
  - Braillers are difficult to use for people who lose their vision at a later age. They need a comprehensive training to learn braille and even though they can have the benefit of using screen readers that can read the braille to them, they still need to learn using "notetakers" to be able to write first.
  - Backward braille writing (right to left) may be hard to learn for some people; a well-structured training should be provided to users to learn writing braille.
  - Users need to be trained in using various built-in software in the electronic or smart braillers.
- Points to be considered in product use
  - Comprehensive training is required when teaching people, especially children, how to manage their braille equipment. They need to be trained on how to operate the device, whether mechanical or electronic.
  - In order to write braille, a special paper is needed that may not be available everywhere.
- Points to be considered in product maintenance / follow-up
  - The maintenance and repair of braillers is expensive and trained technicians are required for the purpose.
  - Braillers must be stored in a clean and dry environment as humid and moist conditions can cause corrosion of the metal components.
  - The exterior of the brailler must be cleaned on a regular basis; a lint-free cloth and soft bristle brush can be used for the purpose.
  - When not in use, the brailler must be covered to protect it from dust and debris which can cause sluggish movement of keys and carriage.
  - The device must be sent to a certified repair center for regular service. An ideal time period for service depends on how frequently a brailler is used; a brailler that is used irregularly or is in normal use, should be serviced every 3 to 5 years but for a brailler that is heavily used, a more frequent service is required.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=221330

## 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.*

*ASPREX Fact Sheet*

# Walking stick

Hand-held device designed to support walking. It is usually composed of a T-shaped handgrip, a height-adjustable shaft, and a rubber-tip ferrule.

- Product Classification
  - APL (WHO Assistive Product Priority List): 5 (Canes/sticks)
  - ISO 9999:2022: 120303 (Walking sticks and canes)
- Possible configuration variants
  - Contoured handgrip (anatomically shaped).
  - Curved handgrip.
  - Ice ferrule (ferrule with metal spikes instead of rubber tip).
  - Pivoting ferrule (ferrule with a large swivel base enabling to maintain full contact with the ground when used on uneven surfaces).
  - Three footholds (in which case the product is usually called Tripod and is classified by ISO under category 120316).
  - Four or more footholds (in which case the product is usually called Tetrapod and is classified by ISO under category 120316).
  - Folding shaft.
  - Swan-necked shaft.
- Possible accessories or optional components
  - Wrist strap (to keep the stick fastened to the wrist).
  - U-shaped clip (to secure the walking stick to a wheelchair or other walking aid when not in use).
  - Prop (to be clipped around the walking stick to hang it when not in use).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Walking [d450].
  - Moving around in different locations [d460].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450] (mild difficulty in walking).
  - Maintaining body position [d415] (mild difficulty in standing).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Moderate difficulty in walking.
  - Severe difficulty in walking.
  - Moderate difficulty in standing.
  - Severe difficulty in standing.
  - Severe arms weakness.
  - Severe difficulty in grasping/gripping. *Unless used with variants: Contoured handgrip*
  - Severe difficulty in holding things.
  - Poor balance and strength.
  - Ability to use only one leg.
  - Having had a fall in the past months or feeling at risk of falls.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Iced ground. *Unless used with variants: Ice ferrule*
  - Wet or slippery ground (unless the walking path is equipped with handrails or grab bars to provide stable support).
  - Low friction pavements.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Having a wounded foot or being at risk of developing wounded feet (due for instance to diabetes; in which case one should never hop on the wounded foot).
- Points to be considered in product selection
  - Ensure that the chosen equipment is suitable for the person's weight (check in the product documentation or with the provider what is the maximum person's weight the stick can bear).
  - Ensure that the handgrip can be firmly held by the person.
  - In case the stick is going to be used also on low-friction surfaces, a larger pivoting ferrule may be considered instead of the standard rubber tip.
  - If the stick is going to be used also on ice, provide an ice ferrule to apply on the tip when needed.
  - A wrist strap is advisable if the person has difficulties finding places to lay the stick when not needed or bending to collect it from the ground if it falls.
  - In case the person is particularly unstable and unable to collect the stick if it falls to the ground, a tripod may be considered instead (or even a tetrapod, to increase stability), although it is a little bit heavier and less versatile than a stick.
- Points to be considered in product fitting
  - Ensure that the stick is adjusted to the correct height: the handgrip should be at the wrist level (of the stronger side of the body, in case one side is painful or weaker than the other one), when the person is standing with shoulder relaxed, a slight bend in elbow (about 15 angle degrees) and wearing shoes.
- Points to be considered in product use
  - The walking stick should be used on the stronger side of the body, in case one side is painful or weaker than the other one.
  - When walking, footwear should be well fitted, secure on the feet and supportive.
  - When walking, place the walking stick in front and to the side and at the same time, step forward with the weaker leg; step forward with the stronger leg and then step again with the stick and weaker leg together.
  - When going up stairs, step up with the stronger leg first; then step up with the stick and the weaker leg together.
  - When going downstairs, step down with the weaker leg and the walking aid together; then step down with the stronger leg.
  - When rising from a chair or bed, push up with the hands on the arms of the chair or on the bed and only take hold of the stick once standing: don't lean on the stick, as it is not stable enough to support; in case there is no place to lay the stick while rising, hold it with the weaker side, so as to use the stronger side to push up.
  - When sitting down, stand in front of the chair or bed, with back of legs touching it, hold the walking stick in one hand (on the weaker side), reach back with the free hand to hold onto the chair/bed and slowly sit down.
- Points to be considered in product maintenance / follow-up
  - Regularly inspect the ferrules and change them when worn.
  - Regularly inspect the handgrip and change it when worn.
  - Replace the stick with a new one if the shaft is broken or damaged.

- Carry out follow-up checks about every six months; in case the stick seems to be not used any more, consider the following possible reasons: the stick is broken and needs replacement; it hasn't been fit correctly; the user has not learned correct use; there are health problems affecting the user's mobility; the environment makes it difficult to use the device; the user needs support from others to use the stick but does not have the support.

- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=120303

## 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.*

*ASPREX Fact Sheet*

# Mobile commode shower chair

Chair which enables users to shower / engage in a hygiene routine when seated. Consists of a tubular frame, four legs, seat and backrest, with wheels for self-propulsion or castors for assistant propulsion; brakes and a removable waste collection receptacle (pan or bucket) beneath the seat, armrests which may be adjustable and flip up footplates or a sliding footrest. Materials are waterproof, such as rustproof metal, rigid plastic, plastic webbing or padded polyurethane. Additional features are: tilt in space seat mechanism for users with complex positioning needs; seat opening (aperture) options to enable perineal hygiene (open front or closed front or side aperture); padded (upholstered) seats to provide pressure care and some postural support; back and head supports to assist users with sitting balance and postural support (head rest; high or low back rest options; back rest extension). It comes in various sizes to fit individual users.

- Product Classification
  - APL (WHO Assistive Product Priority List): 6 (Chairs for shower/bath/toilet)
  - ISO 9999:2022: 091203 (Commode chairs)
- Possible configuration variants
  - Attendant-propelled versions (fitted with push handles for assistant propulsion with either four castor wheels and brakes mounted on the seat canes, or small rear wheels with brakes accessible to the assistant).
  - Travel mobile shower commode chair (lightweight and folding, able to fit into a sedan vehicle or be transported on public transport).
- Possible accessories or optional components
  - Amputee footrests.
  - Postural supports (head support and related safety belts).
  - Frame variations (tilt in space or elevating footplates / reclining backrest).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Toileting [d530].
  - Washing oneself [d510].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Muscle power functions [b730].
  - Washing oneself [d510].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Indoors.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Shower recesses with raised edging, steps into the bathroom, high toilets or toilets without sufficient clearance from the wall.
- Other indicated factors

*Other factors or situations the product is intended to address:*

- Going to the toilet by wheeling into position over a plumbed toilet or voiding into commode.
- Showering from a seated base, by wheeling into the shower.
- Need to complete showering and related personal care activities from a seated base, without transferring to bath or toilet.:
  - Use by children. *Only if used with variants: Pediatric size.*
  - Use by people with obesity. *Only if used with variants: Bariatric size.*
-

- ## Other contraindicated factors

*Other factors or situations in which the product may be inappropriate:*
None specified.

- ## Points to be considered in product selection
  - Mobile shower commode chairs are sized to fit over a western-style toilet or a roll-in shower. Preferably, the environment has toilet and shower in close proximity enabling the user to toilet then move into the shower for optimal perineal hygiene management. Alternately, users may choose to use a pan for toileting whilst in the shower area. A further consideration within the environment is an area for drying and dressing and transfers off the mobile shower commode chair.
  - Ensure there is an area within the environment for drying and dressing and transfers off the mobile shower commode chair.
  - The product should be able to withstand conditions expected in a domestic bathroom such as warm water, humidity. It should be used on a smooth floor surface. If used in a shower there should be no lip between the bathroom floor and shower floor (i.e. a roll-in shower). The product should have enough clearance to slide over the top of the toilet.
  - The combination of features must be determined based on the user goals; pan (and waste disposal method) is required if toileting will occur away from the toilet; pan not required if user wishes to wheel the mobile shower commode over a plumbed toilet; large rear wheels for self-propelling are indicated even if user can only self-propel for minimal distances (this is a safety feature when the product is rolled into a shower, enabling the user to move themselves if water temperature is too hot/ cold).
  - Mobile commode shower chairs come in a range of sizes (bariatric, paediatric).
- ## Points to be considered in product fitting
  - Seat width: the seat should fit the user comfortably, ensuring clearance to the perineal area for hygiene purposes, but ensuring sufficient surface area of the remaining seat to support the user without pressure points to prevent skin breakdown.
  - Seat depth: the seat should be sufficiently deep to fully support thighs but ensure there is a space of two to three finger-widths between the front seat edge and the popliteal fossa (back of the knees). This enables enable even weight distribution across the sitting surfaces of the body but also protects the skin and important vessels behind the knee.
  - Seat height: when seated, the knees should be approximately level with the hips. This can be achieved by adjusting the footrest.
  - Footrest should be adjusted to comfortably suit leg length and support the feet; ensure the feet are approximately at right angles and there is clearance between the footrest and the ground.
- ## Points to be considered in product use
  - These products are effectively wheelchairs for use in wet areas and during hygiene activities, and therefore the same precautions apply as in any wheelchair.
  - Seat aperture and frame too wide: causes unstable sitting base.
  - Seat aperture and frame too narrow: encourages pelvic obliquity and instability, and difficulty accessing perineal area for hygiene.
  - Seat aperture and frame too long: pulls person forward in chair, increases slumping and instability, compromises lower limb circulation.
  - Seat aperture and frame too short: may cause instability by reducing base of support, increases pressure on thighs and supporting area, causing pressure ulcer development, unstable sitting base impacts use of hands and dynamic balance.
  - Armrests too high: may elevate shoulders resulting in discomfort

- Armrests too low: encourages slumping forward or sideways to reach support, may lead to instability and impact on ability to use arms for hygiene.
- Footplates too high: may cause discomfort in hips and knees can lead to abduction of hips or adduction and internal rotation of hips reducing base of support.
- Footplates too low: pulls pelvis forward and encourages slumping and poor sitting stability.
- Seat height too high or low: unsafe transfers.

- Points to be considered in product maintenance / follow-up
  - Consumers and care givers need to appropriately clean and maintain, and safely repair parts of the mobile shower commode chair according to written instructions.
  - Refurbishing the moving parts and upholstered parts of the mobile shower commode chair and checking tire inflation on pneumatic tires may be required as part of periodic maintenance.
  - Be familiar with the product user's manual.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=091203

## 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.*

*ASPREX Fact Sheet*

# Static commode chair

Chair with a tubular frame of various materials (plastic, wood, metal etc.) consisting of four legs and a seat frame with toilet seat opening (aperture) and waste collection receptacle (pan or bucket) beneath the seat. The pan needs to be manually emptied into a plumbed toilet or other suitable waste disposal. Users may be able to lift the pan from the commode and carry (or push on a trolley) to a suitable waste disposal area to empty the pan or bucket, or an assistant may complete this task.

- Product Classification
  - APL (WHO Assistive Product Priority List): 6 (Chairs for shower/bath/toilet)
  - ISO 9999:2022: 091203 (Commode chairs)
- Possible configuration variants
  - Storage and placement of bucket: place in by lifting seat.
  - Storage and placement of bucket: slide.
  - Bariatric size.
  - Pediatric size.
- Possible accessories or optional components
  - Padded seat (for pressure relief and comfort).
  - Removable backrest or armrest to enable standing transfers from, for example bed or wheelchair.
  - Legs: adjustable in height.
  - Skirt or rim to hide the view of the pan or bucket.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Toileting [d530].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Transferring oneself [d420].
  - Maintaining body position [d415] (difficulty with dynamic standing balance).
  - Heart functions [b410].
  - Respiration functions [b440].
  - Walking [d450] (Severe difficulty).
  - Sensation related to the skin [b840].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe arms weakness.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Use by children. *Only if used with variants: Pediatric size*

- Use by people with obesity. *Only if used with variants: Bariatric size*
- Use in flexible locations.

- Other contraindicated factors

*Other factors or situations in which the product may be inappropriate:*
None specified.

- Points to be considered in product selection
  - Position the commode on a level, stable indoor surface to enable safe transfers on/off commode.
- Points to be considered in product fitting
  - Overall height to be adjusted to the highest possible setting while still ensuring the user has their feet flat on the ground when seated.
  - Ask the user where they would like the commode positioned; general principles suggest positioning the commode chair within the environment to be accessible to the user, but also to be discrete to allow privacy during use.
  - Positioning: ensure there is clearance to approach the commode from bed/ wheelchair, or space to prop and access any walking aids.
  - Position to enable the person to reach tissues or toilet paper.
  - Consider whether a second pan or bucket would assist with the emptying and hygiene routine.
- Points to be considered in product use
  - Establish who will empty the commode and how this will be done, to ensure adequate hygiene and safety.
- Points to be considered in product maintenance / follow-up
  - Users and caregivers appropriately clean and maintain the commode according to written instructions.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=091203

## 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.*

*ASPREX Fact Sheet*

# Static over toilet seat

Chair featuring a tubular frame consisting of four legs and a seat frame with toilet seat aperture, intended to aid in user sit-stand transfer and sitting during hygiene routine. Features include height adjustable legs (possible use of push buttons for changing needs and uneven surfaces), raised armrest (for ease of on/off transfer) and non-slip feet (for grip and stability in wet conditions).

- Product Classification
  - APL (WHO Assistive Product Priority List): 6 (Chairs for shower/bath/toilet)
  - ISO 9999:2022: 091212 (Raised toilet seats, free standing)
- Possible configuration variants
  - Pediatric size.
  - Bariatric size.
- Possible accessories or optional components
  - Toilet splash guard (to line the aperture to avoid spills and splashes).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Toileting [d530].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Transferring oneself [d420].
  - Maintaining body position [d415] (difficulty with dynamic standing balance).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe arms weakness.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Bathrooms (mainly domestic bathroom with western-style toilet and smooth floor surfaces).
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Use by children. *Only if used with variants: Pediatric size.*
  - Use by people with obesity. *Only if used with variants: Bariatric size.*
  - Sitting support to attend to perineal hygiene and adjust clothes whilst toileting.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - Over toilet frames may come in different sizes to fit individual users. Bariatric sized over toilet frames for obese users must have a suitable weight capacity. Pediatric sized over toilet frames may feature steps to reach the toilet, and a narrow aperture seat.
  - The product should be able to withstand conditions expected in a domestic bathroom such as warm water and humidity.

- Points to be considered in product fitting
    - The over toilet frame, when positioned over the toilet, provides two stable hand supports which enable users to guide themselves onto the seat, and enable users to push up from sitting position.
    - The over toilet frame is higher than the toilet therefore there is less distance for the user to lower themselves onto the toilet or push themselves off the toilet.
    - Height adjustable legs on the over toilet frame enable the overall height to be adjusted to the highest possible setting while still ensuring the user has their feet flat on the ground when seated.
    - The rear legs can be adjusted 2-7 cm higher than the front legs to create forward rake in order to provide mechanical advantage to the user in raising and lowering themselves, as they will be sitting on a forward slope.
- Points to be considered in product use
    - In a clear, flat area, invite the user to transfer on and off the over toilet frame to evaluate the optimal height adjustment; then, adjust the height of the over toilet frame to suit the user, ensuring the users feet are flat on the ground.
    - Install the over toilet frame over the toilet, ensuring adequate clearance over the toilet bowl. Existing toilet seat and lid will need to be positioned up.
- Points to be considered in product maintenance / follow-up
    - Instruct user as to how to clean the product and who to contact in case of problems.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=091212

## 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.*

*ASPREX Fact Sheet*

# Static shower chair

Chair with a tubular frame consisting of four legs and a seat with backrest, which enables users to shower / engage in a hygiene routine when seated. It comes in various sizes to fit individual users. Materials are waterproof, such as rustproof metal, rigid plastic, plastic webbing or padded polyurethane. The structure includes non-slip feet (for grip and stability in wet conditions) and armrests.

Possible variants include the seat (which can be just a stool without back support), the legs (which can be also adjustable in height) and the armrests (which may be detachable or absent).

- Product Classification
  - APL (WHO Assistive Product Priority List): 6 (Chairs for shower/bath/toilet)
  - ISO 9999:2022: 093307 (Shower chairs with and without wheels)
- Possible configuration variants
  - Pediatric size.
  - Bariatric size.
- Possible accessories or optional components
  - Back support.
  - Padding (on seat or back support).
  - Armrests (fixed, reclining or swing away).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Washing oneself [d510].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Maintaining body position [d415] (difficulty in standing to shower or wash).
  - Changing body position [d410].
  - Walking [d450].
  - Respiration functions [b440].
  - Heart functions [b410].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in transferring independently to a seating position.
  - Inadequate dynamic sitting balance.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Shower recesses.
  - Bathrooms.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Use by children. *Only if used with variants: Pediatric size.*

- Use by people with obesity. *Only if used with variants: Bariatric size.*

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - The product should be able to withstand conditions expected in a domestic bathroom such as warm water, humidity.
  - It should be used on a smooth floor surface.
  - Bariatric sized seats for obese users must have a suitable weight capacity.
  - Pediatric sized seats feature a height for children and may have curved 'potty style' seat and backrest combinations to support a child during hygiene routines.
  - Height adjustable legs on the shower stool or chair enable the overall height to be adjusted to the highest possible setting while still ensuring the user has their feet flat on the ground when seated.
  - In sloped shower recesses, leg adjustments can be uneven to accommodate changing height of the surface.
  - The rear legs can be adjusted 1–3 inches higher than the front legs (creating forward rake) to provide mechanical advantage to the user in raising and lowering themselves, as they will be sitting on a forward slope.
  - Raised armrest may be needed for ease of on/off transfers.
  - Users may require support to transfer off/on the chair and for hygiene (cleaning and drying).
  - Shower stools have a smaller footprint (less depth) and may be easier to place in narrow shower recesses.

- Points to be considered in product fitting

  None specified.

- Points to be considered in product use

  None specified.

- Points to be considered in product maintenance / follow-up
  - Consumers and caregivers need to appropriately clean and maintain and safely repair parts of the shower stool or chair according to written instructions.
  - Refurbishing any upholstered parts and replacing any rusted parts may be required as part of periodic maintenance.

- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=093307

## 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.*

*ASPREX Fact Sheet*

# Closed captioning display (CC)

Digital technology (also called video captions, or subtitles), that decodes, on demand, in real time speech and transcribes it to text, displayed on a screen (e.g. on a TV, a computer, a mobile phone, or a tablet).

Possible configuration variants concern the display software (which may also be hardware, in a form of a special hand held, seat mounted or fixed display for subtitles or video captions), the real time decoding (which may also be hardware or software systems that allow captioning in advance; or integrated ), the on-demand function (which may also be automatic, or included as a fixed option on the screen), the activation of the captioning display (which may also be a special key on the remote control), the speech decoding (which can also be decoding of sound effects, relevant musical cues, and other relevant audio information when sound is unavailable or not clearly audible), and the language of the transcript text (which may be also different from the spoken language, e.g. a subtitle in another language).

Additional features include the options of the displayed text (which may also be edited, re-read and memorized), the aspect of the displayed text (which may also be enlarged, and the color of the font and the background can be modified), and the possibility to increase the accuracy of the voice-to-text recognition process with the support of machine learning.

- Product Classification
  - APL (WHO Assistive Product Priority List): 7 (Closed captioning displays)
  - ISO 9999:2022: 221821 (Decoders for videotext and text television)
- Possible configuration variants
  - Possibility to connect to electronic Braille displays.
  - Possibility to enlarge captioning.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Listening [d115].
  - Understanding spoken words [d310].
  - Learning to read [d140].
  - Acquiring an additional language [d133].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210]. *Only if used with variants: Possibility to connect to electronic Braille displays*
  - Hearing [b230].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in reading (such as illiteracy or dyslexia).
  - Difficulty in understanding written language (decoding written messages to obtain the meaning).
  - Severe vision loss. *Unless used with variants: Possibility to enlarge captioning*
  - Blindness. *Unless used with variants: Possibility to connect to electronic Braille displays*

- Deafblindness. *Unless used with variants: Possibility to connect to electronic Braille displays*

- Indicated environments

  *Specific environments in which the product should be used:*
  - Environment where the audio is difficult to hear or is intentionally muted.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Noisy places (the accuracy of voice-to-text recognition may be difficult in noisy environments, or when more people are temporarily talking, and depends on the quality and on the intensity of the speaker's voice).

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Helping comprehension of literal and implied meanings of messages in spoken language (such as understanding that a statement asserts a fact or is an idiomatic expression).

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Ensure that the user reads and understands written texts.
  - Ensure that the voice-to-text feature is available in the user's language.
  - A mobile real time voice-to-text technology is suitable for people who want to communicate with a talking person out of their home (e.g., in the marketplace, workplace, schools, health care facilities, and civic centers).
  - In case of cloud-based systems and mobile use, make sure that the place where you want to use your mobile device with real time closed captioning is covered by wireless internet access.
  - Speech-to-text technologies are recommended if the user can read and understand written texts; free apps are easily available, also in different languages.
  - In case of video or telecommunication, select a software or device (ISO code 222424, telecommunication, and telematics software) with integrated voice-to-text translation and transcription (closed captioning) into the language the user can read and understand.

- Points to be considered in product fitting
  - In case of mobile devices for voice-to-text conversion, ensure that the software is correctly installed.
  - Ensure that the user can activate the closed captioning display.
  - Ensure that the user can correctly see the text on the display, if not, modify and adapt the aspect of the text (font size and color, contrast between text and background, and background color) to the user preferences.
  - In case of real time voice-to-text to receive communication, check if the translation is accurate, if not, reduce the environmental noises, bring the device microphone nearer to the speaker, increase the microphone sensibility, and ask the speaker to speak louder, slower and one at a time.
  - In case of voice-to-text technology to receive communication, check if the translation is accurate; if not, manually modify the misinterpretation and add the new words to your personal device system.

- Points to be considered in product use
  - If the real time voice-to-text technology is not working perfectly, try to change environmental factors to increase the functionally of the system.
  - If possible, continue to correct the misinterpretations and teach the system to make it work more accurately.
  - If you change your device on which you have installed the closed captioning display, make sure that all your personal adaptations will be transferred to the new device.
  - For mobile use, ensure that your device is charged.

- Points to be considered in product maintenance / follow-up
  - Frequent up-date of the software is recommended.
  - Frequently up-date and back up your personal adaptations of your closed caption display.
  - In case of mobile devices, keep batteries charged.

- Examples of products available on the market
    - Live product search in the EASTIN website
      https://www.eastin.eu/en/searches/products/list?iso=221821

## 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.*

*ASPREX Fact Sheet*

# Club foot brace

Brace designed to modify the structural and functional characteristics of the neuromuscular system of the ankle and foot; it may be custom manufactured to meet the individual functional requirements or prefabricated and adjustable to fit the individual user. It has two differentiated parts: a) a couple of ankle foot orthoses (AFO) or shoes, and b) a bar. The AFOs or shoes are designed to control the inversion or forefoot adductus and achieve a neutral dorsiflexion of the foot; the shoes may be made of strong leather or other strong fabric and may be reinforced with a straight medial border; different shoe closures such as Velcro, straps or shoelaces can be used; the toes should not be covered by the brace: it is an open toed shoe; the heel cup needs to have an inspection on the medial side; foam mold for the inside of the shoe can make it more tolerable and better fit; the shoes may be detachable or not from the bar.

The bar is designed to position the feet horizontally at the desired angle in the sagittal plane; it should be as long as the distance between the child´s shoulders and should be bent to allow 10-15 degrees of dorsiflexion; the bar can be extensible to be lengthened over time as the child grows; to increase the ease and adherence of use, the bar may have detachable clips for shoes into and out; the bar can have the possibility to angle the shoe to externally rotate the affected foot up to 90 degrees. The clubfoot brace should be easy for parents to fit on the child, able to fasten firmly enough to keep the child's heels down within the shoes, it should be light weight, strong, durable and easy to clean. The bar should be strong enough to maintain the shoes/feet in a position of abduction and dorsiflexion.

- Product Classification
  - APL (WHO Assistive Product Priority List): 8 (Club foot braces)
  - ISO 9999:2022: 061206 (Ankle-foot orthoses)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Maintaining body position [d415].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Mobility of joint functions [b710].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Lack of sensation or skin integrity.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

*Environments in which the product may be inappropriate:*
None specified.

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Maintaining a standing position with proper foot alignment.
  - Walking with proper foot alignment.
  - Distortion of the foot at an early age so that the sole cannot be placed flat on the ground.
  - Foot twisted inward and downward, increasing the arc and turning the heel inward.
  - Having one foot and one leg smaller than the other.
  - Underdeveloped calf muscle in the affected leg.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Use by children over 5 years (as there is no evidence that the shape of the foot will modify over that age).
- Points to be considered in product selection
  - Start to use it as soon as possible because the joints and tendons are very flexible: it is ideal to correct the child´s foot shape and function before he or she learns to walk.
  - Children up to 5 years are the typical users, as at that age they have completed the corrective phase of clubfoot treatment.
  - The product is widely effective under the age of two.
  - It can affect one or both feet.
  - Ensure that it should be easy for parents to fit on the child, able to fasten firmly enough to keep the child-s hell down within the shoes.
  - The device should be light weight, strong, durable, and easy to clean.
  - The bar should be strong enough to maintain the shoes/feet in a position of abduction and dorsiflexion.
  - The device can be combined with Ponseti Method, which involves a combination of casting, Achilles tendon release and bracing; widely effective under the age of two.
  - It can be combined with the French method, which involves realignment, taping, and long-term home exercises and night splinting; this is much dependent on the reliability and involvement of the caregivers.
  - Provide the proper measures.
- Points to be considered in product fitting
  - Ensure that the brace is well fitted to the size of the feet and in relation to abduction and rotation.
  - Shoes are solid and attached to a bar, the feet need to be at shoulder with apart in a position of abduction and dorsiflexion.
  - The length of the bar should be followed up and set so that the child´s heels are shoulder width apart.
  - The angle of dorsiflexion of the shoe on the bar is set to 10-15 degrees dorsiflexion.
  - The angle of abduction of the shoe on the bar is usually set to 60-70 degrees.
  - For unilateral cases, the angle of abduction is 60-70 degrees in the affected foot and in the unaffected foot is normally set to 30-40 degrees.
  - Check if the orthoses is providing the appropriate stability or correction.
  - Pad the bar: this will protect your child, yourself, and your furniture from being hit by the bar when the child is wearing the brace.
- Points to be considered in product use
  - Bracing as soon as possible and for 4-5 years every night is the most effective method to correct the distortion.
  - Wear the brace full time for the first three months and the overnight until they are 4 or 5 years old.
  - Training parents and caregivers in how to fit and when to use the brace is critical.
  - Consideration of the use if needed to combine with other approaches if the child has other/additional impairments.
  - Make the treatment a routine.

- Dosage use program: depending on the age and the condition of the soft tissue; there are special indications on the hours of wearing time expected to make changes in the foot; it varies from 6 hours to 24 hours.
- Expect your child to fuss in the brace for the first 2-3 days.
- Explain what to do if there is discomfort or injury. If you notice any bright red spots or blistering contact your health care provider.
- Play with your child in the brace; this is a key to getting quickly over the child's irritability.
- Show your child pictures of other children with clubfoot wearing their brace.Use rewards and incentives to help your child understand the importance of the brace.

- Points to be considered in product maintenance / follow-up
  - Regularly check the size of the shoe.
  - Replace the stick with a new one if the shaft is broken or damaged.
  - Regularly check the distance of separation of the feet in the bar.
  - Look for clinical or technical help if: the brace is broken in any part of it; there are health problems affecting the child; it has not been fit correctly; the user´s family has not learned correct use; you find any difficult to use the device.
  - Carry out follow-up checks about every six months if there is no other sign of concern about the correct use of the brace.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=061206

## 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.*

*ASPREX Fact Sheet*

# Body-worn absorbent product

Products intended to move moisture away from the skin and absorb and contain moderate or heavy urine loss or faeces. They are intended to protect the user's clothes and nearby environment, thereby preserving the user's dignity, comfort and quality of life, and if applicable, that of their caregiver(s), to promote social inclusion. They can be single-use or washable.

A body-worn absorbent product generally comprises:

- a top sheet, which lies against the wearer's skin; this is made from a water-permeable material that allows urine to pass readily through to the absorbent core beneath;
- an acquisition layer, which lies between the topsheet (above) and the absorbent core (below); this is designed to allow urine to enter the pad readily and spread over a large area of absorbent core. It does not absorb urine;
- an absorbent core, where urine is captured, spread and stored; this is made from material(s) that absorb(s) and spread(s) urine readily and retain(s) it under pressure;
- a back sheet, which is a layer of waterproof material that forms the outside surface of the pad, away from the wearer's body; this may be breathable;
- a fastening system (all-in-one and belted pads only) self-adhesive or hook-and-loop tabs to secure the products if a separate supporting product (e.g. underwear or fixation pants) is not used; pants/briefs (fixation underwear) can be used to secure single-use absorbent pads.

A washable body-worn absorbent product generally comprises:

- a washable waterproof-backed pad worn with fixation pants, or pull-on pad;
- a washable absorbent unbacked fabric pad (usually shaped) or a fabric square folded for use and opened out flat for washing and drying; these are typically made from cotton toweling, but they may also be made from other absorbent fabrics, such as bamboo, rayon or polyester fibres. It is worn with a separate waterproof component (usually a plastic pant (underwear) but can be a plastic sheet folded to fit and secured by tying) to prevent urine or faeces leaking on to clothing and bedding. The waterproof component can provide additional security.
- A fixation device can be a safety pin or clip.

- Product Classification
  - APL (WHO Assistive Product Priority List): 19 (Incontinence products, absorbent)
  - ISO 9999:2022: 0930 (Assistive products for absorbing urine and faeces)
- Possible configuration variants
  - Single-use pad for urine (rectangular or shaped pads held in place with user's own close-fitting underwear or with fixation underwear as first part of two-piece system).
  - Male pad for urine (shaped pads designed to cover penis and scrotum and held in place with user's own closely fitting underwear or with fixation underwear, as first part of two-piece system).
  - Single-use belted pad for absorbing urine or containing faeces (with built-in fastener system).
  - Single-use pull-on pad for absorbing urine or containing faeces (resembles ordinary close-fitting underwear).
  - Single-use wraparound pad for absorbing urine or containing faeces (with built-in fastener system).
  - Washable incontinence pull-on pad (similar in appearance to standard underwear with integrated waterproof-backed absorbent pad).
  - Washable absorbent pad (waterproof-backed pad worn with fixation pants).
  - Washable wraparound pad (unbaked fabric pad, square or shaped, for urine or faeces, shaped to fit around the legs and fasten in the front or at the sides; held in place with integrated or separate fastening device eg pins or clips; worn with washable waterproof product, eg pants or underwear or folded waterproof sheet).
- Possible accessories or optional components

    - Washable fixation underwear (designed to hold pad in position as second part of two-piece system, that resembles male and female styles, adult and child sizes).
    - Washable fixation underwear made from stretchy fabric (designed to hold pad in position as second part of twopiece system, resembling regular male and female styles, in adult and child sizes, with a more generous design for comfortable fit and to secure the pad).

- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
    - Toileting [d530].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
    - Urination functions [b620].
    - Defecation functions [b525].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection

  None specified.
- Points to be considered in product fitting

  None specified.
- Points to be considered in product use

  None specified.
- Points to be considered in product maintenance / follow-up

  None specified.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=0930

## 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.*

*ASPREX Fact Sheet*

# Communication board (or book or cards)

Low technology device, which enables two persons to communicate with each other in the same space. Included are letters, pictures, symbols, and icon sets. Their features include printed boards categorized into topics in a grid of communication resources such as a set of symbols, paintings, icons, real-life pictures, letters, words or objects to represent ideas when communicating with others.

- Product Classification
  - APL (WHO Assistive Product Priority List): 9 (Communication boards/books/cards)
  - ISO 9999:2022: 222103 (Letter and symbol sets and boards)
- Possible configuration variants
  - Transparent communication boards.
  - Boards with tactile symbols.
- Possible accessories or optional components
  - Ring binder (to protect the board and card, and to make it easier to have different boards together for multiple communication needs).
  - Laminating finish (to protect a single board and card).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Understanding spoken words [d310].
  - Producing nonverbal messages [d335]
  - Holding a conversation [d350].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Acquiring concepts [d137].
  - Mental functions of language [b167].
  - Acquiring concepts [d137].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Lack of communication intention.
  - Blindness. *Unless used with variants: Boards with tactile symbols*
  - Insufficient consciousness level to enable association of keystrokes with resulting actions.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Places with bad visual conditions (such as dark rooms, bad lighting, glare, reflecting light).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Augmenting verbal comprehension.
  - Inability to speak due to comprehension impairment (inability to understand and be familiar with a situation).
  - Inability to speak due to motor impairment (neuromotor, muscular, joints, bones).
  - Inability to speak due to praxis impairment (ability to spontaneously conceive, organize and carry out a motor act in the correct sequence from beginning to end).

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Need to write messages.
  - Need to produce messages with voice output.
- Points to be considered in product selection
  - List the tasks the user needs to do with the product and check that the user can actually sustain these tasks.
  - Understand the intellectual and language abilities to guide vocabulary, language options and symbol system choice to include several approaches.
  - Select the size of the Boards / books/ cards depending on the number of icons per page/ size of icons/ number of pages.
  - Boards/ Cards/ Books basic formats include the following components: action words, people, places, personal information, greetings and social exchanges, quick phrases, feelings, food and drinks, adjectives and identifying features, body parts, clothing items, toys or favorite activities, weather, colors, shapes, letters and numbers, school supplies, holidays, question words, age-appropriate slang, School specific activity pages, home specific activity pages.
  - Choose topics that meet the interests and the needs of the person.
  - People with significant cognitive limitations may benefit from fewer icons per page, thus requiring lower cognitive load.
  - People with higher linguistic skills may benefit from many icons per page/ board.
  - Find out (through appropriate assessment) the user's body functions that are best suited to comfortably access the product: eye gaze, pointing or partner assisted scanning.
- Points to be considered in product fitting
  - Make sure that the chosen topics motivate communication for the user.
  - Make sure that the icon sizes, the background size, the color and the contrast fit adequately the user´s visual capabilities.
  - Organize the icons in such a way (number per page, most frequently used ones in easiest to access spots) that allows the user to easily access them.
  - Train relatives on how to communicate with the icons.
- Points to be considered in product use
  - Competence in product use is highly context- dependent.
  - It will help if someone mediates the communication and shows how symbols / icons / words can be used to communicate.
  - Start with simple models; ask for very motivating things, such as specific songs to be played, or favorite food to be offered.
- Points to be considered in product maintenance / follow-up
  - Keep the board safe from breaks or water and protect it (e.g. with a plastic cover).
  - Make sure to have reliable contacts that can help with any problem.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222103

## 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.*

*ASPREX Fact Sheet*

# Communication software

Software application to be installed on a computing device (computer, tablet, smartphone, or dedicated communication device), primarily designed to produce communication messages.

It comes with pre-defined textual or pictorial or symbolic communication tables tailored to various daily life situations such as conversation, writing, phoning, emailing, web browsing. The items on the tables (letters, pictures, icons, symbols) can be selected through various techniques, such as direct selection (the user directly targets the desired item), row-column scanning (the software first scans the table rows, then the columns of the selected row until locating the desired item) or block scanning (the software first scans large blocks of items, then smaller blocks within the selected one until locating the desired item).

The user can operate the system through a variety of input devices, such as a touch screen, a mouse, a wearable pointer, a keyboard, one or more switches or sensors, eye-gaze recognition, movement tracking, or a brain computer interface). This product also comes with configuration software that allows the user or support professionals to create custom-made communication tables and customize input and output functions.

Different versions may be available for installation on different devices, operating systems, and operating system versions. Each product item on the market may have a different range of capabilities and functions, as well as different hardware and software requirements to ensure proper installation and operation.

- Product Classification
  - APL (WHO Assistive Product Priority List): 10 (Communication software)
  - ISO 9999:2022: 222112 (Face-to-face communication software)
- Possible configuration variants
  - Environmental control capability (ability to control the electrical appliances of the home or the surrounding environment).
  - Word processing capability.
  - Speech output capability.
  - Phoning and messaging capability.
  - Computer control capability (ability to access and operate all software applications that run on the computing device where the product is installed, such as a computer or a tablet or a smartphone or a dedicated communication device).
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Speaking [d330]. *Only if used with variants: Speech output capability*
  - Writing messages [d345].
  - Writing [d170]. *Only if used with variants: Word processing capability*
  - Holding a conversation [d350]. *Only if used with variants: Speech output capability*
  - Using communication devices and techniques [d360].
- Indicated impairments

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

    - Speaking [d330] (severe difficulty). *Only if used with variants: Speech output capability*
    - Hand and arm use [d445].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
    - Insufficient consciousness level to enable association of symbols with messages.
    - Lack of communication intention.
    - Blindness.
    - Severe vision loss.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
    - In the rain.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
    - Assisting functional assessment and training strategy within rehabilitation programs (for people with pre-intentional communication i.e., without reliable yes/no responses to develop intentional communication, particularly in the acquired brain injury and profound intellectual disability population).
    - Controlling a computing device such as a computer or a tablet or a smartphone. *Only if used with variants: Computer control capability*
    - Controlling the electrical appliances of the home or the surrounding environment. *Only if used with variants: Environmental control capability*
    - Phoning and messaging. *Only if used with variants: Phoning and messaging capability*
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
    - Check that the product is available in your primary language or in a language that is known by you and your interlocutors.
    - In the product documentation, check the hardware, software, and network requirements for installation.
    - If installing the product on a current computing device (such as a laptop, a tablet, a smartphone, or a specific communicator), make sure that the device is configured with the required operating system and version, is powerful enough to run the application and can have internet connectivity when needed.
    - If you are selecting a new computing device along with the application, consider all the tasks you want to perform and what the environments of use will be: depending on that, you may prefer a mainstream device (such as a laptop or a table or a smartphone) or a dedicated device (such as a communicator which can be fitted onto an outdoor wheelchair and endure vibrations and bad weather); you may prefer a larger screen for better visibility or a smaller screen for better portability; you may need additional batteries to keep the device working as long as you need; you may also need other products to complete the assistive solution, such as a flexible fixation arm or an adjustable table or stand.
    - Think about the audio capability: in case you need spoken output outdoors or in noisy places, the device built-in audio system may be not loud enough so additional loudspeakers may be required.
    - If the application is also used for environmental control, additional hardware may be needed to interface the device with the appliances to be controlled; you may need engineering assistance to check their compatibility, decide the signal transmission means (wired, infrared, radiofrequency etc.) and protocols (Wi-Fi, Konnex etc.) and configure the connection; in order to avoid mistakes, carry out this technical analysis before acquiring the device and installing the application.
    - Depending on your motor abilities, consider the physical way you will operate the application, whether through a touch screen, or a pointing device (such as a mouse or a touchpad), or a keyboard, or through switches or sensors (which may require additional hardware interfaces); the choice of the best physical

interaction method should be based on thorough assessment, training and trials within a habilitation or rehabilitation program.

- Depending on your cognitive and language abilities and your physical interaction speed, you need to decide the structure, the symbolism (texts, photos, pictograms, symbolic languages, etc.) and the layout of the communication tables appearing on the screen, which contain the activation buttons to be selected; these tables may come with the product at its first installation, or may be downloaded later from the Internet (free or upon payment), or can be built by yourself by means of the configuration software embedded in the product; as for the physical interaction method, also these decisions should be based on thorough assessment, training and trials within a habilitation or rehabilitation program.
- When deciding on the communication tables, the way the messages should be presented to the communication partners and the product functionalities to be implemented, consider all communication needs the product should meet: whether those of a child or an adult or an elderly; whether within the family or also with strangers; whether in the school environment (primary or secondary or high or university) or in the work environment; whether within a habilitation or rehabilitation setting such as an augmentative communication program.
- Keep in mind that this is a complex product with plenty of configuration options and usage levels; learning to use it effectively may take time and may need frequent configuration readjustments, especially in the first period of use; if the person is not already an expert user of assistive communication products, make sure that the person can rely on a knowledgeable professional or trusted person, able to serve as communication facilitator in the first period of usage.
- If Internet connection is required for installation and regular updates, make sure that such connection exists and has sufficient bandwidth in the place where the user lives.

- Points to be considered in product fitting
  - Install the application on the selected device following the instructions of the installation program; at this stage, you may need to be connected to the Internet for registration and download of updates, communication tables and plug-ins.
  - Connect and install all the peripherals you need (control switches/sensors, loudspeakers, printer, environmental control interfaces, etc.) and check that all work correctly with the application.
  - If the device is not going to be used handheld, position the device on an appropriate support (e.g., an adjustable stand, or a wheelchair-mounted articulated arm) in such a way that you can operate it comfortably, see well the screen and look face-to-face at interlocutors; you may also need to adjust the screen brightness in relation to the ambient light.
  - Carry out the initial configuration of the communication tables according to the decisions taken in the assessment / selection stages.
  - Plan a training program to familiarize with the system and achieve the skills needed to efficiently operate it; usually the selection, fitting and use of this kind of products is carried out in specialized centers where all needed competences are available, as part of individual habilitation / rehabilitation programs or augmentative communication interventions.
  - Consider that during the training program, the communication tables may need to be adjusted and improved several times as your use skills improve.
  - Find out the user's body functions that are best suited to comfortably access the product; be mindful of how carrying out the physical movements needed to control the device may change overtime, particularly where the person fatigues quickly.
  - The user´s posture should be taken into account, since it is directly related to the capability to operate the product.
  - Configure the user profile, if the product has a users' profile management system.
- Points to be considered in product use
  - When you need to communicate with persons who are unfamiliar with assistive communication equipment, put them at ease by informing that you cannot speak or produce messages in the same way as most others, but the device does it for you; this instruction can be given for instance by selecting something like a "start conversation" button on the communication table to speak out a welcome message with instruction.
  - Regularly check about the availability of new software updates or new communication tables (often the system carries out this check automatically) and download and install them if appropriate.
  - You may wish to join social networks of users of this product, to exchange views and learn from each other's experience.

- Points to be considered in product maintenance / follow-up
    - Your capabilities are likely to change over time: the functions required from the product may need to be changed or adjusted as your personal situation develops and moves through life stages.
    - Regular reviews (annual or biannual) are recommended, to check whether the product still meets your needs, or configuration adjustments are needed in relation to changes in your capabilities, occupation, use environment, clinical condition, or life goals.
    - Make sure to have a reliable contact person or company in case of any technical problem.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222112

## 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.*

*ASPREX Fact Sheet*

# Elbow crutch

Hand-held device, usually used in pairs, designed to support walking. It is usually composed of a handgrip with elbow support (cuff), a height-adjustable shaft and a rubber-tip ferrule; both the floor-to-handgrip and the handgrip-to-cuff distances are adjustable. The shaft can be made of various materials such as steel, aluminum or carbon fiber.

- Product Classification
  - APL (WHO Assistive Product Priority List): 11 (Crutches, axillary/elbow)
  - ISO 9999:2016: 120306 (Elbow crutches)
- Possible configuration variants
  - Closed cuff (cuff composed of an incomplete ring which prevents the forearm slipping forwards out of place).
  - Ice ferrule (ferrule with metal spikes instead of rubber tip).
  - Pivoting ferrule (ferrule with a large swivel base enabling to maintain full contact with the ground when used on uneven surfaces).
  - Shock-absorbing ferrule (ferrule made in such a way to cushion the impact with the ground).
  - Contoured handgrip (anatomically shaped).
- Possible accessories or optional components
  - U-shaped clip (to secure the crutch to a wheelchair or other walking aid when not in use).
  - Prop (to be clipped around the crutch to hang it when not in use).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Walking [d450].
  - Moving around in different locations [d460].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450] (moderate difficulty in walking).
  - Maintaining body position [d415] (moderate difficulty in standing).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe difficulty in walking.
  - Severe difficulty in standing.
  - Severe arms weakness.
  - Severe difficulty in grasping/gripping. *Unless used with variants: Contoured handgrip*
  - Ability to use only one hand.
  - Severe difficulty in holding things. *Unless used with variants: Closed cuff*
  - Having had a fall in the past months or feeling at risk of falls.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Iced ground. *Unless used with variants: Ice ferrule*
  - Wet or slippery ground.
  - Low friction pavements.

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - Ensure that the chosen equipment is suitable for the person's weight (check in the product documentation or with the provider what is the maximum person's weight the crutch can bear).
  - Ensure that the handgrip can be firmly held by the person.
  - If the crutches are going to be used also on low-friction surfaces, a larger pivoting ferrule may be considered instead of the standard rubber tip.
  - If the crutches are going to be used also on ice, provide an ice ferrule to apply on the tip when needed.
  - A closed cuff is advisable if the person often needs to use the hands when standing with the crutches (for instance, to open a door with the key).
- Points to be considered in product fitting
  - First, adjust the handgrip height: the handgrip should be at the wrist level, when the person is standing with shoulder relaxed, a slight bend in elbow (about 15 angle degrees), and wearing shoes.
  - Second, adjust the elbow support height: the cuff, whether open or closed, should cradle the forearm just below the elbow joint so that the movement of the elbow is not impeded.
- Points to be considered in product use
  - When walking, footwear should be well fitted, secure on the feet and supportive.
  - When walking, place the crutches in front and slightly to the side of the body; push down on handgrips and step forward with the weaker (or only) leg; step forward with the stronger leg.
  - When going up stairs, step up with the stronger (or only) leg first; lift the crutches onto the step; step up with the weaker leg.
  - When going downstairs, place the crutches on to the step first; step down with the weaker (or only) leg; step down with the stronger leg.
  - When rising from a chair or bed, push up with the hands on the arms of the chair or on the bed and only take hold of the crutches once standing: don't lean on the crutches, as they are not stable enough to support; in case there is no place to lay the crutches while rising, hold them with the weaker side, so as to use the stronger side to push up.
  - When sitting down, stand in front of the chair or bed, with the back of legs touching it, hold the crutches in one hand (on the weaker side), reach back with the free hand to hold onto the chair/bed and slowly sit down.
- Points to be considered in product maintenance / follow-up
  - Regularly inspect the ferrules and change them when worn.
  - Regularly inspect the handgrip and change it when worn.
  - Replace the crutches with new ones if the shaft is broken or damaged.
  - Carry out follow-up checks about every six months and in case the crutches seem to be not used any more, consider the following possible reasons: they are broken and need replacement; they have not been fit correctly; the user has not learned correct use; there are health problems affecting the user's mobility; the environment makes it difficult to use the device.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=120306

## 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.*

*ASPREX Fact Sheet*

# Forearm crutch

Hand-held device, usually used in pairs, designed to support walking. It is usually composed of a handgrip with forearm support, a height-adjustable shaft and a rubber-tip ferrule; the distance between the handgrip and the forearm support is also adjustable. The shaft can be made of various materials such as steel, aluminum or carbon fiber.

- Product Classification
  - APL (WHO Assistive Product Priority List): 11 (Crutches, axillary/elbow)
  - ISO 9999:2022: 120309 (Forearm crutches)
- Possible configuration variants
  - Ice ferrule (ferrule with metal spikes instead of rubber tip).
  - Pivoting ferrule (ferrule with a large swivel base enabling to maintain full contact with the ground when used on uneven surfaces).
  - Shock-absorbing ferrule (ferrule made in such a way to cushion the impact with the ground).
  - Contoured handgrip.
  - Closed forearm support (to prevent the forearm slipping sideways out of place).
- Possible accessories or optional components
  - U-shaped clip (to secure the crutch to a wheelchair or other walking aid when not in use).
  - Prop (to be clipped around the crutch to hang it when not in use).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Walking [d450].
  - Moving around in different locations [d460].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450] (moderate difficulty in walking).
  - Maintaining body position [d415] (moderate difficulty in standing).
  - Fine hand use [d440] (difficulty in grasping/gripping).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe difficulty in walking.
  - Severe difficulty in standing.
  - Severe difficulty in grasping/gripping. *Unless used with variants: Contoured handgrip*
  - Ability to use only one hand.
  - Severe arms weakness.
  - Severe difficulty in holding things. *Unless used with variants: Closed forearm support*
  - Having had a fall in the past months or feeling at risk of falls.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Iced ground. *Unless used with variants: Ice ferrule*
  - Wet or slippery ground.
  - Low friction pavements.

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - Ensure that the chosen equipment is suitable for the person's weight (check in the product documentation or with the provider what is the maximum person's weight the crutch can bear).
  - Ensure that the handgrip can be firmly held by the person.
  - In case the crutches are going to be used also on low-friction surfaces, a larger pivoting ferrule may be considered instead of the standard rubber tip.
  - If the crutches are going to be used also on ice, provide an ice ferrule to apply on the tip when needed.
- Points to be considered in product fitting
  - First, adjust the forearm support height: the support should be at the elbow level, when the person is standing with shoulder relaxed, and wearing shoes.
  - Second, adjust the distance between the handgrip and the forearm support: the latter, whether open or closed, should cradle the forearm just below the elbow joint so that the movement of the elbow is not impeded.
- Points to be considered in product use
  - When walking, footwear should be well fitted, secure on the feet and supportive.
  - When walking, place the crutches in front and slightly to the side of the body; push down on handgrips and step forward with the weaker (or only) leg; step forward with the stronger leg.
  - When going up stairs, step up with the stronger (or only) leg first; lift the crutches onto the step; step up with the weaker leg.
  - When going downstairs, place the crutches on to the step first; step down with the weaker (or only) leg; step down with the stronger leg.
  - When rising from a chair or bed, push up with the hands on the arms of the chair or on the bed and only take hold of the crutches once standing: don't lean on the crutches, as they are not stable enough to support; in case there is no place to lay the crutches while rising, hold them with the weaker side, so as to use the stronger side to push up.
  - When sitting down, stand in front of the chair or bed, with back of legs touching it, hold the crutches in one hand (on the weaker side), reach back with the free hand to hold onto the chair/bed and slowly sit down.
- Points to be considered in product maintenance / follow-up
  - Regularly inspect the ferrules and change them when worn.
  - Regularly inspect the handgrip and change it when worn.
  - Replace the crutches with new ones if the shaft is broken or damaged.
  - Carry out follow-up checks about every six months and in case the crutches seem to be not used any more, consider the following possible reasons: they are broken and need replacement; they have not been fit correctly; the user has not learned correct use; there are health problems affecting the user's mobility; the environment makes it difficult to use the device.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=120309

## 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.*

*ASPREX Fact Sheet*

# Axillary crutch

Hand-held device, usually used in pairs, designed to support walking. It is usually composed of a height-adjustable shaft with an underarm pad, a handgrip and a rubber-tip ferrule; both the floor-to-handgrip and the handgrip-to-underarm pad distances are adjustable.

- Product Classification
  - APL (WHO Assistive Product Priority List): 11 (Crutches, axillary/elbow)
  - ISO 9999:2022: 120312 (Axillary crutches)
- Possible configuration variants
  - Contoured handgrip (anatomically shaped).
  - Ice ferrule (ferrule with metal spikes instead of rubber tip).
  - Pivoting ferrule (ferrule with a large swivel base enabling to maintain full contact with the ground when used on uneven surfaces).
  - Shock-absorbing ferrule (ferrule made in such a way to cushion the impact with the ground).
- Possible accessories or optional components
  - U-shaped clip (to secure the crutch to a wheelchair or other walking aid when not in use).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Walking [d450]
  - Moving around in different locations [d460].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450] (severe difficulty in walking).
  - Maintaining body position [d415] (severe difficulty in standing).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Mild difficulty in walking.
  - Moderate difficulty in walking.
  - Mild difficulty in standing.
  - Moderate difficulty in standing.
  - Lack of arms strength.
  - Severe difficulty in grasping/gripping. *Unless used with variants: Contoured handgrip*
  - Ability to use only one hand.
  - Severe difficulty in holding things.
  - Having had a fall in the past months or feeling at risk of falls.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Iced ground. *Unless used with variants: Ice ferrule*
  - Wet or slippery ground.
  - Low friction pavements.
- Other indicated factors

*Other factors or situations the product is intended to address:*
None specified.

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Ensure that the chosen equipment is suitable for the person's weight (check in the product documentation or with the provider what is the maximum person's weight the crutch can bear).
  - Ensure that the handgrips can be firmly held by the person.
  - In case the crutches are going to be used also on low-friction surfaces, a pivoting ferrule may be considered instead of the standard rubber tip.
  - In case the crutches are going to be used also on ice, provide an ice ferrule to replace the tip as needed.
- Points to be considered in product fitting
  - First, adjust the underarm pad height: the pad should be three-finger widths below the person's armpit, when the person is standing with shoulder relaxed and wearing shoes.
  - Second, adjust the handgrip height at wrist level, while the elbow stays relaxed with a slight bend (about 15°).
- Points to be considered in product use
  - When walking, footwear should be well fitted, secure on the feet and supportive.
  - When walking, place the crutches in front and slightly to the side of the body; push down on handgrips and step forward with the weaker (or only) leg; step forward with the stronger leg.
  - When going up stairs, step up with the stronger (or only) leg first; lift the crutches onto the step; step up with the weaker leg.
  - When going downstairs, place the crutches on to the step first; step down with the weaker (or only) leg; step down with the stronger leg.
  - When rising from a chair or bed, push up with the hands on the arms of the chair or on the bed and only take hold of the crutches once standing: don't lean on the crutches, as they are not stable enough to support; in case there is no place to lay the crutches while rising, hold them with the weaker side, so as to use the stronger side to push up.
  - When sitting down, stand in front of the chair or bed, with back of legs touching it, hold the crutches in one hand (on the weaker side), reach back with the free hand to hold onto the chair/bed and slowly sit down.
- Points to be considered in product maintenance / follow-up
  - Regularly inspect the ferrules and change them when worn.
  - Regularly inspect the handgrip and change it when worn.
  - Replace the crutches with new ones if the shaft is broken or damaged.
  - Carry out follow-up checks about every six months and in case the crutches seem to be not used any more, consider the following possible reasons: they are broken and need replacement; they have not been fit correctly; the user has not learned correct use; there are health problems affecting the user's mobility; the environment makes it difficult to use the device.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=120312

## 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.*

*ASPREX Fact Sheet*

# Fall detector

Body worn device detecting a user's fall and triggering an alert to someone who can help. Product features include a detector (which can be worn on the wrist or as a necklace or a belt), automatic detection of falls (sensor detects if person falls from upright position), automatic sending of alert to caregivers or emergency service, manual alert triggering false alarms can be cancelled , notification that an alert has been sent (notification can be an LED on device) and low battery notification. Possible variants include waterproofness and inclusion of a two-way intercom.

- Product Classification
  - APL (WHO Assistive Product Priority List): 13 (Fall detectors)
  - ISO 9999:2022: 222906 (Personal emergency alarm systems)
- Possible configuration variants
  - Gravity sensing fall detector.
  - Capability to transmit alerts over landline or cellular phone.
- Possible accessories or optional components
  - Compatibility with various alarm systems.
  - Compatibility with smartphones.
  - Waterproofness.
  - Inclusion of a two-way intercom.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Using communication devices and techniques [d360].
  - Changing body position [d410].
  - Walking [d450].
  - Transferring oneself [d420].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Consciousness functions [b110]. *Only if used with variants: Gravity sensing fall detector*
  - Vestibular functions [b235].
  - Speaking [d330].
  - Using communication devices and techniques [d360].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Incapability of living independently, with or without accommodations.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Indoors.
  - Outdoors. *Only if used with variants: Capability to transmit alerts over the phone, waterproofness*
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Areas where the device is out of range of the hub which transmits alerts to a monitoring center or caregiver.
- Other indicated factors

  *Other factors or situations the product is intended to address:*

    - Conditions making someone prone to falls (such as epilepsy, diabetes, or Parkinson's disease).
    - Having had a fall in the past months or feeling at risk of falls.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
    - While some fall detectors will send a message automatically, there is also the capability of communicating with a caregiver and/or emergency service.
    - Fall detectors use various kinds of sensors to detect a fall from a standing position; these sensors include gravity sensor technology with appropriate algorithms, inertia sensors and accelerometers.
    - The fall alert is a communication device that will send a message to a pre-selected caregiver and/or a subscription emergency service.
    - Most devices will communicate with a subscription service that can then alert a public emergency service such as 911 in the USA or 112 in the EU.
    - Some devices will call 911 in the USA automatically.
    - Many devices can send text or messages to phones of family or caregivers including cell phones.
    - There is a possibility of false alarms, i.e. indicating a fall when there is none specified.
    - There is also the possibility of not detecting a fall.
    - The person using a fall alert device should otherwise be capable of living independently with or without accommodations.
    - The person using a fall alert device should be comfortable wearing the device, either on the wrist, around the neck or on a belt.
- Points to be considered in product fitting
    - The device must be set up; this typically includes setting up the alerts so the correct people and caregivers and alerted when necessary.
    - The device must be properly connected to either a landline or cellular phone.
- Points to be considered in product use
    - The person using the device should be trained in the proper use of the device, especially the feature that enables the user to send an alert.
    - The person should be trained in the proper procedures for dealing with false alarms.
- Points to be considered in product maintenance / follow-up
    - Maintaining a good battery life.
    - Sensor should be tested regularly.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222906

## 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.*

*ASPREX Fact Sheet*

# Gesture to voice technology

Camera-based system to identify motion gestures (e.g., hand movements, facial expressions, and sign language, used by deaf persons to communicate), recognize them and translate them in real-time into speech. They can also perform the reverse function of translating from speech to gestures (sign language) communicated by an animated avatar on the screen. Internet pages, with integrated text to sign language translation technology options, may facilitate access to information for deaf and hearing-impaired signers who have no personal assistive technology.

Possible variants concern the recognition technique (which may also be a non-vision technology – based on sensors placed on the body or on a garment of the person, e.g. a special glove, that analyze the movement of the hand and arm – or an audio-based technology for speech to gesture conversion), the conversion from gesture to voice (which may also be from gesture to text), the conversion from voice to gesture (which may also be from speech to text, or from speech to text and gesture), the desk top version of the system (which can also be mobile version, on mobile phone, or tablet), the software (which can also be a plug-in for web pages, for the translation from text to sign language, include the alternate text images), the web cloud based support (which can also be missing, in which case the recognition system is installed on the device), and the bi-directionality (which can also be one-way conversion, from gesture to text, from gesture to spoken language, from text to sign language, or from spoken language to sign language).

- Product Classification
  - APL (WHO Assistive Product Priority List): 14 (Gesture to voice technology)
  - ISO 9999:2022: 222109 (Dialogue units)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Understanding gestures or sign language [d320].
  - Producing messages in sign language [d340].
  - Reading [d166].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Hearing [b230].
  - Listening [d115].
  - Understanding spoken words [d310].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Inability to understand sign language.
  - Deafblindness.
  - Motor difficulty that makes it difficult to interpret the gesture, the facial expression, or the sign language.

- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Noisy places (the accuracy of voice to gesture or voice to text recognition may be difficult in noisy environments).
  - Places with bad visual conditions (bad lighting, uneven background, and little contrast between the speakers' hands and face and the background).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Supporting conversation between people who use sign language and people who do not know it.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - Ensure that the user can adequately communicate with sign language, including fingerspelling.
  - Ensure that the gesture to text or to voice technology is available in the sign language of the user; be aware that the spoken language does not reflect the sign language (e.g., American Sign Language, ASL, is quite different from British Sign Language, BSL, even though English is the spoken language of both countries).
  - A mobile gesture to voice technology is suitable for signers that want to communicate with a talking person in the marketplace, workplace, schools, health care, and civic centers.
  - In case of cloud-based systems and mobile use, make sure that the place you want to use gesture to voice technology is covered by wireless internet access.
  - Select a voice or text to gesture system for deaf and hearing-impaired signers who have difficulties in reading and understanding written language.
  - The accuracy of the translation process of text to gesture technologies is very high, because it is less susceptible to negative interference of contextual factors like light, contrast, noise, or sound quality.
  - For mobile use of text to gesture technology, the user's device may be touched by unknown people and the user may be exposed to the virus.
  - Speech to text technologies are recommended if the user can read and understand written texts; free apps are easily available, also in different languages.
  - In case of video or telecommunication, select a software (ISO code 222424, telecommunication, and telematics software) with integrated voice to text translation and transcription (closed capturing) into the language the user can read and understand.
  - For gesture to text or to speech technologies, a hands-free communication is necessary, and the device camera must frame the hands; mobile use may be difficult, if there is no appropriate placement for the device.
- Points to be considered in product fitting
  - Ensure that the user can activate his gesture to voice technology.
  - In case of gesture to voice or to text technology to produce communication, ensure that the translation is accurate, if not, increase the environmental brightness, change the background, or try to sign slower.
  - In case of machine learning system, correct misinterpretations and teach the system to better interpret your personal sign language.
  - In case of voice to gesture technology to receive communication, check if the translation is accurate, if not, reduce the environmental noises, bring the device microphone nearer to the speaker, increase the microphone sensibility, and ask the speaker to speak louder, slower and one at a time.
  - In case of text to gesture technology to receive communication, check if the translation is accurate, if not, check if synonyms exist and add new words or synonym words to your personal system.
  - In case of voice to text technology to receive communication, check if the translation is accurate, if not, manually modify the misinterpretation and add the new words to your personal device system.

- Points to be considered in product use
    - If the voice to gesture technology is not working perfectly, try to change environmental factors to increase the functionally of your system.
    - If possible, continue to correct the misinterpretations and teach your system to make it work more accurately.
    - If you change your device on which you have installed the voice to gesture technology, make sure that all your personal adaptations will be transferred to the new device.
    - Place the camera or your device with a camera in a stable and safe place and ensure that it is properly oriented to frame your gestures.
    - For mobile use, ensure that your device is charged.
- Points to be considered in product maintenance / follow-up
    - Regularly clean the camera of your voice to gesture technology.
    - Frequent up-date of the software is recommendable.
    - Frequently up-date and back-up your personal adaptations to the voice to gestures technology.
    - In case of mobile device, control and charge the batteries when they are low.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222109

## 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.*

*ASPREX Fact Sheet*

# Global positioning system locator (GPS locator)

Small electronic device with software that receive signals from satellites to determine their precise location on earth. They can help a user in navigating safely in their surroundings more easily. The software or application installed in the device uses automated voice to give precise instructions and directions to users as they move around, which greatly assists them in reaching where they want to go. The GPS locator or tracker works by first determining a user's starting position and then keeps guiding the user about their route or path as they move. The software keeps updating the inbuilt maps to calculate positions more accurately. The information conveyed to the user may include the information about the nearby shops, bus stops, any road crossings, and calculates and informs the exact time required to reach the destination.

GPS locators or trackers can be available either as stand-alone devices or as part of smart phones, in both android and iOS (iPhone) applications. However, the GPS component of the software available in smartphones is considered more accurate as compared to stand-alone GPS trackers, as they continuously update the maps with the help of cell-phone towers also, as the user moves around. To provide further support to users, there are some GPS locators that have an added functionality of making an emergency call to a friend or relative in case a user loses their way. A button can be pressed by a user on their device, to connect either to an operator or any of their preferred contacts, who can then identify user's location and provide necessary assistance.

- Product Classification
  - APL (WHO Assistive Product Priority List): 15 (Global positioning system (GPS) locators)
  - ISO 9999:2022: 222912 (Localization and tracking systems)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Moving around in different locations [d460].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (blindness or severe low vision).
  - Memory functions [b144].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in hearing (the device usually provides audio directions and instructions).
  - Cognitive difficulty that may impact safe use and wayfinding.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Outdoors (usually GPS locators only work outdoors).
- Contraindicated environments

*Environments in which the product may be inappropriate:*

- Crowded or noisy places (where hearing the GPS tracker instructions may be difficult).
- Far off locations which are not shown on digital maps.
- Situations obstructing the GPS signals (such as places surrounded by tall building, bad weather, or indoors spaces of buildings that are not equipped with GPS repeaters).

- Other indicated factors

*Other factors or situations the product is intended to address:*

- Need for navigation assistance.
- Tracking the location in case the user gets lost.

- Other contraindicated factors

*Other factors or situations in which the product may be inappropriate:*
None specified.

- Points to be considered in product selection
  - Despite all the navigational utility provided by GPS locators, the information provided by the devices can be mainly categorized into three main things, which include the position of a user, the changing path or route as one moves, and the estimated time of travel.
  - There are various factors that one needs to consider while using GPS locators or trackers such as the situations in which these devices might not work effectively or might fail.
  - The GPS locators must receive signals from at least 4 satellites to function properly and therefor any location where adequate signals are unable to reach the device, which could be due to high-rise buildings or bad weather, the device would not work effectively.
  - Ensure that the device is water-resistant.
- Points to be considered in product fitting
  - There are several other challenges faced in using the technology such as the locators may have limited use in the developing countries, availability of an Internet service or access to Wi-Fi signals is must, a user must have a smart phone which many users in poor or developing countries, especially in the rural settings, might not have.
  - The technology is still relatively under-utilized in developing world. A user may use an earphone but then the earphones may suppress other sounds from the surroundings, which may be important for a user's safe mobility.
  - The availability of GPS services in local languages and dialects is limited; therefore, the user needs to understand the language of instructions.
  - In order to effectively use GPS locators, a person with blindness or vision impairment also needs to be trained for mobility.
  - The user must be trained to activate the device and set-up the correct information for the destination.
  - For better assistance in orientation, the users also need to be trained to integrate the GPS information with other environmental information such as weather conditions.
- Points to be considered in product use
  - The satellite signals can be blocked by thick concrete walls or metals.
  - As GPS locators are electronic devices, they are battery powered and so the device must have fully functional and charged battery to assist the user consistently.
  - A GPS locator does not inform the user about any obstacles or barriers in their path, which means that even though devices can greatly help in navigation, they cannot, provide safety to the users.
  - The devices are battery operated and therefore a special caution is required to ensure the batteries are fully charged before going outdoors or travelling.
  - Most GPS devices are hand-held. There is a chance of them getting damaged if they fall, especially when users are travelling. Securing the device by some kind of strap (either hanging them from neck or fastening to one's wrist) can help.
- Points to be considered in product maintenance / follow-up
  - Users need to ensure the batteries are always charged properly and are not over charged.
  - A spare set of batteries must be available, or they must be replaced through vendors at the defined time.

- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222912

## 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.*

*ASPREX Fact Sheet*

# Handrail

Continuous rail fixed to a sidewall to allow the person firmly grabbing and thus provide lateral support while walking or climbing stairs; it can accommodate for any length of the walking path and follow any wall conformation by straight, rounded and angled sections. The materials used in the framework may include metal, plastic, wood or other materials.

- Product Classification
  - APL (WHO Assistive Product Priority List): 16 (Handrails/grab bars)
  - ISO 9999:2022: 181803 (Handrails and support rails)
- Possible configuration variants
  - Coating (which may be textured or made of metal, plastic, epoxy or other materials).
  - Reflective or high-contrast surfaces (to increase identifiability for people with low vision).
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Walking [d450].
  - Maintaining body position [d415].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450].
  - Seeing [b210] (difficulty in orientation while walking).
  - Muscle power functions [b730].
  - Stability of joint functions [b715].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe difficulty in grasping/gripping. *Unless used with variants: Coating*
  - Ability to use only one leg.
  - Severe arms weakness.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Wall-bordered paths.
  - Stairs.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Weak walls.
  - Walls lacking points where the rail can be safely fixed to bear the person's weight.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Having a wounded foot or being at risk of developing wounded feet (due for instance to diabetes; in which case one should never hop on the wounded foot).

- Points to be considered in product selection
    - The handrail must be safe, which means stable, irremovable, not deformable, supporting the person's weight when walking or resting, and able to bear the user's pushing/pulling force when clinging or falling.
    - An unsafe handrail is a potential source of accidents rather than a facilitator.
    - The handrail safety depends on three factors: the technical quality of the selected product item, the characteristic of the walls where the handrail is going to be installed, and the expertise of the person who is going to install it.
    - When selecting the product item, always check the product documentation to find out the technical quality data and the installation instruction.
    - Good quality traditional masonry and bricks should cause no problems if the recommended fixtures and procedures are followed.
    - A plasterboard or tiled surface should not affect the fixing, although ensure that the whole depth of the fixing is supported by the masonry.
    - Most dense concrete blocks are strong enough to support rails; however, care should be taken as their composition may make it difficult to drill a straight hole through them.
    - If the wall is made of lightweight, aerated and hollow brickwork, even the most appropriate fixings may not be able to withstand the loads that can be suddenly applied to the rails.
    - The insides of the hollow blocks are often filled with a polystyrene type insulating material, which will not provide enough support for fixtures screwed into it.
    - Aerated concrete blocks, which are often used in bathrooms and toilets as the waste pipes are carried through their cavities, are made of a very lightweight substance, which limits their fixing support qualities; supporting fixtures should be attached to this type of wall using specific wall mounted support products or battens.
    - Even if a partition or stud wall is physically strong and stable and has a suitable flat surface to take a handrail, the addition of a pattress or backboard on the wall is advised when fixing a grab rail to it; this should be a flat, unknotted piece of wood, which is screwed into the vertical joining pieces of the partitions.
    - Particular care should be taken when attaching rails to domestic sandwich partitions, e.g. plasterboard with a hardboard facing.
    - Fixing to UPVC plastic door frames should be avoided, as the frames are unlikely to have the necessary internal materials in the required area to support a grab rail's fixings.
    - When rails are installed outside or in a bathroom and are likely to become wet, consider using brass or chromium-plated screws to avoid the formation of unsightly rust stains.
    - Make sure to have a person who will be able to carry out the installation in a perfect manner.
    - If you are unsure of the construction of your home, you should seek the advice of a builder; they may also be able to advise you, and fit rails if suitable.
    - The installer should ensure there is no possibility that any metal part that may be touched by you, including fixing screws, will come into contact with electric cabling.
    - Choose the handrail coating based on your gripping ability, comfort perception, heat / cold sensitivity and aesthetics; especially if the handrail is placed in outdoor spaces or exposed to high or low temperature, a plastic or epoxy coating may be necessary.
    - Once all points above have been addressed, the physical shape and the path of the handrail should be designed: this will allow calculation of the exact number of components, spare parts and consumables that is needed for installation.
- Points to be considered in product fitting
    - The handrail height should be between 900-1000 mm above ground, or above the pitch line of the stairs, which is the same height as normal banisters.
    - A different height may be chosen depending on specific user's needs; however, as a handrail - once installed - tends to be used by more people (family members, visitors etc.), for safety reasons it is recommended to install it at a standard height and provide a second parallel handrail at custom height (e.g. 750 mm above the ground, which is suitable to children or people using wheelchairs).
    - The handrail should have a fixing at least every 1000 mm and no more than 150 mm from each end; it may require mounting on a pattress or backboard to ensure stable and safe support.

    - When used on stairs, it is recommended that the handrail is run continuously from the bottom to the top of your flight of stairs, including going around the edge of any intervening landings and across window openings; the handrail should be allowed to continue past the top and bottom steps at least by 300mm.
- Points to be considered in product use
    - If the user happens to experience losses in the hand's strength, or pain in the hands or wrist or elbows or shoulder, his or her gripping ability may be temporarily hindered; additional support by another person may be advisable.
- Points to be considered in product maintenance / follow-up
    - Regularly clean and sanitize the handrail.
    - Regularly inspect the handrail stability and safety: if any component shows deformation, breaks, unscrewing or detachment, repair should be carried out immediately.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=181803

## 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.*

*ASPREX Fact Sheet*

# Fixed grab rail

Straight (or angled or square-angled) bar fixed to a side wall to allow the person to firmly grab and thus provide support while standing or transferring from one position to another, for instance to enter a bathtub or a shower or moving from the wheelchair to a bed. It can be made of metal, plastic, wood or other materials.

- Product Classification
  - APL (WHO Assistive Product Priority List): 16 (Handrails/grab bars)
  - ISO 9999:2022: 181806 (Fixed grab bars and handgrips)
- Possible configuration variants
  - Coating (which may be textured or made of metal, plastic, epoxy or other materials).
  - Folding drop-down bar (wall-fixed grab rail that can be folded away when needed to free the passage).
  - Floor-to-wall or floor-to-ceiling grab bar.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Changing body position [d410] (standing up or sitting down).
  - Maintaining body position [d415].
  - Transferring oneself [d420].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Changing body position [d410] (difficulty in standing up or sitting down).
  - Transferring oneself [d420].
  - Muscle power functions [b730].
  - Stability of joint functions [b715].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe difficulty in grasping/gripping. *Unless used with variants: Coating*
  - Severe arms weakness.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Wall-bordered paths.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Weak walls.
  - Walls lacking points where the rail can be safely fixed to bear the person's weight.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Having had a fall in the past months or feeling at risk of falls.
  - Poor balance and strength.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
    - Select the shape and the size of the grab rail depending on your personal transfer needs and techniques, your height and weight, and the amount of mobility and strength you have in your hands, arms and shoulders.
    - Knowing and mastering the transfer techniques that are most effective for the individual case (whether in the bathroom or in the sleeping rooms or in other situations) is a prerequisite for appropriate selection, as different techniques may involve different grab rail shapes and positioning; in case the user is uncertain about the best technique, consulting an experienced professional is strongly recommended.
    - The grab rail must be safe, which means stable, irremovable, not deformable, supporting the person's weight when walking or resting, and able to bear the user's pushing/pulling force when clinging or falling.
    - An unsafe grab rail is a potential source of accidents rather than a facilitator.
    - The grab rail safety depends on three factors: the technical quality of the selected product item, the characteristic of the walls where the grab rail is going to be installed, and the expertise of the person who is going to install it.
    - When selecting the product item, always check the product documentation to find out the technical quality data and the installation instruction.
    - Good quality traditional masonry and bricks should cause no problems if the recommended fixtures and procedures are followed.
    - A plasterboard or tiled surface should not affect the fixing, although ensure that the whole depth of the fixing is supported by the masonry.
    - Most dense concrete blocks are strong enough to support rails; however, care should be taken as their composition may make it difficult to drill a straight hole through them.
    - If the wall is made of lightweight, aerated, and hollow brickwork, even the most appropriate fixings may not be able to withstand the loads that can be suddenly applied to the rails.
    - The insides of the hollow blocks are often filled with a polystyrene type insulating material, which will not provide enough support for fixtures screwed into it.
    - Aerated concrete blocks, which are often used in bathrooms and toilets as the waste pipes are carried through their cavities, are made of a very lightweight substance, which limits their fixing support qualities; supporting fixtures should be attached to this type of wall using specific wall mounted support products or battens.
    - Even if a partition or stud wall is physically strong and stable and has a suitable flat surface to take a grab rail, the addition of a pattress or backboard on the wall is advised when fixing a grab rail to it; this should be a flat, unknotted piece of wood, which is screwed into the vertical joining pieces of the partitions.
    - Particular care should be taken when attaching rails to domestic sandwich partitions, e.g. plasterboard with a hardboard facing.
    - Fixing to UPVC plastic doorframes should be avoided, as the frames are unlikely to have the necessary internal materials in the required area to support a grab rail's fixings.
    - When rails are installed outside or in a bathroom and are likely to become wet, consider using brass or chromium-plated screws to avoid the formation of unsightly rust stains.
    - Make sure to have a person who will be able to carry out the installation in a perfect manner.
    - If you are unsure of the construction of your home, you should seek the advice of a builder; they may also be able to advise you, and fit rails if suitable.
    - The installer should ensure there is no possibility that any metal part that may be touched by you, including fixing screws, will come into contact with electric cabling.
    - Choose the grab rail coating based on your gripping ability, comfort perception, heat / cold sensitivity and aesthetics; especially if the grab rail is placed in outdoor spaces or exposed to high or low temperature, a plastic or epoxy coating may be necessary.
- Points to be considered in product fitting
    - Make sure that the grab rail is positioned in such a way to provide the best support that is consistent with your transfer technique.
- Points to be considered in product use
    - If you happen to experience losses in hand strength, or pain in the hands or wrist or elbows or shoulder, your gripping ability may be temporarily hindered; additional support by another person may be advisable.

- Points to be considered in product maintenance / follow-up
  - Regularly clean and sanitize the grab rail.
  - Regularly inspect the grab rail stability and safety: if any component shows deformation, breaks, unscrewing or detachment, repair should be carried out immediately.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=181806

## 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.*

*ASPREX Fact Sheet*

# Suction grab rail

Straight or square-angled bar installed onto a side wall by means of suction caps to allow the person firmly grab and thus provide support while standing or transferring from one position to another, for instance to enter a bathtub or a shower or moving from the wheelchair to a bed; the grab bar can be removed by loosening the cups and relocated in other places. The framework may be made of metal, plastic, wood or other materials.

- Product Classification
  - APL (WHO Assistive Product Priority List): 16 (Hand rails/grab bars)
  - ISO 9999:2022: 181810 (Removable grab rails and handgrips)
- Possible configuration variants
  - Coating (which may be textured or made of metal, plastic, epoxy or other materials).
  - Number of suction cups: more or less than two.
  - Junction between the suction cup and the rail: articulated to be fixed on a corner.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Changing body position [d410] (standing up or sitting down).
  - Maintaining body position [d415].
  - Transferring oneself [d420].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Changing body position [d410] (difficulty in standing up or sitting down).
  - Transferring oneself [d420]
  - Muscle power functions [b730].
  - Stability of joint functions [b715].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe difficulty in grasping/gripping. *Unless used with variants: Coating*
  - Severe arms weakness.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Wall-bordered paths.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Weak walls.
  - Walls lacking points where the rail can be safely fixed to bear the person's weight (such as uneven surfaces, small tiles, structured tiles, or drywall).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Having had a fall in the past months or feeling at risk of falls.
- Other contraindicated factors

*Other factors or situations in which the product may be inappropriate:*
None specified.

- Points to be considered in product selection
    - Suction grab rails are only intended to assist transfer with balance: they are not as weight bearing as the fixed grab rails.
    - An unsafe grab rail is a potential source of accidents rather than a facilitator.
    - Select the shape and the size of the grab rail depending on your personal transfer needs and techniques, your height and weight, and the amount of mobility and strength you have in your hands, arms, and shoulders.
    - Knowing and mastering the transfer techniques that are most effective for the individual case (whether in the bathroom or in the sleeping rooms or in other situations) is a prerequisite for appropriate selection, as different techniques may involve different grab rail shapes and positioning; in case the user is uncertain about the best technique, consulting an experienced professional is strongly recommended.
    - The grab rail safety depends on the technical quality of the selected product item (including the bar itself, the bar supports and the suction cups) and the walls where it is going to be installed.
    - Suction grab rails attach to a smooth surface by forming a strong suction grip at each end; a suitable suction can be only obtained on smooth tiled walls.
    - Choose the grab rail coating based on your gripping ability, comfort perception, heat / cold sensitivity, and aesthetics.
- Points to be considered in product fitting
    - Make sure that the wall is dry and clean before applying the suction cups.
    - Make sure that the grab rail is positioned in such a way to provide the best support that is consistent with your transfer technique.
- Points to be considered in product use
    - If you happen to experience losses in the hand's strength, or pain in the hands or wrist or elbows or shoulder, your gripping ability may be temporarily hindered; additional support by another person may be advisable.
- Points to be considered in product maintenance / follow-up
    - Regularly clean and sanitize the grab rail.
    - Regularly inspect the grab rail stability and safety: if the cups loose suction, remove the grab rail, clean accurately the wall surface and reinstall the rail again; if the cups or other components show deformation or breaks, repair or change the grab rail.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=181810

## 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.*

*ASPREX Fact Sheet*

# In-the-canal hearing aids (ITC)

Device for receiving, amplifying, and modulating environmental sound and voices for a person with hearing problems. An in-the-canal hearing aid can be worn in the ear canal. An in-the-ear hearing aid is a digital electronic device with different electronic components housed in a very small custom-made case. The main components are microphone, amplifier circuitry, sound processor, miniature loudspeaker/receiver, and battery. In-the-canal hearing aids carry sounds from the environment into the ear, make low sounds louder, loud sounds more comfortable, and modulate them. In-the-ear hearing aids are custom made (worn at the entrance of the era canal) and powered with a small hearing aid battery.

Possible configuration variants concern the dimensions and how deep the device is placed into the ear canal (complete-in-the-canal or CIC, worn in the first part of canal or invisible-in-the-canal or IIC or mini-CIC, worn in the middle of the ear canal), and batteries (replaceable or rechargeable).

- Product Classification
  - APL (WHO Assistive Product Priority List): 17 (Hearing aids (digital) and batteries)
  - ISO 9999:2022: 220612 (In-the-ear hearing aids)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Noise reduction.
  - No manual controls (such as volume wheels or program button on the apparatus, adjustments need to be made via a dedicated external device).
  - Wireless connectivity (can be connected to smartphone).
  - Remote controls.
  - Variable programming.
  - Bluetooth connectivity.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Hearing [b230].
  - Listening [d115].
  - Understanding spoken words [d310].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Hearing [b230] (any type of unilateral or bilateral mild to moderate hearing loss).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe hearing loss (due to the very small dimension, very small batteries, and limited amplification).
  - Temporary hearing loss that can be completely treated by medical intervention that will restore normal hearing (due e.g., to earwax small object occlusion).
  - Difficulty in fine hand use.
  - Profound hearing loss (due to the very small dimension, very small batteries, and limited amplification).
- Indicated environments

*Specific environments in which the product should be used:*
None specified.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Underwater.
  - Windy places (strong wind may create noises because the microphone is not protected).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Need to connect to inductive hearing loops (the product has no telecoil sensor integrated).
  - Use by children.
- Points to be considered in product selection
  - Before selecting an in-the-canal hearing aid, ensure that the hearing loss is not due to a removable obstacle in the ear canal.
  - Hearing assessment (audiogram) and diagnostic of hearing are necessary for adequate and personalized selection of an in-the-ear hearing aid.
  - Digital in-the-canal hearing aids are suitable for any kind of hearing loss (conductive, sensorineural, and mixed); they improve mild to moderate hearing loss (due to less powerful amplification) mainly for adults (not for children); they are easy to clean.
  - An in-the-canal (ITC) hearing aid is custom molded, suitable for all kind of hearing loss (conductive, sensorineural, mixed, improve mild), and improve mild to moderate hearing loss in adults, but it is not indicated for children. It is less likely to pick up wind noise and it is partially visible in the ear. It uses small batteries with shorter life (batteries exchange or recharge more frequently) and can be difficult to handle (not suitable for dexterity issues or grasping limitation. They are some features on the apparat, but it may be difficult to adjust due to its small size. The in-the-canal hearing aid is susceptible to earwax clogging the speaker.
  - The smallest version of in the canal hearing aids, the invisible-in-the-canal devices (IITC), cannot be connected to a smartphone app, as it is placed deep inside the ear. It is suitable for user wearing helmets, headphones, or headgear. It is susceptible to earwax clogging the speaker and is unsuitable for users with dexterity issues, or potentially with visual impairments.
  - Consider the cost of hearing aid batteries when they need to be replaced; in-the-ear device batteries have shorter battery life, batteries must be available.
  - Rechargeable batteries are recommended if daily access to electric current is guaranteed; choose extra rechargeable batteries if daily access is not guaranteed or power bank recharger.
  - Choose extra rechargeable batteries if daily access is not guaranteed or power bank recharger.
  - For hearing loss associated to tinnitus, select in-the-canal hearing aid with tinnitus masking.
  - Ensure that the device is programmable and contains programs for noise reduction and for the sound scenery of the environment where the device will be used.
  - For use in connection to smart phones, ensure that the in-the canal hearing aid is equipped with a Bluetooth technology connectible to iOS and Android phones, televisions, tablets, and other favorite audio devices.
  - Once all points above have been addressed, the style of the in-canal ear hearing aid and level of amplification be identified: this will allow calculation of the price class of the hearing aid and the various features required.
- Points to be considered in product fitting
  - The in-the-canal hearing aid must stay firmly and comfortable in the ear canal.
  - An impression of the ear canal is needed for custom made in the canal hearing aids; the in-the-canal must fit perfectly and comfortable in the canal.
  - The volume (gain) remote control is used to adjust the amount of amplification needed for linear hearing loss (same gain for all frequency).

- Different amplification for different frequency loss (low, middle, high) should be adjusted by an audiologist or a hearing aid specialist, able to modify the software parameters of the digital sound processor; In-the-canal hearing aids should be especially programmed to match the results of the users hearing test.
- Ensure that the user can switch on/off the hearing aid, manage the remote-control function, fit the device in the canal and take it off.
- Ensure that the user can change the battery or recharge correctly the batteries, can clean and dry the hearing aid, and can store the device correctly when not used.
- Ensure that left and right hearing aid are easily distinguishable in case of bilateral hearing loss.

- Points to be considered in product use
  - If the user does not use the hearing aid (for example at night), carefully store them, always in the same place, carry them in a special case (for blind or visually impaired user tactile markers may be needed on the case for left and right device), and keep it away from heat or heat sources, as they can damage the device.
  - Charge batteries during the night.
  - Do not use hearing aids underwater.
  - Ensure that batteries have enough charge during use; backup battery are recommended.
- Points to be considered in product maintenance / follow-up
  - Regularly (daily) clean the device, dry them accurately.
  - Regularly control if batteries are charged or need to be exchanged.
  - Regularly inspect the fitting in the canal and sure a firm fitting.
  - In case of frequent sound feedback issues (hearing aid starts whistling), consult a hearing aid center for technical control.
  - In case of increased problems with listening or understanding, repeat a hearing test and a functional test of the hearing aid.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=220612

## 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.*

*ASPREX Fact Sheet*

# In-the-ear hearing aid (ITE)

Device for receiving, amplifying, and modulating environmental sound and voices for a person with hearing problems. An in-the-ear hearing aid is worn within the ear. An in-the-ear hearing aid is a digital electronic device with different electronic components housed in a small custom-made case. The main components are microphone, amplifier circuitry, sound processor, miniature loudspeaker/receiver, and battery. In-the-ear hearing aids carry sounds from the environment into the ear, make low sounds louder, loud sounds more comfortable, and modulating incoming sounds. The body interface case of in-the-ear hearing aids are custom made (worn in the bowl-shaped area of your outer ear) and powered by a small hearing aid battery.

Possible configuration variants concern the dimensions (full shell, worn in the bowl-shaped area of the outer ear, or half shell, worn in the lower part of the outer ear), and the batteries (replaceable or rechargeable).

- Product Classification
  - APL (WHO Assistive Product Priority List): 17 (Hearing aids (digital) and batteries)
  - ISO 9999:2022: 220612 (In-the-ear hearing aids)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Environmental noise reduction.
  - Directional microphones.
  - Connectivity to FM systems (ISO 22.18.24).
  - Telecoil sensor (also called T-coil sensor or T-switch, for connection to hearing loop (ISO 22.18.30)).
  - Wireless connectivity (can be connected to smartphone).
  - Remote controls.
  - Variable programming.
  - Tinnitus masking.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Hearing [b230].
  - Listening [d115].
  - Understanding spoken words [d310].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Hearing [b230] (any type of unilateral or bilateral mild to severe hearing loss).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Profound hearing loss.
  - Temporary hearing loss that can be completely treated by medical intervention that will restore normal hearing (due e.g., to earwax small object occlusion).
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Underwater.
  - Windy places (strong wind may create noises because the microphone is not protected).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Use by children.
- Points to be considered in product selection
  - Before selected an in-the-ear hearing aid, ensure that the hearing loss is not due to a removable obstacle in the ear canal.
  - Hearing assessment (audiogram) and diagnostic of hearing are necessary for adequate and personalized selection of an in-the-ear hearing aid.
  - An in-the-ear (ITE) hearing aid is custom moulded. It is suitable for any kind of hearing loss (conductive, sensorineural, mixed), and it improves mild to severe hearing loss in adults. It is suited to users with dexterity issues or visual impairment. It is not suitable for children.
  - Recharging batteries (rechargeable model) is easier than replacing the battery (replaceable model).
  - Rechargeable batteries are recommended if daily access to electric current is guaranteed; choose extra rechargeable batteries if daily access is not guaranteed or power bank recharger.
  - Consider the cost of hearing aid batteries when they need to be replaced; in-the-ear device batteries have shorter battery life, thus batteries must be available.
  - In-the-ear hearing aids are not indicated for very windy environments.
  - In-the-ear hearing aids are available in a range of colours to match with user's skin tone.
  - For hearing loss associated to tinnitus, select in-the-ear hearing aid with tinnitus masking.
  - Ensure that the device is programmable and includes programs for noise reduction and for the sound scenery of the environment where the device will be used.
  - For use in connection to smart phones, ensure that the hearing aid is equipped with a Bluetooth technology connectable to iOS and Android phones, televisions, tablets, and other favourite audio devices.
  - Once all points above have been addressed, the style of the in-the-ear hearing aid and level of amplification should be identified: this will allow calculation of the price class of the hearing aid and the various features required.
  - Different amplification for different frequency loss (low, middle, high) should be adjusted by an audio metrist or a hearing aid specialist, able to adjust the software parameters of the digital sound processor. The in-the-ear hearing aids will be especially programmed to match the results of the user's hearing test.
- Points to be considered in product fitting
  - The in-the-ear hearing aid must stay firmly and comfortable in the out ear.
  - An impression of the outer ear is needed for customizing the in the ear hearing aids.
  - The volume control (directly or remote) is used to adjust the amount of amplification needed for linear hearing loss (same gain for all frequency).
  - Ensure that the user can switch on/off the hearing aid, manage the control function, fit the device in the ear or in the canal and take it off.
  - Ensure that the user (or care giver) can change the battery (replaceable model) or recharge the batteries correctly (rechargeable model), clean and dry the hearing aid, and store the device correctly when not used.
  - Ensure that left and right hearing aid are easily distinguishable in case of bilateral hearing loss.
- Points to be considered in product use
  - If the user does not use the hearing aid (for example at night) carefully store them, always in the same place, carry them in a special case (blind or visually impaired users need tactile markers for distinguishing left and right device) and place it far from heat or heat sources, as they may damage the device.
  - Ensure that the batteries have enough charge during use; reserve battery are recommended.

- Charge batteries during the night.
- In noisy environment, choose specific program.
- Do not use hearing aids in water.
- When activating the T-Coil switch for use of hearing loop system (ISO 22.18.30), remember that the hearing aid microphone is switched off; remember to switch off T-coil function, when leaving the inductive loop area.

- Points to be considered in product maintenance / follow-up
  - Regularly (daily) clean the device, dry them thoroughly.
  - Regularly control if batteries are charged or need to be replaced.
  - Regularly inspect the product firmly fits in the ear.
  - In case of frequent sound feedback issues (hearing aid starts whistling), consult a hearing aid center for technical control.
  - In case of increased problems with listening or understanding, repeat a hearing test and a functional test of the hearing aid.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=220612

## 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.*

*ASPREX Fact Sheet*

# Behind-the-ear hearing aid (BTE)

Digital battery-powered devices for receiving, amplifying, and modulating environmental sound and voices, with different electronic components (microphone, amplifier circuitry, miniature loudspeaker/receiver, sound processor, and battery), housed in a plastic case, worn behind the ear. Behind-the-ear hearing aids carry sounds from the environment into the ear, with a thin transparent plastic tube to a custom-made silicon ear mold, make low sounds louder, make loud sounds more comfortable, and modulate them. Common behind-the-ear hearing aid features are environmental noise reduction, directional microphones, rechargeable batteries, feedback suppression, T-coil / telephone switch for connection with hearing loop (ISO 22.18.30), connectivity to FM systems (ISO 22.18.24), wireless connectivity, remote controls, variable programming, tinnitus masking, different colors, and headband (for placing the device in the headband).

Possible variants concern the dimensions of the case (can be also a mini behind-the-ear, worn on-the-ear), the type of the ear mold (can be also non-customized), the size of the ear mold (can be also small), the style how the sound reach the ear canal (can be also receiver in the ear canal), the fitting (can be also open fitting, connected to a tip that sits within the ear canal without blocking the ear canal completely), the batteries (which can be also rechargeable), the power of batteries (can be also powerful batteries for so called power behind the ear hearing aids), and the operating system (can be also analogue without sound processor and less options).

- Product Classification
  - APL (WHO Assistive Product Priority List): 17 (Hearing aids (digital) and batteries)
  - ISO 9999:2022: 220615 (Behind-the-ear hearing aids)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Hearing [b230].
  - Listening [d115].
  - Understanding spoken words [d310].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Hearing [b230] (any type of unilateral or bilateral mild, moderate, severe, or profound hearing loss, which may or may not be medically treatable).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Temporary hearing loss that can be completely treated by medical intervention that will restore normal hearing (due e.g., to earwax small object occlusion).
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.

- ## Contraindicated environments

  *Environments in which the product may be inappropriate:*

  - Underwater.

- ## Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.

- ## Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- ## Points to be considered in product selection

  - Before selecting a behind-the-ear hearing aid, ensure that the hearing loss is not due to a removable obstacle in the ear canal.
  - Hearing assessment (audiogram) and diagnostic of hearing are necessary for adequate and personalized selection of a hearing aid.
  - Digital hearing aids are for sensorineural hearing loss, conductive hearing loss, mixed hearing loss, and for every degree of hearing impairment or loss (deafness).
  - For conductive hearing loss, both analog and digital hearing aids can be selected; analog devices have fewer possibilities to modulate and adapt the incoming sound.
  - A behind-the-ear (BTE) hearing aids is suitable for any kind of hearing impairment (conductive, sensorineural, mixed), and improves every degree of hearing loss (mild, moderate, severe, profound). It is suitable for all edges (children to adults), and it is simple to use. It is more affordable than smaller styles of hearing devices and has long battery life. It is easy to clean, is easy to handle, is less susceptible to damage, and is more visible than in-the-ear and in-the canal devices.
  - Replacing the battery is easy (due to the bigger size of the case).
  - Due to the position, a behind-the-ear device can pick up more wind noise.
  - The configuration of a power behind-the-ear aid, with powerful battery, can be also suitable for severe and profound hearing impairment or loss (deafness).
  - The custom-made ear mold of a behind-the-ear hearing aid fits safely, is suitable also for children, but can cause occlusion; custom-made ear mold services must be available and accessible.
  - If custom-made ear mold services are not available, a receiver-in-canal (RIC) and a receiver-in-the-ear (RITE) hearing aid configuration can be suitable.
  - Non-custom-made dome available in different shapes and sizes is easy to clean and to change.
  - The receiver-in-canal device (RIC) and the receiver-in-the-ear device (RITE) configuration style is not recommended for users with severe to profound hearing impairment or loss (deafness), is susceptible to earwax clogging the speaker, is difficult to handle and to adjust (due to smaller parts), is not suitable for people with dexterity issues or grasping limitation and is not suitable for children.
  - Consider the cost of hearing aid batteries when they need to be replaced; batteries must be available.
  - Rechargeable batteries are recommended if daily access to electric current is guaranteed; choose extra rechargeable batteries if daily access is not guaranteed or power bank recharger.
  - A behind-the-ear hearing aid with tinnitus masking is suitable for hearing loss associate with tinnitus.
  - For person without or deformed auricle, the behind-the-ear hearing aid can be fixed with a hand band.
  - To prevent loss and damage caused by falling, select a behind-the-ear hearing aid that offers the possibility to attach a retention cord with a clip for fixing on collar; a retention cord is recommended especially for children and people with multiple disabilities.
  - Ensure that the device is programmable and contains programs for noise reduction and for the sound scenery of the environment where the device will be used.
  - Ensure that the device has a Telecoil (T-coil) / telephone switch for use in places equipped with a telecoil transmission system like in church, theater, and airport.
  - For use with smartphones, ensure that the hearing aid is equipped with a Bluetooth technology connectible to iOS and Android phones, televisions, tablets, and other favorite audio devices.
  - Skin or hair-colored cases are less visible; colored cases can meet personal preferences.

- Once all points above have been addressed, the style of the behind-the-ear hearing aid, type of the receiver, and level of amplification should be identified: this will allow calculation of the price class of the hearing aid and the various features required.

- Points to be considered in product fitting
  - The behind-the-ear hearing aid must stay firmly behind the ear, the tube or wired connected the earpiece must be not too short and not too long.
  - An impression is needed for custom-made ear molds; the silicon or plastic ear mold must fit perfectly and comfortable in the entrance of the ear canal.
  - For in the ear or in the canal receiver choose the best fitting dome related to the person's ear canal.
  - The volume (gain) control is used to adjust the amount of amplification needed for linear hearing loss (same gain for all frequency).
  - Different amplification for different frequency loss (low, middle, high) should be adjusted by an audio metrist or a hearing aid specialist, able to modify the software parameters of the digital sound processor; behind-the-ear hearing aids should be especially programmed to match the results of the users hearing test.
  - Audiometric vocal testing with the selected hearing aid is important to evaluate hypoacusis and therefore to the prescription of a hearing aid; the speech banana is a helpful tool for adaptation of the hearing aid to the specific hearing loss.
  - Ensure that the user can switch on/off the hearing aid, can manage the control function, fit the device in the ear or in the canal and take it off.
  - Ensure that the user (or caregiver) can replace or recharge correctly the batteries, can clean and dry the ear mold or dome, and can store the device correctly when it is not used.
  - In case of bilateral hearing loss with different amplification profile for left and right ear, ensure that left and right hearing aid are easily distinguishable.
- Points to be considered in product use
  - If the user does not use the hearing aid (for example at night), carefully store them, always in the same place, carry them in a special case (for blind or visually impaired user tactile makers may be needed on the case for left and right device), and keep it away from heat or heat sources, as they can damage the device.
  - At night, it is advisable to leave the battery compartment open for better drying; keep the device always dry.
  - Charge batteries during the night.
  - Do not use hearing aids underwater.
  - Ensure that batteries have enough charge during the use, backup battery are recommended.
  - In noisy environment, choose specific program for noise reduction.
- Points to be considered in product maintenance / follow-up
  - Regularly (daily) clean the ear mold, the transparent tube, or the dome, dry them accurately.
  - Regularly control if batteries are charged or need to be exchange.
  - Regularly inspect the firmly fitting of the custom-made ear mold (the ear form can change especially in children).
  - In case of frequent sound feedback issues (hearing aid starts whistling), consult a hearing aid center for technical control.
  - In case of increased problems with listening or understanding, repeat a hearing test and a functional test of the hearing aid.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=220615

## 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.*

*ASPREX Fact Sheet*

# Hearing loop (Induction loop amplifier)

Device for receiving or transmitting audio information using magnetic, wireless signal in induction loop systems, that is picked up by the hearing aid when it is set to the T-position (Telecoil setting). An induction hearing loop consists of a microphone to pick up the spoken word; an amplifier (driver) which processes the signal which is then sent through the final piece; the loop cable, a wire placed in the perimeter beneath the room's carpeting or flooring in a facility (i.e. a meeting room, a church, a service counter), which acts as an antenna that magnetically transfers the sound signals to the hearing aids and cochlear implants with Telecoil (T-coil) receiver (sensor). Inductive hearing loops are not visible: for this reason, a specific sign (symbol of the ear with diagonal line and T letter) must inform the user that an inductive hearing loop facility is installed, available, and connected to an active microphone or audio system.

Possible configuration variants concern the dimensions of the induction loop aerial, where the magnetic signal can be received (which can be for a specific area of a room, or around the entire room, e.g. theatres, classrooms, auditoriums, place of worship), the quantity of hearing aids that can receive the signal (which can be also for an one-to-one situation, e.g. bank counters, ticket offices and supermarket checkouts), the installation (which also can be also portable and battery powered), the connectivity (which can be also connected to the room audio system); loop and driver can be also integrated in the machines (e.g. ticket machines, door entry intercoms and supermarket checkouts).

- Product Classification
  - APL (WHO Assistive Product Priority List): 18 (Hearing loops/FM systems)
  - ISO 9999:2016: 221830 (Induction loop devices)
- Possible configuration variants
  - Connectivity to room audio systems.
  - Portable and battery powered.
- Possible accessories or optional components
  - Specific sign (symbol of the ear with diagonal line and T letter).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Hearing [b230].
  - Listening [d115].
  - Understanding spoken words [d310].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Hearing [b230].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Indoors.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Adjacent rooms with hearing loop (due to spill-over effect).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Cutting out unwanted background noise into a hearing aid.
  - Sending audio information directly to hearing aids or cochlea implants with integrated T-coil sensor.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Wearing a hearing aid without telecoil sensor (such as complete-in-the-canal or invisible-in-the-canal hearing aids).
- Points to be considered in product selection
  - Before selecting a hearing loop system, define the dimension of the area to connect to the induction loop.
  - Through the loop, the sound goes directly into the hearing aid: it can be used by anyone with a compatible hearing aid, it is inconspicuous and unobtrusive with "T" coil hearing aids or cochlear implants, it is cost effective, and any number of users can use the system installed in public facilities.
  - If a hearing loop is added to an existing audio system, ensure that the selected product is compatible and connectable to the existing audio system; ensure that the induction loop wire can be placed beneath the room's carpeting or flooring in a facility, behind the skirting, or on the ceiling.
  - Ensure that the loop aerial, where the installation is planned, is free from metal elements, power lines, and devices with a strong magnetic field that may interfere with the magnetic signal of the hearing loop system.
  - In case of installation of two or more loops in the same facility, ensure that the distances between the loops are large enough to avoid magnetic field interference.
  - Device-integrated hearing loops must be integrated during the construction of the device, be certified by the manufacturer, and be labeled with a Telecoil symbol.
  - If the place where the hearing loop system is needed changes frequently, select a portable hearing loop system.
- Points to be considered in product fitting
  - Ensure that the induction loop wire is fixed safely under the floor covering, behind or above the skirting; in case of ceiling installation the power of the magnetic field decreases, if the wire is positioned too high.
  - The installer of the hearing loop should ensure that there will be no possibilities to touch or to pull the loop wire.
  - In case of churches, theaters, congress rooms or other facilities where people listen to a speaker, place the loop aerial near to the podium or to the speaker, so that the person with hearing loss can better observe the speaker's face and lips.
  - In case of cinema, large stage or screen, the loop aerial must be placed not too near to the screen or to the stage, to offer the users a better visual field.
  - At home, the hearing loop aerial can be installed around the entire living room and connected to the TV or home theater, to increase clarity and volume, and to permit the user a greater freedom of movement.
  - Ensure that no architectural element is placed between the loop and the screen / podium that can obstacle the view.
  - After connecting the loop to the amplifier, microphone, or audio system, the power and quality of the magnetic signal inside the loop aerial must be checked by the installer.
  - Removable elements with strong magnetic field, that may have interference on magnetic signal quality, should be removed from the loop aerial.
  - The hearing aid users should be informed by a hearing loop sign, that the room / seat / place is equipped with a hearing loop system.
- Points to be considered in product use
  - Ensure that the hearing loop system is active when people with hearing aids are present in the facility.

- For receiving the magnetic audio signal from anywhere inside the loop, the deaf and hard of hearing users of a hearing aid must turn their telecoil enabled hearing device to the T-position i.e., deactivating the microphone of the hearing aid.
- Inform the users by the hearing loop sign that the area, room, seat row or place is equipped with an induction hearing loop.
- Do not place metal structures or devices with magnetic field emission in the loop aerial.
- Increase the amplification when the magnetic signal is weak.
- In case of use of multiple microphones, all microphones must be connected to the hearing loop system.
- Switch off the hearing loop system when it is not used.

- Points to be considered in product maintenance / follow-up
  - Regularly control if the hearing loop system is working correctly and if the loop area has an adequate quality of magnetic signal.
  - Permit hearing aid users to give a feedback on clarity and volume receiving the audio information in T-setting.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=220625

## 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.*

*ASPREX Fact Sheet*

# Personal hearing loop

Body worn device (hanging around the neck), designed for one person, for receiving or transmitting sound using magnetic, wireless signal in induction loop systems, that is picked up by the hearing aid when it is set to 'T' (Telecoil) setting. A personal hearing loop consists of a portable inductive mono listening device, without batteries (passive), with a wire loop connected to a cable with a 3.5mm jack, used with any equipment which provides a suitable output for operating personal headphones, by plugging directly into the headphone socket. Portable personal hearing loops may be neck loops (hanging around the neck, different length), inductive silhouette ear hook, pillow loops, or clip-on equipment.

Possible variants concern the length of the loop (shorter or longer), the form of the loop (can be also a silhouette ear hook), the canal transmission (can be also stereo), the location of the loop (can be also on the ear or in a pillow), and the mode of operation (can be also active powered by batteries, with built-in amplifiers, microphone, Bluetooth connectivity, that connect a Bluetooth device to the hearing aid).

- Product Classification
  - APL (WHO Assistive Product Priority List): 18 (Hearing loops/FM systems)
  - ISO 9999:2022: 220625 (Sound transmission systems for hearing aids)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Hearing [b230].
  - Listening [d115].
  - Understanding spoken words [d310].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Hearing [b230].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty to remember to switch the t-coil function (to deactivate the hearing aid microphone).
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Cutting out unwanted background noise into a hearing aid.
  - Sending audio information directly to hearing aids or cochlea implants with integrated T-coil sensor (information such as voice amplifier, MP3 player, computer, or mobile phone).

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Wearing a hearing aid without telecoil sensor (such as complete-in-the-canal or invisible-in-the-canal hearing aids).
- Points to be considered in product selection
  - Ensure that the hearing aid or cochlear implant has an integrated T-coil sensor and a T-switch for activating the magnetic wave receiver.
  - Ensure that the audio transmission device or audio system can be connected to induction loop devices.
  - If principally used in lying or body relaxed positions (bed, sofa, armchair) a pillow loop may be recommended.
  - For a bilateral hearing aids user, a stereo inductive silhouette ear hook can be selected for stereo listening.
  - For people with only one hearing aid (with integrated induction coil) select an induction ear hook matched to a normal headphone and a microphone (for listening to stereo music, binaural telephone use).
  - An inductive headset with build in microphone is suitable for the hard of hearing without hearing aid.
  - For Bluetooth induction loop devices ensure that the audio transmission device or audio system to be connected is equipped with Bluetooth.
  - Personal hearing loops can be connected to different audio devices (personal radio, CD player, MP3 player, TV, home theater, smartphone, talking book machines) and result in an increased sound clarity and volume.
- Points to be considered in product fitting
  - Ensure that user can switch on/off the T-position on the hearing aid.
  - Ensure that the neck loop length is adequate to wearing and to managing the device.
  - Ensure that user can connect the 3,5 mm jack to the audio device or audio system.
  - In case of a Bluetooth induction loop, ensure that a Bluetooth connection will be established to the Bluetooth device and check, if the user is able to manage the different control functions.
  - In case of an active personal hearing loop, check if user can see or feel the different control buttons; in case of difficulties, visual and/or tactile markers on the buttons may be added.
  - If using an active personal hearing loop, ensure that the user can replace or recharge the batteries.
  - USB charging devises need to be charged with USB cable, check if user can connect the personal hearing loop to an USB charging point or station.
- Points to be considered in product use
  - Always switch the hearing aid to T- position, when using personal hearing loops, and remember to switch off T-coil for normal microphone use of the hearing aid.
  - Use both hands when connecting the hearing loop to a device; do not pull on the cable itself but pull on the jack, when unplugging the personal hearing loop.
  - Increase the amplification when the magnetic signal is weak.
  - If using a Bluetooth hearing loop, activate Bluetooth in the audio device to be connected.
  - Ensure that batteries of an active personal hearing loop have enough charge during use, especially out of home.
  - To receive the magnetic signal, the user must switch the telecoil enabled hearing device in the T- position. For most hearing aids when T-position is selected the microphone becomes dead.
  - Meaning problems of feedback are eliminated and hearing aid(s) might be able to be used louder than usual.
- Points to be considered in product maintenance / follow-up
  - Regularly review if personal hearing loop system is working correctly and transmitting audio signal with clarity and adequate volume.
  - Do not put magnets near the hearing loop when it is in use.
  - Regularly review if batteries are charged or need to be replaced.
  - In case of problems, review the personal hearing loop, the audio device connected and the hearing aid in T position.
- Examples of products available on the market

- Live product search in the EASTIN website
  https://www.eastin.eu/en/searches/products/list?iso=220625

## 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.*

*ASPREX Fact Sheet*

# Pressure relief cushion

Seated support surface (cushion) designed for prevention of pressure injury. Product features include the shape and material characteristics of the cushion. Cushions may be one piece, or a series of layers. Materials may include static air, foam, gel, coir, mesh, fluid, silicone coated wool, and dynamic (alternating air) cushions. Materials offer varying amounts of pressure redistribution. Cushion shape or the contour of the cushion also influences pressure redistribution. Cushion contours may include an ischial (pre-seat bone) shelf to prevent sliding; contoured side supports which create a well to off-load pressure under the ischia (seat bones) to optimize pressure distribution; and contoured seat well (depth may vary according to level of postural support and pressure relief function provided).. Profile height of cushion will vary according to cushion function.

- Product Classification
  - APL (WHO Assistive Product Priority List): 29 (Pressure relief cushions).
  - ISO 9999:2022: 043303 (Seat cushions and underlays for tissue integrity).
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Base (insert or replacement stable base).
  - Cover or cover with handle (covers should be washable, two-way stretch, vapor (air) permeable and water resistant).
  - Hand pump for air cushions.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Caring for body parts [d520].
  - Maintaining body position [d415].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Protective functions of the skin [b810].
  - Sensation related to the skin [b840].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Seating surfaces (for example a wheelchair or static chair).
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Hot or cold environments (the pressure relieving properties of some materials such as foam and gel react and change in hot or cold environment, becoming more viscous or stretchy in hot weather, and less malleable in cold weather).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Limited sensation, mobility, activity and high potential for friction, shear and moist skin (factors that increase the risk of pressure injuries).

- History of pressure injuries (due to diabetes mellitus, other perfusion, oxygenation, nutritional and circulation deficits, impaired motor abilities causing movement restrictions such as spinal injury or cerebral palsy).

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - The cushion represents just one of the surfaces with which a user will interact within 24 hours. Transfers on / off the cushion should be considered as a source of risk (shear forces or different heights for sliding transfers, risk of puncturing air cushions with slideboards, risk of skin shearing during positioning of sling for hoist use, risk to user if transferring onto a non-pressure-relieving surface such as a plastic shower seat or commode seat). Consideration should be given to achieving the same level of pressure relief on all surfaces.
  - A stable base is essential to support the cushion and is a condition for this product to work as intended, giving stability and comfort.
  - Users of different sizes should be provided with suitable cushions e.g. paediatric, bariatric, users with high level lower limb amputations.
  - Each user has a unique set of needs. These needs can be categorized as: physical (the user's health situation and postural and functional needs), environmental (where users live and where they need to use the cushion), and lifestyle (the things users need to do when sitting on the cushion as a base from which to lead their chosen way of life).
  - Each user requires an individual assessment, taking into account lifestyle, vocation, home environment and physical condition; using the information gained from the assessment, a pressure cushion prescription is developed together with the user, family member or caregiver.
  - The prescription details the selected cushion type, size, special features and modifications; also detailed is the training the user needs to effectively use and maintain the cushion.
  - Users with sensation or partial sensation for pressure and touch who use cushion on full time or temporary basis; and users who need minimal posture support features, can utilize comfort and low pressure relief cushions (contoured base injection molded foam cushion with posture support features design, or layered cushions with a firm base, low contour shelf and well, low profile, soft or low firmness foam, noting layered cushions can be customized for additional postural features to stabilize the pelvis and thighs).
  - Users with no sensation, or partial pressure/touch sensation with good skin condition, little atrophy and good movement ability in the wheelchair and persons who need minimal posture support features to stabilize the pelvis and thighs can utilize contoured air cushions with no base (specifically, no dedicated base but multiple sections, medium profile, where air volume can be manipulated in different sections through inflating/deflating cells or changing air pressure. The placement of sections and air volume create off-loading of pressures on seat bones (ischia) and create a pre-seat bone (ischial) shelf.
  - Users with no sensation, or partial pressure/touch sensation with good skin condition, little atrophy and good movement ability in the wheelchair and persons who need posture support features to stabilize the pelvis and thighs can utilize postural support and medium risk pressure relief cushions (contoured base injection molded foam cushion with posture support features, or cushion with contoured base and removable fluid-filled (gel or air) pad located in well area, or layered cushion with a firm base, medium contour depth of well, medium to high profile, soft foam, with optional modifications to support any postural deviations of the pelvis, hips and thighs.
  - Users with no sensation and at high risk of skin breakdown due to their level of functional impairment as well as body function and structure impairments (e.g. degree of atrophy, fragile skin condition)or who need minimal to moderate posture support features to stabilize the pelvis and thighs require postural support and high-risk pressure relief cushions such as a contoured air cushion with multiple high profile sections in which air volume can be manipulated through removal/adding cells or changing air pressure.
  - User with no sensation and at high risk of skin breakdown who requires additional postural support is more suited to contoured base cushions with posture support features and fluid-filled (gel or air) pad (firm base, deep contoured well, high profile top layer with large volume fluid-or air-filled pad located in shelf/well area, which have some ability to modify and adjust the postural configuration through shaping support surfaces.

- Points to be considered in product fitting
  - Trained personnel fit the cushion and ensure it is on a suitable base and installed correctly front to back; depending on the product and service facilities, this may include assembly, and possible modification, of products supplied by manufacturers or production of products in the service workshop.

- During fitting, the user and competent personnel together check that: the cushion is the correct size; is correctly adjusted for the user and meets the user's mobility and postural support needs to minimize the risk of the user developing secondary deformities or complications.

- Points to be considered in product use
  - The user and caregivers should be instructed on how to safely and effectively use and maintain the cushion. Key areas of user training include: how to transfer in and out of the wheelchair, how to handle the wheelchair; how to ensure an air cushion is sufficiently inflated, basic wheelchair mobility; how to stay healthy in the wheelchair – for example prevention of pressure sores; how to look after the wheelchair and cushion and, if appropriate, dismantle and reassemble the wheelchair; and who to contact in case of problems.
  - In addition to a suitable support surface, active management is recommended for users at risk of / with pressure areas: 1) Active repositioning and pressure-relieving maneuvers such as leaning forward to lift pressure from the sacrum or pushing up on armrests to life pressure from the buttocks and thighs are recommended throughout the day. 2) Frequent small shifts in body position for user who are too unstable to maintain a regular repositioning schedule can be implemented by caregivers. 3) Users and caregivers should monitor pressure care through regular skin checks and should be encouraged to do so every week with the correct training.
- Points to be considered in product maintenance / follow-up
  - Follow-up appointments are an opportunity to check cushion is providing good postural support and pressure relief for the user. The frequency of follow-up will depend on the individual needs of the user.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=043303

## 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.*

*ASPREX Fact Sheet*

# Keyboard emulation software

Software application to be installed on a computing device designed to be operated by means of a keyboard and a mouse; all functions of the hardware keyboard are emulated by a virtual keyboard displayed on the computer screen, whose keys are controlled by a mouse or an alternate pointing device requiring different motor abilities.

Possible variants include the keyboard layout (which may be fixed – based on a given standard such as QWERTY or alphabetical – or also configurable), the keys appearance (which may be fixed or also configurable in relation to size or shape or font or color), the input method (which may also be based on row-column scanning, or block scanning, or arrow movement i.e. keys are selected by means of a cursor that can be moved along fixed directions), the presence of auditory cues (to help understand whether the selected key has performed the intended action), and the embedding of mouse emulation capabilities.

Different versions may be available for installation on different devices, operating systems, and operating system versions. Each product item on the market may have a different range of capabilities and functions, as well as different hardware and software requirements to ensure proper installation and operation.

- Product Classification
  - APL (WHO Assistive Product Priority List): 20 (Keyboard and mouse emulation software)
  - ISO 9999:2022: 241324 (Software for operating electrical devices)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Using communication devices and techniques [d360].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Hand and arm use [d445].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Lack of communication intention.
  - Insufficient consciousness level to enable association of keystrokes with resulting actions.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Compatible computer operating systems (like any software application, it only works with the devices and related operating system versions indicated by the manufacturer for each product item).
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Places where electricity is not available to maintain battery charge.
- Other indicated factors

  *Other factors or situations the product is intended to address:*

- Controlling keyboard functions (in relation to the computer operating system and all installed applications).

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Check the compatibility of the product with the computing device on which it will be installed, and make sure it really performs all the functions that the keyboard that normally comes with the device would do.
  - If the product requires internet connection for installation and regular updates, make sure that such connection exists and has sufficient bandwidth in the place where the user lives.
  - List the tasks the user needs to do with the product, make sure to install all the applications needed for those tasks, and check that the user can actually sustain them.
  - Find out – through careful assessment – the user's body function that are best suited to comfortably operate the product.
  - Identify the proper physical interface (mouse, touch screen, joystick, control switches, alternate user interfaces such as eye-gaze, etc. and input method (direct selection, arrows, row-column scanning, block scanning etc.).
  - This software will only provide ease of access but will not compensate for the lack of communication intention or a low consciousness level

- Points to be considered in product fitting
  - Install the product on the computing device, along with all related components and other possible assistive products needed such as input interfaces.
  - Position the device (height, distance, tilting, orientation in relation to environmental light conditions etc.) in such a way that the user can operate it.
  - If applicable, set up the software to the person's profile (layout adjusted to visual capabilities and needs, included word-prediction capability to make typing faster, etc in such a way that the user can operate it).
  - Training may be needed for the user, to ensure that he or she is able to master all product functionalities in relation to the intended tasks; if applicable, this training should also be extended to the user's assistants.

- Points to be considered in product use
  - The product as such does not require specific precautions; however, all precautions should be taken to keep safe the device on which the product is installed.

- Points to be considered in product maintenance / follow-up
  - Download and install product updates every time is required.
  - Make sure to have a reliable contact person or company in case of any technical problem.

- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=241324

## 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.*

*ASPREX Fact Sheet*

# Mouse emulation software

Software application to be installed on a computing device designed to be operated by means of a keyboard or other kind of hardware interface; all functions of the hardware mouse are performed by a virtual mouse whose displacement and keys are controlled by capturing different user's voluntary actions such switches activation, usually managed through a software control panel appearing whenever needed.

Different versions may be available for installation on different devices, operating systems, and operating system versions. Each product item on the market may have a different range of capabilities and functions, as well as different hardware and software requirements to ensure proper installation and operation.

- Product Classification
  - APL (WHO Assistive Product Priority List): 20 (Keyboard and mouse emulation software)
  - ISO 9999:2022: 241324 (Software for operating electrical devices)
- Possible configuration variants
  - Input technique: face movement captured through the device cam.
  - Input technique: eye blinks.
  - Input technique: eye gaze captured through infrared sensors.
  - Input technique: voice recognition.
  - Input method: row-column scanning.
  - Input method: block scanning.
  - Input method: arrows movement.
  - Auditory cues (to help understand whether the selected key has performed the intended action).
  - Embedded keyboard emulation capabilities.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Using communication devices and techniques [d360].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Hand and arm use [d445].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Lack of communication intention.
  - Insufficient consciousness level to enable association of keystrokes with resulting actions.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Compatible computer operating systems (like any software application, it only works with the devices and related operating system versions indicated by the manufacturer for each product item).
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Places where electricity is not available to maintain battery charge.
- Other indicated factors

*Other factors or situations the product is intended to address:*

- Controlling mouse functions (in relation to the computer operating system and all installed applications).

- Other contraindicated factors

*Other factors or situations in which the product may be inappropriate:*
None specified.

- Points to be considered in product selection
  - Check the compatibility of the product with the computing device on which it will be installed, and make sure it really performs all functions that the mouse that normally comes with the device would do.
  - If the product requires internet connection for installation and regular updates, make sure that such connection exists and has sufficient bandwidth in the place where the user lives.
  - List the tasks the user needs to do with the product, make sure to install all the applications needed for those tasks, and check that the user can actually sustain them.
  - Find out – through careful assessment – the user's body function that are best suited to comfortably operate the product.
  - Identify the proper physical interface (mouse, touch screen, joystick, control switches, alternate user interfaces such as eye-gaze, etc. and input method (direct selection, arrows, row-column scanning, block scanning etc.).
  - This software will only provide ease of access but will not compensate for lack of communication intention or low consciousness.
- Points to be considered in product fitting
  - Install the product on the computing device, along with all related components and other possible assistive products needed such as input interfaces.
  - Position the device (height, distance, tilting, orientation in relation to environmental light conditions etc. in such a way that the user can operate it).
  - If applicable, set up the software to the person's profile (e.g. layout adjusted to visual capabilities and needs).
  - Training may be needed for the user, to ensure that he or she is able to master all product functionalities in relation to the intended tasks; if applicable, this training should also be extended to the user's assistants.
- Points to be considered in product use
  - The product as such does not require specific precautions; however, all precautions should be taken to keep safe the device on which the product is installed.
- Points to be considered in product maintenance / follow-up
  - Download and install product updates every time is required.
  - Make sure to have a reliable contact person or company in case of any technical problem.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=241324

## 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.*

*ASPREX Fact Sheet*

# Digital magnifier (CCTV)

Equipment consists of a camera with zoom lens and a monitor for reading. The camera of the device is mounted on a frame or arm that displays a magnified image on a monitor. Digital magnifiers can provide magnification from 2-100X depending on the model and screen size. These are suitable across a range of vision losses especially in cases of severe vision loss. The primary benefit of a digital magnifier is that it can magnify any print, pictures, or anything placed under its camera. The image produced on monitor can be improved by setting contrast and brightness options provided in the device. The digital magnifiers come with a range of features including adjustable magnification. Reverse polarity, frame freeze and high contrast options. The digital magnifiers come with a rechargeable battery and can provide up to four hours of continuous use before the batteries need to be recharged. Digital Magnifiers are available in both stationary and portable forms. The primary function of both is to help users in reading by enlarging image of a reading material.

- Product Classification
  - APL (WHO Assistive Product Priority List): 21 (Magnifiers, digital hand-held)
  - ISO 9999:2022: 220318 (Image-enlarging systems)
- Possible configuration variants
  - Mouse-type magnifier (similar to the computer mouse and attached to a visual display such as a television or a computer monitor; the user moves the mouse across the text and reads from the visual display; the extent of magnification depends on the size of the monitor; this device comes with the standard feature of adjustable magnification, high contrast mode and frame freeze).
  - Digital magnifier with built-in display (stand-alone unit with a built-in display, including adjustable magnification, high contrast mode, reverse polarity and frame freeze; the built-in LED display is available in different sizes from 3,5 inches up to 10 inches; the user moves the magnifier on the text and reads from the attached display; some of the more advanced models come with a built-in SD card so that the materials can be transferred onto a computer; these magnifiers can also be attached to an external visual display to increase the screen size).
  - Head-mounted digital magnifier (the magnifier is mounted on a unit, which is worn on the head in front of the eyes and provide viewing at near and far through an autofocus function; the user views by pointing the device in the direction of the task and the views on a display mounted in the device in front of the eyes; a processing unit is attached with a belt around the waist, which processes the information; newer models are also available with built-in processor in the hamlet worn over the head).
  - Magnifier with built-in optical character recognition and speech output (not only does it magnify the text on screen but also read it aloud).
- Possible accessories or optional components
  - Camera that can be connected through Bluetooth.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Reading [d166].
  - Writing [d170].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (severe to moderate vision loss).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*

- Difficulty in fine hand use (good manual dexterity is required to use this product effectively). *Unless used with variants: Head-mounted digital magnifier*

- ## Indicated environments

  *Specific environments in which the product should be used:*
  None specified.

- ## Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.

- ## Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.

- ## Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- ## Points to be considered in product selection

  - These devices have been available for a while but have never become mainstream as the users despite the advantage find these cumbersome and heavy. Its use is also limited because of the cosmetic factors. The cost of these units is also very high making these not a feasible option for many users.
  - These devices can be prescribed in a non-clinical setting and do not require a detailed assessment by a clinician. Training in the use of these devices is however important for the user to understand the various functions and moving the device over the task.
  - Availability of electricity is essential to plug in or recharge the batteries. The maintenance of these devices is also a factor as after sale services are not available in many countries.
  - Most of these devices require a flat surface to move these over the task.
  - The digital magnifiers are most useful when extended reading is required and therefore is suitable for use in schools, libraries and workplaces.
  - Selecting the right digital magnifier will depend on what the user needs and how often they plan to use it. While some of the features of overlap, there are different uses out of the different models. If being mobile is a priority, then battery life will be a major consideration.
  - With the use of smart phones becoming very common, many users prefer to use the zoom function on their mobiles or tablets rather than opting for a separate digital magnifier.
  - The main advantages of mouse-type magnifiers include the adjustable size of display, standard viewing distance and normal sitting posture. It is also the cheapest digital magnifier available however if the price of the visual display device is added then the price substantially increases. It can also be prescribed in a non-clinical setting, as the magnification is adjustable.
  - The main disadvantages of mouse-type magnifiers include the change in spatial relationship where the mouse is moved over a text while the viewing occurs on the visual display. It also requires good manual dexterity. Finding the next row in the text is also a challenge especially in users with visual field defects. The other limitation is the portability of the unit unless it is attached to a laptop.
  - The main advantages of digital magnifiers with built-in display include the portability as the can be carried around with ease and can be used at home in workplaces, schools etc. These magnifiers also maintain the spatial relationship with the task as the user is viewing the text on the screen that is on the task. Some of these magnifiers can also be used for writing when attached with a bracket, which lifts the magnifier over the text. It also comes with rechargeable batteries, which provide up to four hours of continuous use. It allows the user a comfortable sitting posture and maintain the habitual viewing distance. Some digital magnifiers can also be used to view far objects when these are pointed in that direction. For example, a student can point the device towards the writing board in the classroom. o Some of the more advanced units come with an option of either the visual or the voice modes where the user can choose if they want to see the text visually or in the voice mode.
  - The main disadvantages of digital magnifiers with built-in display include the small size of display limiting the magnification and the visual fields. These magnifiers require the user to use the spectacles to correct any significant refractive error, which can cause the blurring of the task. The recharging time of the batteries is also long and requires the user to plug in daily to recharge. Some users also complain about the glare and

eye strain because of the small size of the display. Manual dexterity is also critical to move the magnifier over the text. Another common challenge faced by most digital magnifier users is fining the next row on the text. The proper use of these devices require training to use these effectively. The cost of the units has significantly come down however these are still not affordable for a vast number of users.

- Points to be considered in product fitting
    - The setting-up of stationary digital magnifier must be done ergonomically keeping it at an eye level of user. The level of table and chair must also be adjusted accordingly.
    - The display of the monitor can reflect light which can be uncomfortable for users.
    - The monitor size ranges from 16 to 24 inches. Picking the appropriate size of monitor depends on the workspace and the amount of magnification required.
- Points to be considered in product use
    - Digital magnifiers must be fit at an appropriate level and distance for the user to effectively read anything. The background of the object and the colors must be adjusted according to user's preferences. The camera must be pointed adequately at an appropriate angle.
    - Magnifiers are primarily designed for people with low vision and therefore the device controls are designed to make them visible and easy to use in order to zoom in on the objects, to change colors or set-up other relevant options. Users can comfortably identify, interpret and use the well-marked buttons and knobs. There are some magnifiers that additionally provide a wired control pad with the same controls as provided on the device. For people with dexterity issues, it is easier to use the control pad rather than using the controls on the device.
    - Portable devices can be stored in a protection case.
- Points to be considered in product maintenance / follow-up
    - For stationary devices, users must keep the camera, and the display unit must be cleaned regularly.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=220318

## 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.*

*ASPREX Fact Sheet*

# Hand-held optical magnifier

Device consists of one or more lenses placed between the eye and the objects to be viewed. It enlarges the image for near viewing. The lens is a high-powered-plus lens, fitted in a plastic or metal body with a handle. The power of magnifier is denoted as X, which symbolizes the extent of the enlargement offered by a magnifier (e.g. 2X means that the magnifier will increase the image size by two times of original size). Hand-held magnifiers are generally available from 1X to 20X. The shape of the frame in which the lens is fitted can be rectangular or round. The round frame is available in different diameters. The grips are ergonomically designed for easier handling. Some magnifiers have rubberized grips.

The lenses can be either glass or acrylic. The acrylic lenses are much lighter in weight than the glass lens and provide better scratch resistance.

- Product Classification
  - APL (WHO Assistive Product Priority List): 22 (Magnifiers, optical)
  - ISO 9999:2022: 220309 (Magnifier glasses, lenses and lens systems for magnification)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Internal illumination and batteries.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Reading [d166].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Tremors (using the product requires accurate and steady handling; the lens must be held at the correct focal distance in order to obtain the maximum power; tremors may prevent from maintaining focus).
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Reading a book for a long time (it puts a strain on readers and makes them tired).
- Points to be considered in product selection

- Consider the advantages of an optical magnifier: variable eye to lens distance; normal reading distance; convenient for short term tasks; it is readily available and inexpensive; the device may have its own light source, thereby also improving contrast; portability.
- Appropriate magnification systems should be determined for the user with low vision; based on the needs of the user, magnification may be required for near or distance visual acuity improvement, or both.
- The required level of magnification is usually task-specific, in other words, it may vary for different activities.
- Can be used with distance and near glasses for providing extra magnification.

- Points to be considered in product fitting
  - When training the user in the use of the device, explain how the new low vision aid should affect tasks that the user would like to perform.
- Points to be considered in product use
  - The individual can move the device around the print or object and will be able to see an enlarged image of the target. One hand is in use.
- Points to be considered in product maintenance / follow-up
  - The lens must be kept clean for better visibility: it can be cleaned with a soft microfiber cloth to prevent any scratches.
  - Magnifiers with glass lens should be carried around with care as a drop may damage or break the lens
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=220309

## 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.*

*ASPREX Fact Sheet*

# Lower limb orthosis

Assistive device attached to the body for supporting the neuro-muscular-skeletal systems or movement functions related to the functioning of the lower extremities. Orthoses are designed to modify or support the structural and functional characteristics of the neuromuscular system of the lower limb; the devices may be custom fabricated or prefabricated devices that may be adjustable or ready to use. The orthosis may be made of various materials, such as thermoplastic, polypropylene, subortholene, composite carbon fibers, cork, leather, polyethylene foams, Ethyl Vinyl Cetates (EVA), neoprene, silicone. Occasionally, various padding materials are used as cover foams, gels, cushions.

- Product Classification
  - APL (WHO Assistive Product Priority List): 23 (Orthoses, lower limb)
  - ISO 9999:2022: 0612 (Lower limb orthoses)
- Possible configuration variants
  - Foot orthosis (Iso 061203) (including insoles, shoe inserts, pads, arch supports, heel cushions and heel cups).
  - Ankle foot orthoses (Iso 061206).
  - Knee orthosis (Iso 061209).
  - Knee-ankle-foot orthosis (Iso 061209).
  - Lower leg orthosis (Iso 061213).
  - Hip orthosis (Iso 061215).
  - Hip-knee orthosis (Iso 061216).
  - Thigh orthosis (Iso 061217).
  - Hip-knee-ankle-foot orthosis (Iso 061218).
  - Lumbo-sacral-hip-knee-ankle-foot orthosis (Iso 061219).
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Maintaining body position [d415] (stability of lower limbs).
  - Caring for body parts [d520].
  - Walking [d450].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Mobility of joint functions [b710] (lower limbs).
  - Stability of joint functions [b715] (lower limbs).
  - Muscle tone functions [b735] (lower limbs).
  - Muscle power functions [b730] (lower limbs).
  - Motor reflex functions [b750].
  - Involuntary movement reaction functions [b755].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - High temperature or humidity.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Helping maintain the best alignment of the different segments of the lower extremities.
  - Protecting, accommodating, avoiding secondary complications of the lower limbs.
  - Protecting the lower limbs from further injuries.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - List the physical and environmental need of the user in relation to the lack of lower extremities stability,
  - Find out if the product will be custom made or prefabricated: will it be rigid or dynamic? will it be for providing stability for function? will it be supportive for protecting and avoiding secondary complications?
  - Provide the proper measures or mold (in case of custom made).
- Points to be considered in product fitting
  - It is an important step to avoid secondary damage, you must be sure the orthosis is not providing pain, or extra forces that will cause skin injury.
  - Check that the orthosis is providing appropriate stability or correction.
- Points to be considered in product use
  - Training may be needed for the user to ensure that he or she is able to fit in the product with or without help as expected.
  - Dosage use program.
  - Have a plan of what to do if there is discomfort or injury.
- Points to be considered in product maintenance / follow-up
  - Check the tolerance.
  - Carry out follow-up checks about every six months if there is no other sign of concern about the correct use of the orthoses
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=0612

## 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.*

*ASPREX Fact Sheet*

# Spinal orthosis

Assistive device attached to the body for supporting the neuro-muscular-skeletal systems or movement functions related to the functioning of the spine. Orthoses are designed to modify the structural and functional characteristics of the neuromuscular system of the spine; the device may be custom fabricated or prefabricated and adjustable to fit an individual user or may be ready to use so that adjustment is not possible or no adjustment is necessary for any user. The product may be custom manufactured or assembled from prefabricated components. It can be rigid or flexible (different types).

In case it is custom manufactured: Ideally, orthoses are custom fabricated to fit specific body landmarks so that the devices provide adequate motion control through the best possible leverage system biomechanics. The thoracic band is located so that the superior edge rests 24mm inferior to the inferior angle of the scapula. The band may be horizontal across the back or convex in a superior plane to provide the greatest height at the midline while allowing freedom of the scapula. Laterally to each scapula, the component dips inferiorly to allow space for the axilla. The component ends just anterior to the lateral midline of the body or the mid axillary trochanteric line, a line defined by the bisection of the body at the axilla and trochanter. The inferior edge of the pelvic band rests at the middle of the sacro-coccygeal junction, Lateral to the midline, the component usually dips inferiorly to contain the gluteal musculature. The rationale for the curve is to provide the greatest leverage for the orthosis. The paraspinal bars are contoured to follow the paraspinal musculature. All metal orthoses can be worn with either a corset or an anterior panel of corset material. The components used to construct the most common metal spinal orthoses are typically aluminum alloys that are radiolucent and malleable, yet of sufficient strength to hold their shape. Rigid immobilization is accomplished using a “body jacket” made of plastic with a soft foam interface (lining). Dynamic immobilization gives support with semi rigid materials like high density foam with plastic (permanent or removable). It allows some movement. A plastic frame can be incorporated into the foam for additional restriction of motion if desired. Tend to be better tolerated. The custom-made, soft, high-density Lumbosacral Orthosis (LSO) or off-the-shelf semi-rigid LSO with a compound closure system to optimize support are excellent alternative to rigid body jacket or corset, offering a balance between comfort and control.

Common materials used for spinal orthoses are plastic, thermoplastic, plastizote, aluminum bars, soft foams combined with plastic; the challenge in combining materials is to achieve a balance of comfort and control.

- Product Classification
  - APL (WHO Assistive Product Priority List): 24 (Orthoses, spinal)
  - ISO 9999:2016: 0603 (Spinal and cranial orthoses)
- Possible configuration variants
  - Sacrum-iliac orthosis (Iso 060303).
  - Lumbo-sacral orthosis (Iso 060306).
  - Thoracic orthosis (Iso 060307).
  - Thoraco-lumbar orthosis (Iso 060308).
  - Thoraco-lumbar-sacral orthosis (Iso 060309).
  - Cervical orthosis (Iso 060312), also including atlanto-occipital joint.
  - Cervico- thoracic orthosis (Iso 060315).
  - Cervico-thoraco-lumbo-sacral orthosis (Iso 060318).

- Articulating components for spinal orthosis (Iso 060327), which allow or control the motions of anatomical joints of spine.

- Possible accessories or optional components

  None specified.

- Product goals

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

  - Caring for body parts [d520].
  - Maintaining body position [d415].
  - Transferring oneself [d420].
  - Walking [d450].

- Indicated impairments

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

  - Mobility of joint functions [b710] (lack of mobility of spine joints).
  - Stability of joint functions [b715] (lack of stability of spine joints).
  - Muscle power functions [b730].
  - Muscle tone functions [b735].
  - Motor reflex functions [b750].
  - Involuntary movement reaction functions [b755].
  - Sensation of pain [b280].

- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*

  - Lack of sensation or skin integrity (any skin damage in the area where the orthosis is in contact will worsen with the use of the device; extra caution with visual checking for areas of rubbing/ chafing).
  - Severe gastro-esophageal reflux (it may be exacerbated by abdominal pressure by an orthosis).
  - Severe asthma (in particular periods of exacerbation).

- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*

  - High temperature or humidity (persons who are less tolerant may experience discomfort and potential breathing restriction, and the skin may be less capable of withstanding the forces generated without its integrity being comprised; the decision to use a rigid rather than a more flexible system should therefore be based on the degree to which spinal motion restriction is required).

- Other indicated factors

  *Other factors or situations the product is intended to address:*

  - Correcting a distortion of any part of the spine.
  - Giving stability to the spine to provide postural control (for better arm and hand function and enable people to walk).

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection

  - List the physical and environmental need of the user in relation to the lack of Lower Extremity stability, giving priority to determine which spinal motion control.
  - Find out if the product will be custom made or prefabricated: will it be rigid or dynamic? Will it be for providing stability for function? Will it be supportive for protecting and avoiding secondary complications?
  - Provide accurate measurements or mold (in case of custom made).

    - Deciding rigid or flexible: orthoses that are more rigid are often preferred in terms of protecting the involved spinal segment. The decision to use a more flexible system is based on the practical issue of orthotic tolerance and thus compliance with wearing the orthosis. The ideal orthosis serves no purpose at all if is not worn; it is sometimes necessary to make practical decisions that involve sacrifice orthotic control to gain person´s acceptance.
- Points to be considered in product fitting
    - Fitting to the need of the person, checking that the orthoses provides the appropriate stability and no part of the orthoses will injure the body of the person.
    - Appropriate training should be provided to caregivers: 1) maintain spinal precautions to facilitate optimal healing; 2) never use the orthosis as a handhold during transfers, 3) educate patient regarding any spinal precautions to promote carryover.
    - Identify how orthosis or spinal precautions will affect transfer.
- Points to be considered in product use
    - Training may be needed for the user to ensure that he or she is able to fit in the product with or without help (as expected). Usually help is needed to fit in this kind of orthosis so it is needed to train the caregivers how to do it.
    - Dosage use program. needs to adapt to the use increasing time and checking the possible skin injures.
    - Tolerance to wear the orthosis could be limited, especially when the need is to cover an extensive area.
    - What to do if there is discomfort or injury.
- Points to be considered in product maintenance / follow-up
    - Check the tolerance.
    - Carry out follow-up checks about every six months if there is no other sign of concern about the correct use of the orthoses.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=0603

## 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.*

*ASPREX Fact Sheet*

# Personal Digital Assistant (PDA)

Small handheld device that comprises an electronic visual display. Original PDAs utilized a stylus with handwriting recognition for input. Additional means of input include keyboard and voice recognition. Functions of PDAs include: calculator, calendar, appointment book, address book, game machine, global positioning system , digital audio recorder, and digital still and/or video camera. Modern PDAs may include: send and receive e-mail over wired or wireless networks, surf the Web, interface with a computer, send and receive phone calls, display videos, play music.

- Product Classification
  - APL (WHO Assistive Product Priority List): 26 (Personal digital assistants (PDAs))
  - ISO 9999:20226: 223306 (Portable computers and personal digital assistants (PDAs))
- Possible configuration variants
  - Speech output.
  - Screen magnification.
- Possible accessories or optional components
  - Software that can be run on a PDA that can perform a number of functions in addition to those included in the usual configuration.
  - Software (such as the Jogger) which presents behavioral prompts and cues for the user at pre-programmed times and recording the user's responses; customized for the user, these prompts can assist the user to perform job tasks, perform household chores, tasks to be completed before leaving work, take medication, and more.
  - Additional ports including those for compact flash drive, infrared, serial, USB and headphones.
  - Peripherals such as docking cradle, AC power adapter, serial cable, carrying case, external speaker, and speaker cable.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Carrying out daily routine [d230].
  - Using communication devices and techniques [d360]
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Memory functions [b144].
  - Attention functions [b140].
  - Calculating [d172].
  - Orientation functions [b114].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Blindness. *Unless used with variants: Speech output [b210]*
  - Severe vision loss. *Unless used with variants: Screen magnification [b210]*
  - Hand dexterity. *Unless used with variants: Voice recognition [b265]*
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*

- Areas where a mobile network or access to Wi-Fi is not available (for connection by the device).

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Personal information management.

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Use by people with limited familiarity with modern technology.
  - Users who are not literate to the extent needed to use the device.

- Points to be considered in product selection
  - The environment in which the device will primarily be used.
  - The input technique should match the individual's functional abilities.
  - The output of the PDA should match the individual's functional abilities.
  - The specific tasks the device will perform.
  - The capabilities of the device should match the specific tasks it will perform.
  - PDAs have been essentially replaced by smart phones and tablet computers. Are newer devices more appropriate? PDAs have been mostly displaced by the widespread adoption of highly capable smartphones specifically those based on iOS and Android.

- Points to be considered in product fitting
  - The user's specific needs must be considered to properly set up and program the device.
  - The user should be trained to use the device properly including setting it up and programming it, if necessary.

- Points to be considered in product use
  - Appropriate software and applications to accomplish desired tasks.
  - If necessary, appropriate mounting, particularly for wheelchair users.

- Points to be considered in product maintenance / follow-up
  - Maintain good battery life.
  - Software and operating system should be kept current.

- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=223306

## 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.*

*ASPREX Fact Sheet*

# Personal emergency alarm

Small handheld device (wrist worn or pendant) that comprises a button and transmitter. The transmitter sends a signal to a console that is connected to a telephone line. Pre-programmed calls are sent to a call center and/or emergency contacts via voice and/or text. The transmitter is usually waterproof and can be worn around the neck or on the wrist.

Personal emergency alarms may include a subscription service that receives emergency calls. The console or phone is programmed to telephone the emergency response center, where the caller is identified. All information about the caller is available to the emergency dispatcher, who tries to determine the nature of the emergency. If the dispatcher cannot contact the user or determine whether an emergency exists, local emergency service providers (paramedics) are alerted to go to the user's location. The dispatcher also stays on the intercom with the user and monitors the situation until the problem or emergency crisis is resolved. Some emergency alarms include GPS or links to Google maps to allow the exact location of the phone to be viewed on a map. Systems typically have the capability of being programmed to call multiple contacts with automatic messages. Some systems enable two-way communication.

- Product Classification
  - APL (WHO Assistive Product Priority List): 27 (Personal emergency alarm systems)
  - ISO 9999:2022: 222906 (Personal emergency alarm systems)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Activity sensors (if the sensor detects no activity in a programmed period of time, the system will automatically call for help).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Using communication devices and techniques [d360].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Heart functions [b410].
  - Walking [d450].
  - Changing body position [d410].
  - Moving around [d455].
  - Consciousness functions [b110].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Indoors.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Areas where the device is out of range of the hub which transmits alerts to a monitoring center or caregiver.

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Indicating an emergency situation needing intervention.
  - Balance, mobility, or neurological conditions that are at risk for medical emergencies.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - The person has the abilities to function independently in their homes.
  - The input technique should match the individual's functional abilities.
  - A phone service must be available.
  - Appropriate emergency contacts must be identified.
  - If a subscription service is necessary, the resources to pay for the service must be available.
- Points to be considered in product fitting
  - Appropriate emergency texts and messages must be programmed.
  - Proper setup includes connecting the device to the user's phone service.
  - Appropriate wearing of the device, i.e. wrist or around the neck.
- Points to be considered in product use
  - Person needs the psycho-social abilities to use the alarm system appropriately.
  - The alarm system will only work within a given distance to the main console.
- Points to be considered in product maintenance / follow-up
  - Maintain good battery life.
  - Maintain phone service.
  - If appropriate, maintain subscription service.
  - Maintain appropriate emergency texts and messages.
  - Test the system on a regular basis to ensure proper connections are maintained.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222906

## 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.*

*ASPREX Fact Sheet*

# Pill organizer

Device to dispense the correct dosage of a medicine. These products store an individual's prescribed medications and enable monitoring of whether the individual took the medication. They may also notify the individual when the prescribed medications are due to be taken. Pill organizers comprise a storage system, which can be opened by the user. The size of the pill organizers vary and are usually lightweight and portable, with sufficient space for the user's daily doses of medication. Product variations include grid-shaped square box or fan-shaped round box. Usually made of transparent plastic for easy identification of drugs, with marks (colors, printing, raised marks, braille marks) used to distinguish time (hour/time period/day/month). Different capacities include one dose (single compartment), daily dosage (3-4 compartments including mealtimes or time of day), or a rack of seven days. Products are made from durable food grade plastic.

- Product Classification
  - APL (WHO Assistive Product Priority List): 28 (Pill organizers)
  - ISO 9999:2022: 041904 (Assistive products for administering non-liquid medicines)
- Possible configuration variants
  - Timed reminder functions.
  - Time-controller access of medications storage cells.
- Possible accessories or optional components
  - Time prompts or alarms.
  - Lock function.
  - Automated timed pill reminders (auditory, visual or vibration alarm).
  - Reminder software (to relay messages through the users' mobile phone, or connection to remote monitoring service with data logging and sharing capabilities, to share medication management information with the treating medical team).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Looking after your own health [d570].
  - Memory functions [b144].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Attention functions [b140].
  - Memory functions [b144].
  - Hand and arm use [d445].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Direct sunlight or situations of extreme heat (guidance from manufacturers should be followed on environmental situations of non-safe use).

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Concerns regarding the safe storage and taking medications in the correct dosages at the correct time and to prevent adverse drug events (e.g. missed doses, overdoses).
  - Need to be prompted or reminded about medication compliance. *Only if used with variants: Timed reminder functions*
  - Need for cognitive support to control dosage. *Only if used with variants: Timed reminder functions, Time-controller access of medications storage cells*
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - Selection of the product model can be guided by usage factors such as portability within and outside the home and duration (how many doses contained within).
- Points to be considered in product fitting
  - If the product comes with an alarm this should be set with the user and caregiver input.
  - Labeling style (color or print mark used to distinguish the time to take medication in each compartment) must be visible and comprehensible to user.
  - Information on how to assemble and adapt the pill organizer should be provided.
- Points to be considered in product use
  - The user or carer removes pills from the pill organiser by opening the compartment (flip lid, move slider, rotate lid), tipping out the contents (into palm or onto a surface) and then ingests the medication.
- Points to be considered in product maintenance / follow-up
  - Ensure it is easy to open, but it does not open automatically due to carrying and vibration.
  - Check the lid can be tightly closed to prevent moisture and ensure the health and safety of the medicine.
  - Instructions on how to maintain, service, repair, refurbish and clean the pill organizer should be provided: occasional washing in warm soapy water to remove any pill dust; wipe external surface periodically.
  - Check the printed markings or raised markings are not worn.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=041904

## 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.*

*ASPREX Fact Sheet*

# Pressure relief cushion

Seated support surface (cushion) designed for prevention of pressure injury. Product features include the shape and material characteristics of the cushion. Cushions may be one piece, or a series of layers. Materials may include static air, foam, gel, coir, mesh, fluid, silicone coated wool, and dynamic (alternating air) cushions. Materials offer varying amounts of pressure redistribution. Cushion shape or the contour of the cushion also influences pressure redistribution. Cushion contours may include an ischial (pre-seat bone) shelf to prevent sliding; contoured side supports which create a well to off-load pressure under the ischia (seat bones) to optimize pressure distribution; and contoured seat well (depth may vary according to level of postural support and pressure relief function provided). Profile height of cushion will vary according to cushion function.

- Product Classification
  - APL (WHO Assistive Product Priority List): 29 (Pressure relief cushions).
  - ISO 9999:2022: 043303 (Seat cushions and underlays for tissue integrity).
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Base (insert or replacement stable base).
  - Cover or cover with handle (covers should be washable, two-way stretch, vapor (air) permeable and water resistant).
  - Hand pump for air cushions.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Caring for body parts [d520].
  - Maintaining body position [d415].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Protective functions of the skin [b810].
  - Sensation related to the skin [b840].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Seating surfaces (for example a wheelchair or static chair).
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Hot or cold environments (the pressure relieving properties of some materials such as foam and gel react and change in hot or cold environments, becoming more viscous or stretchy in hot weather, and less malleable in cold weather).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Limited sensation, mobility, activity and high potential for friction, shear and moist skin (factors that increase the risk of pressure injuries).

- Past history of pressure injuries (due to diabetes mellitus, other perfusion, oxygenation, nutritional and circulation deficits, impaired motor abilities causing movement restrictions such as spinal injury or cerebral palsy).

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - The cushion represents just one of the surfaces with which a user will interact within 24 hours. Transfers on / off the cushion should be considered as a source of risk (shear forces or different heights for sliding transfers, risk of puncturing air cushions with slide boards, risk of skin shearing during positioning of sling for hoist use, risk to user if transferring onto a non-pressure-relieving surface such as a plastic shower seat or commode seat). Consideration should be given to achieving the same level of pressure relief on all surfaces.
  - A stable base is essential to support the cushion and is a condition for this product to work as intended, giving stability and comfort.
  - Users of different sizes should be provided with suitable cushions e.g. pediatric, bariatric, users with high level lower limb amputations.
  - Each user has a unique set of needs. These needs can be categorized as: physical (the user's health situation and postural and functional needs), environmental (where users live and where they need to use the cushion), and lifestyle (the things users need to do when sitting on the cushion as a base from which to lead their chosen way of life).
  - Each user requires an individual assessment, taking into account lifestyle, vocation, home environment and physical condition; using the information gained from the assessment, a pressure cushion prescription is developed together with the user, family member or caregiver.
  - The prescription details the selected cushion type, size, special features and modifications; also detailed is the training the user needs to effectively use and maintain the cushion.
  - Users with sensation or partial sensation for pressure and touch who use cushion on full time or temporary basis; and users who need minimal posture support features, can utilize comfort and low pressure relief cushions (contoured base injection molded foam cushion with posture support features design, or layered cushions with a firm base, low contour shelf and well, low profile, soft or low firmness foam, noting layered cushions can be customized for additional postural features to stabilize the pelvis and thighs).
  - Users with no sensation, or partial pressure/touch sensation with good skin condition, little atrophy and good movement ability in the wheelchair and persons who need minimal posture support features to stabilize the pelvis and thighs can utilize contoured air cushions with no base (specifically, no dedicated base but multiple sections, medium profile, where air volume can be manipulated in different sections through inflating/deflating cells or changing air pressure. The placement of sections and air volume creates off-loading of pressures on seat bones (ischia) and creates a pre-seat bone (ischial) shelf.
  - Users with no sensation, or partial pressure/touch sensation with good skin condition, little atrophy and good movement ability in the wheelchair and persons who need posture support features to stabilize the pelvis and thighs can utilize postural support and medium risk pressure relief cushions (contoured base injection molded foam cushion with posture support features, or cushion with contoured base and removable fluid-filled (gel or air) pad located in well area, or layered cushion with a firm base, medium contour depth of well, medium to high profile, soft foam, with optional modifications to support any postural deviations of the pelvis, hips and thighs.
  - Users with no sensation and at high risk of skin breakdown due to their level of functional impairment as well as body function and structure impairments (e.g. degree of atrophy, fragile skin condition)or who need minimal to moderate posture support features to stabilize the pelvis and thighs require postural support and high-risk pressure relief cushions such as a contoured air cushion with multiple high profile sections in which air volume can be manipulated through removal/adding cells or changing air pressure.
  - User with no sensation and at high risk of skin breakdown who requires additional postural support is more suited to contoured base cushions with posture support features and fluid-filled (gel or air) pad (firm base, deep contoured well, high profile top layer with large volume fluid-or air-filled pad located in shelf/well area, which have some ability to modify and adjust the postural configuration through shaping the support surface.

- Points to be considered in product fitting

- Trained personnel fit the cushion and ensure it is on a suitable base and installed correctly front to back; depending on the product and service facilities, this may include assembly, and possible modification, of products supplied by manufacturers or production of products in the service workshop.
- During fitting, the user and competent personnel together check that: the cushion is the correct size; is correctly adjusted for the user and meets the user's mobility and postural support needs to minimize the risk of the user developing secondary deformities or complications.

- Points to be considered in product use
  - The user and caregivers should be instructed on how to safely and effectively use and maintain the cushion. Key areas of user training include: how to transfer in and out of the wheelchair, how to handle the wheelchair; how to ensure an air cushion is sufficiently inflated, basic wheelchair mobility; how to stay healthy in the wheelchair – for example prevention of pressure sores; how to look after the wheelchair and cushion and, if appropriate, dismantle and reassemble the wheelchair; and who to contact in case of problems.
  - In addition to a suitable support surface, active management is recommended for users at risk of / with pressure areas: 1) Active repositioning and pressure-relieving maneuvers such as leaning forward to lift pressure from the sacrum or pushing up on armrests to life pressure from the buttocks and thighs are recommended throughout the day. 2) Frequent small shifts in body position for user who are too unstable to maintain a regular repositioning schedule can be implemented by caregivers. 3) Users and caregivers should monitor pressure care through regular skin checks and should be encouraged to do so every week with the correct training
- Points to be considered in product maintenance / follow-up
  - Follow-up appointments are an opportunity to check cushion is providing good postural support and pressure relief for the user. The frequency of follow-up will depend on the individual needs of the user.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=043303

## 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.*

*ASPREX Fact Sheet*

# Pressure relief mattress

Body support product whose shape and or material characteristics redistribute pressure. Shapes may include full depth pads to replace the standard mattress, or one-piece mattress overlays, which are thinner pads, placed on top of a standard mattress. Materials may include foam, gel, coir, mesh, sheepskin, silicone coated wool, fluid, and static air cell or automated air pump mattresses, and construction may be layered or segmented.

- Product Classification
  - APL (WHO Assistive Product Priority List): 30 (Pressure relief mattresses).
  - ISO 9999:2022: 043306 (Assistive products for tissue integrity when lying down).
- Possible configuration variants
  - Dynamic surface mattress: alternating air cells and power source (may be an overlay or full mattress replacement).
  - Static surface single-piece mattress (such as silicone coated wool).
  - Static surface hybrid mattress (comprising layers of material such as dense foam topped with memory foam or lower density foam).
  - Static surface segmented mattress (such as foam with inserts of different density or insert of air cells).
  - Mattress made of heat- and cold-resistant materials.
- Possible accessories or optional components
  - Mattress covers (washable, two-way stretch, vapor permeable and water-resistant).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Caring for body parts [d520]. *Only if used with variants: Static surface single-piece mattress, Static surface hybrid mattress, Static surface segmented mattress*
  - Maintaining body position [d415] (lie comfortably in bed).
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Protective functions of the skin [b810].
  - Repair functions of the skin [b820] (current pressure injuries). *Only if used with variants: Dynamic surface mattress: alternating air cells and power source*
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Beds (pressure relief mattresses are placed on beds, usually western-style single beds: on top of bed frame if a full depth mattress, on top of mattress if an overlay).
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Hot or cold environments (the pressure relieving properties of some materials such as foam and gel react and change in hot or cold environments, becoming more viscous or stretchy in hot weather, and less malleable in cold weather). *Unless used with variants: Mattress made of heat- and cold-resistant materials.*
- Other indicated factors

  *Other factors or situations the product is intended to address:*

- Past history of pressure injuries (due to diabetes mellitus, other perfusion, oxygenation, nutritional and circulation deficits, impaired motor abilities causing movement restrictions such as spinal injury or cerebral palsy).
- Risk of pressure injuries (due to limited sensation, mobility, limited activity and a high potential for friction, shear and moist skin).
- Current pressure injuries. *Only if used with variants: Dynamic surface mattress: alternating air cells and power source*

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - Each user has a unique set of needs: these needs can be categorized as: a) physical – the user's health situation and postural and functional needs; b) environmental – where users live and sleep; and c) lifestyle – the things users need to do in the bed to lead their chosen way of life (including proximity to partners).
  - Each user requires an individual assessment, taking into account lifestyle, vocation, home environment and physical condition. Using the information gained from the assessment, a bed and pressure mattress prescription is developed together with the user, family member or caregiver.
  - Selection of a support surface that meets the individual's need for pressure redistribution is based on the following factors: level of immobility and inactivity, need to influence microclimate control and shear reduction, size and weight of the individual, number, severity and location of existing pressure injuries (most at-risk areas include buttocks, heels, and occiput), risk for developing new pressure injuries.
  - The mattress represents just one of the surfaces with which a user will interact within 24 hours. Transfers on / off the mattress should be considered as a source of risk (shear forces or different heights for sliding transfers, risk of puncturing air cushions with slide boards, risk to user if transferring onto a non-pressure-relieving surface such as a plastic shower seat or commode seat). Consideration should be given to achieving the same level of pressure relief on all surfaces.
  - Users of different sizes should be provided with suitable sized pressure relief mattresses e.g. pediatric, bariatric.
  - The prescription details the mattress type and the training the user needs to effectively use and maintain the mattress.
  - Individuals at risk of developing pressure injuries (stage 1 pressure injury: non-blanchable erythema of intact skin) require a static low level pressure relieving surface such as reactive single layer foam mattress or overlay or air mattress. If users are under 45 kg in weight, a silicone-coated wool overlay or configuration of medical grade sheepskin and foam can be trialed.
  - Individuals with mild pressure injuries or who have co-morbidities, or a past history of healed pressure injuries require a moderate level pressure relieving surface such as gel, air (static or dynamic) or high-quality hybrid mattresses or mattress overlays.
  - Individuals with current pressure injuries (stage 2 pressure injury: partial-thickness skin loss with exposed dermis, stage 3 pressure Injury: full-thickness skin loss, or stage 4 pressure Injury: full-thickness skin and tissue loss) require high level pressure relieving surfaces such as high-quality hybrid mattresses, air filled or active air cell mattresses.
  - Press relief mattresses are combined with beds with one or more sections of the mattress support platform that can be adjusted in height or angle, manually or by an electric mechanism.
  - It is important to ensure the adjustability of the base is compatible with the mattress, as some mattresses become ineffective if their shape is deformed through tilting.
- Points to be considered in product fitting
  - Trained personnel assemble any moving parts, inflate (if required) and fit the mattress onto the bed.
  - During fitting, the user and competent personnel together check that: the mattress is correctly adjusted for the user and meets the user's mobility and postural support needs to minimize the risk of the user developing secondary deformities or complications.
  - Adding a mattress to a bed, or on top of an existing mattress, may impact on the height of the bed relative to the floor and to other surfaces from which the user is transferring; it may be necessary to adjust the height of the bed legs to ensure the overall night of the bed and mattress combination allows for functional transfers and for caregivers to provide support without manual handling strain.

- Points to be considered in product use
    - Reposition all individuals with or at risk of pressure injuries on an individualized schedule. Collaborate with the user to decide repositioning frequency with consideration to the individual's level of activity, mobility and ability to independently reposition.
    - Reposition the individual in such a way that optimal offloading of all bony prominences and maximum redistribution of pressure is achieved. using manual handling techniques and equipment that reduce friction and shear.
    - Users and caregivers can monitor their own pressure care through regular skin checks and should be encouraged to do so.
- Points to be considered in product maintenance / follow-up
    - The user and caregivers are instructed on how to safely and effectively use and maintain the mattress and who to contact in case of problems.
    - Follow-up appointments are an opportunity to check the mattress and whether it provides adequate pressure relief for the user.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=043306

## 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.*

*ASPREX Fact Sheet*

# Lower limb prosthesis

Assistive device which consists of a selection of compatible components integrated together to replace wholly or in part an absent or deficient lower limb segment. Prostheses are designed to modify the structural and functional characteristics of the neuro-muscular systems of the lower limb; the devices may be custom fabricated or prefabricated devices that may be adjustable or ready to use.

The main configurations are TF (trans femoral i.e. above the knee), TT (transtibial i.e. below the knee) and PF (Partial foot).

The components of the device with the range of raw materials are: a) liner, sleeves and socks, which can be made of ethylene-vinyl acetate (EVA) foam, silicone, gel, urethane, thermoplastic elastomer (TPE), pelite, wool, cotton; socket, which can be made of polypropylene, thermoplastic elastomer (TPE), wood, aluminum, glass- reinforced plastic (GRP), resin, carbon fiber; c) knee joint, which can be made of titanium, aluminum, polypropylene, nylon, wood; d) pylon, which can be made of wood, titanium, aluminum, steel, carbon fiber, glass-reinforced plastic (GRP), polypropylene; e) foot, which can be made of polypropylene, For the cosmetics, common materials are silicone, local fabrics, ethylene-vinyl acetate (EVA) foam.

- Product Classification
  - APL (WHO Assistive Product Priority List): 31 (Prostheses, lower limb)
  - ISO 9999:2022: 0624 (Lower limb prostheses)
- Possible configuration variants
  - Partial foot prosthesis, including toe prostheses (Iso 062403).
  - Ankle foot unit (Iso 062427).
  - Ankle disarticulation prosthesis (Iso 062406).
  - Trans-tibial prosthesis (Iso 062409).
  - Knee disarticulation prosthesis (Iso 062412).
  - Trans-femoral prosthesis (Iso 062415).
  - Hip disarticulation prosthesis (Iso 062418).
  - Trans-pelvic prosthesis (Iso 062421).
  - Temporary prostheses for lower limb amputees (062448).
- Possible accessories or optional components
  - Axial rotators (Iso 062430).
  - Load attenuators (shock absorbers) (Iso 062431).
  - Prosthetic turntable (062432).
  - Knee units (062433).
  - Hip units (062436).
  - External (side) joints for lower limb prostheses (062437).
  - Liners for lower limb prostheses (062440).
  - Sockets for lower limb prostheses (062441).
  - Suspensory components for lower limb prostheses (062442).
  - Alignment components for lower limb prostheses (062445).
  - Structural components for lower limb prostheses (062446).
  - Cosmetic components for lower limb prostheses (062447).

- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Walking [d450].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Stump with infected ulceration or lacking skin integrity.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Avoid secondary complications related to the absence of segments of the lower limbs.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - Better functioning with lower limbs enables better functioning in upright positions, standing, transferring oneself, walking and independence; improved lower extremity functioning can significantly improve many functional activities and participation including to the capacity to work, autonomy in daily living activities, recreation and leisure, use of transport, doing housework, undertaking single and multiple tasks).
  - User: level of amputation, clinical presentation of the residual limb, age, general health, weight, strength, desired mobility level, type of work, and lifestyle.
  - Context: environment (terrain, temperature, humidity), proximity to service providers for maintenance.
  - Find out availability of local or imported materials and components, types of fabrication equipment, and component supply available to the service provider.
  - A prosthetist takes measurements and casts impressions of residual limb. The cast of the stump is modified by the clinician to consider individual biomechanics attributes.
- Points to be considered in product fitting
  - The prosthetist fabricates the socket and assembles components; finally, the prosthesis is fitted and customized to the user´s needs.
  - As an important step to avoid secondary damage, ensure the prosthesis does not cause pain, or apply extra forces that will cause skin injury.
  - Check if the prosthesis provides appropriate stability.
- Points to be considered in product use
  - Functional training is needed for the user, to maximize benefits, ensure safety, and continued use.
  - Gait training and provide education on appropriate maintenance and care.
  - Education on appropriate maintenance and care after the device is provided.
  - Dosage use program.
  - Have a plan on what to do if there is discomfort or injury.
- Points to be considered in product maintenance / follow-up
  - For new users, regular socket fit assessment is needed as changes can occur as stump consolidation takes place.

    - Check the tolerance
    - Follow ups with the user tracks outcomes and troubleshoots issues that may arise after a period of use and are an important feedback loop.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=0624

## 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.*

*ASPREX Fact Sheet*

# Portable ramp

Product which provides a moveable sloping surface that bridges a limited gap between two levels. The purpose of using portable ramps is to move up and down stairs or other adjacent uneven surfaces. Portable ramps are short (usually less than 3.5 meters in length) and usually take the form of a wide platform (single piece), or twin tracks (two thin tracks used together). The ramp ends are shaped to prevent the ramp from sliding during use; and angled for smooth transition onto and off the ramp. Variations include material (usually aluminum), surfaces (non-slip texture or applications such as rubber paint), and lighter weight specialist materials (such as fiberglass or graphite fiber) for ramps which are moved frequently, type of edging or rim, the dimensions and angle of the ramp lip where it intersects with the ground, and any markings or guides for installation and for visual cueing during ramp use.

- Product Classification
  - APL (WHO Assistive Product Priority List): 32 (Ramps, portable).
  - ISO 9999:2022: 183015 (Portable ramps).
- Possible configuration variants
  - Single ramp (one-piece platform).
  - Twin ramp (two thin tracks used together).
- Possible accessories or optional components
  - Carry bag.
  - Additional handrails (for those with mobility impairments who cannot use ramps safely without support for balance e.g. cane users).
  - Wheelchair-mounted storage bag.
  - Handles.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Lifting and carrying objects [d430].
  - Moving around using equipment [d465].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Muscle power functions [b730].
  - Walking [d450]. *Only if used with variants: Twin ramp, Single piece platform,*
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Cognitive difficulty that may impact safe use and wayfinding.
  - Difficulty in seeing (making it difficult to find the dimensions of the ramp particularly its edges).
  - Difficulty in motor planning (controlling speed and trajectory of gait).
  - Poor balance (affecting walking on an angle).
- Indicated environments

  *Specific environments in which the product should be used:*
  - Places without level access (where a moveable, flat supporting surface such as a ramp can bridge the gap between two levels).
  - Rough terrain involving a change in gradient.
  - Stairs.
  - Wheelchair accessible vehicles.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Stairs with more than two steps in height.
  - Places where the presence of a ramp is an obstacle (for example blocking pavements or path of travel for pedestrians: care must be taken to balance the needs of all users of the environment).
  - Environments without stable surfaces for positioning and securing the ramp.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Conditions which affect strength, endurance and motor functions of climbing.
  - Use when pushing wheeled loads and needing to access to the built environment.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - Twin portable ramps: each track should be not less than 15.5 cm wide; is is not suitable for ambulant users, as it is not safe to walk with one leg in each track.
  - Twin portable ramps are intended for wheelchair/wheeled mobility device users; they must be positioned at a distance which enables the wheels to safely fit in either track.
  - Twin portable ramps are lighter weight than wide platform ramps.
  - Wide platform ramps are indicated for people who are ambulant but who find steps difficult, or who need to propel a walking aid or other type of load up several steps.
  - Platform ramps are constructed of more material than twin track ramps and are therefore heavier to transport.
  - Platform ramps can accommodate users walking with mobility devices such as canes, crutches, walkers and three or four wheeled mobility devices.
  - A portable ramp can be carried and transported, but the size of the ramp impacts on the length and gradient of the slope it provides when deployed, as well as the weight for carrying and transporting.
- Points to be considered in product fitting
  - The mechanism of use is to position the ramp, so it is tilted at an angle, with one end higher than the other (inclined plane).
  - As a general guideline the maximum length of a portable ramp should be no more than 3.5m, the height of higher end should not exceed 43.75cm.
- Points to be considered in product use
  - Strength: sufficient for safe, repeated use considering weight of user.
  - Driving surfaces and surfaces of the lips should be non-slip, even in wet conditions.
  - Easy to operate: no squeezing hazard when operating the ramp's folding or telescoping mechanism.
  - The ramp should not unfold or displace during transport.
  - The portable ramp should be able to be mounted/installed without the use of tools.
  - Where the length in use exceeds the maximum transport length, the portable ramp should be foldable, dissembled and/or lengthwise adjustable (telescopic).
  - Ramp length must be at least eight times longer than the height of the step(s).
- Points to be considered in product maintenance / follow-up
  - Check the ramp periodically for wear to surfaces or moving parts and check for any bowing or deformation of the ramp itself.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=183015

## 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.*

*ASPREX Fact Sheet*

# Recorder (or Note recorder or Dictaphone)

Battery-powered handheld or desk top device for recording and playback of sounds, which are stored in digital format; its main functionalities include voice recording facility, fast forward and rewind function, variable speed playback (increase or decrease with sound balance), automatic bookmarking which remembers and starts from the last played positions, internal speakers and a removable memory card. Possible variants concern the storage medium (which can be also a reel-to-reel audio tape, or an external digital support), the batteries (which can be also rechargeable), the bookmarking (which can also be manual), the sound output (which can be also through a headset) and the user interface (which can also be simplified i.e. made easier-to-use by reducing the number of options and having colored and big buttons).

- Product Classification
  - APL (WHO Assistive Product Priority List): 33 (Recorders)
  - ISO 9999:2022: 221803 (Sound recording and playing devices)
- Possible configuration variants
  - Simplified user interface (made easier-to-use by reducing the number of options and having colored and big buttons).
- Possible accessories or optional components
  - External microphone (line-in 3.5 mm jack).
  - USB connectivity.
  - Voice-controlled menu navigation.
  - Speech to text conversion.
  - LCD display with zoom function.
  - Hooks for hanging around the neck.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Using communication devices and techniques [d360].
  - Memory functions [b144]. *Only if used with variants: Simplified user interface*
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (blindness or severe low vision).
  - Memory functions [b144] (support for memorizing information). *Only if used with variants: Simplified user interface*
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Profound hearing loss.
  - Severe hearing loss.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Underwater.

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Audio recording (note taking, recording, playback and listening to audio information such as voice, sounds, music).
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Use by children. *Unless used with variants: Simplified user interface*
  - Use by people with limited familiarity with modern technology. *Unless used with variants: Simplified user interface*
- Points to be considered in product selection
  - A recorder is intended to manage practical problems such as note taking, registering, playback and listing audio information (voice, sounds, music); they are also suitable for creating shopping lists, recording telephone lists, preparing emergency contacts, remembering important reminders, organizing appointments, planning procedures, or scheduling events in the calendar; at school, recorders can be used to record oral assessment, capture classroom discussion or record field trip notes.
  - Ensure that the recorder is simple and easy to use, with very few options, colored and big bottoms if addressed to elderly people, children, people with learning disabilities, or memory limitations.
  - Ensure that the recorder is equipped with color contrasted function raised/shaped buttons, tactile, easy-to-read big letters or symbols, and enlargeable LED displays, if addressed to user with low vision or blindness.
  - Light handhelds note recorders are suitable for mobile use; larger and heavier recorders are suitable for use in a fixed position at home or in the office.
  - For safety and comfort, an additional neck strap or hand strap is recommendable during mobile use.
  - A neck strap is suitable also for one hand use (e.g., blind users using a long cane or a guide dog) or for users with reduced finger mobility.
  - Voice-controlled note recorders are suitable for hands free use or users with hand mobility limitation.
  - Large dimensions of memory is needed for extensive use of recording (hours of recording); external memory, interchangeable memory cards, or USB connection to PC, increase memory capacity.
  - For users with hearing impairment and hearing aid with T-coil sensor, the note recorder needs a line-out 3.5 mm jack (headset connection) to be connected to a personal induction hearing loop (ISO 22.18.30).
  - Recorders with voice-to-text function or connectable to PC with voice-to-text function are suitable for users who need to read or re-read vocal audio registration (blind and visually impaired user, user with hearing loss).
- Points to be considered in product fitting
  - Ensure that the user can switch on/off the note recorder.
  - Ensure that the user correctly locates and manages the main function bottoms: record, stop, play, forward, backward, cancel a record.
  - Show the user where the internal microphone is.
  - To prevent accidental operations such as record elimination, show the protection bottom and explain how to unlock.
  - Check if the user can place, replace, and find a bookmark.
  - If the user encounters difficulties in understanding, increase the volume and slow down the speech speed; if the user likes to listen faster, increase the speed.
  - Ensure that the user can replace or recharge the batteries; if USB recharging is required, make sure that the user can connect to a USB charging point or station.
  - Ensure that the user can change or replace exchangeable memory card.
  - For recording the voice of another person and for maintaining the distance (COVID security), use an external microphone with a long cable.
- Points to be considered in product use
  - Always switch off the recorder when not used.
  - If the memory is full, delete records, change memory card, or transfer records to another device.
  - Check batteries charge and take extra batteries for mobile use out of home.

- If used on the move, a neck strap or a hand strap is advisable.
- Do not record with recorder in a pocket or bag (bad sound quality).
- Never touch the microphone when recording.
- Recording with strong wind may disturb the recording quality; use external microphone with wind protection capsules.
- After using an external microphone with wind protection capsules for recording by another person, clean and disinfect the capsules (COVID security).
- Inform the other person if voice recording has started.

- Points to be considered in product maintenance / follow-up
  - Control if the batteries are full or have enough power for use.
  - If the recorder is not used for a long time, take off the batteries.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=221803

## 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.*

*ASPREX Fact Sheet*

# Rollator

Walking support device composed of a height-adjustable and width-adjustable rigid or foldable frame, equipped with three or four wheeled legs, and brakes.

- Product Classification
  - APL (WHO Assistive Product Priority List): 34 (Rollators)
  - ISO 9999:2022: 120606 (Walking tables)
- Possible configuration variants
  - Contoured handgrips.
  - Tray or basket (to carry objects).
- Possible accessories or optional components
  - Seat (to allow the user to take a rest while walking).
  - Brake locks on the brakes.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Walking [d450].
  - Lifting and carrying objects [d430]. *Only if used with variants: Tray or basket*
  - Moving around in different locations [d460].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450] (severe difficulty in walking).
  - Maintaining body position [d415] (severe difficulty in standing).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Mild difficulty in walking.
  - Moderate difficulty in walking.
  - Severe difficulty in grasping/gripping. *Unless used with variants: Contoured handgrips*
  - Ability to use only one hand.
  - Ability to use only one leg.
  - Severe arms weakness.
  - Severe difficulty in holding things.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Stairs.
  - Sandy places.
  - Uneven ground.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Ensure that the chosen product item is suitable for the person's weight (check in the product documentation or with the provider what is the maximum person's weight the stick can bear).
  - Ensure that the handgrips can be firmly held by the person.
  - Brakes with brake locks are much safer than those without locks.
  - Consider that the three-wheeled configuration is more maneuverable than the four-wheeled one, although not as stable, and thus may be more suitable for indoors rather than outdoor use.
  - If the person gets easily tired, a seat would be helpful to allow occasionally stop and seat.
  - The basket would be very useful when using the rollator during shopping or carrying objects.
- Points to be considered in product fitting
  - Ensure that the frame is adjusted to the correct height: the handgrips should be at the wrist level, when the person is standing with shoulder relaxed, a slight bend in elbow (about 15°), and wearing shoes.
  - Ensure that the frame is adjusted to the correct width: the arms should have a comfortable width apart when holding the handgrips.
  - In case the device is equipped with a seat, adjust it to the highest height that allows both sitting and getting up comfortably.
- Points to be considered in product use
  - When walking, footwear should be well fitted, secure on the feet and supportive.
  - When walking, place the frame just in front of the body, make sure that the brakes are off, slowly roll the rollator forward and step towards it, walking as you do normally; press on the brakes if you want to slow the rollator down when walking.
  - When rising from a chair or bed, put the rollator in front of you and lock the brakes; avoid pulling on it to stand up as it may tip over; move to the edge of the chair/bed, place feet under knees and lean forward; push up with the hands on the arms of the chair or on the bed to stand up, and only take hold of the rollator once standing.
  - When sitting down, stand in front of the chair or bed, with the back of legs touching it; lock the brakes; reach back with the hands to hold onto the chair/bed and slowly sit down.
  - When stopping for a short break, always press the brakes and lock them.
- Points to be considered in product maintenance / follow-up
  - Regularly inspect the brakes, adjust the cables tension if too loose (the rollator should not move when the brakes are fully pressed) and replace them when worn.
  - Regularly inspect the wheels and replace them when worn.
  - Regularly inspect the handgrip and replace it when worn.
  - Replace the rollator with a new one if the frame is broken or damaged.
  - Carry out follow-up checks about every six months and in case the rollator seems to be not used any more, consider the following possible reasons: the frame is broken and needs replacement; it hasn't been fit correctly; the user has not learned correct use; there are health problems affecting the user's mobility; the environment makes it difficult to use the device; the user needs support from others to use the device but does not have the support.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=120606
- 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.*

*ASPREX Fact Sheet*

# Screen reader

Device that uses text-to-speech technology to convert the text into speech and convey the information to people with blindness or low vision, through speakers. They can also work with output devices like refreshable braille display to convert the text on screen to braille. Screen readers are available both in the form of hardware devices that can be connected to computer systems to read or create speech through their own built-in sound systems, and in the form of software applications within the computer system whereby they use the sound system of the same computer. The screen readers can also be connected with another device such as a refreshable braille display (RBD) to display the on-screen text as braille output.

Various types of screen readers are available on the market. Nowadays, most screen readers come in the form of software applications that are either pre-installed/built-in, or can be installed in almost all computers, smart phones and tablets. There are screen readers that have been designed for various operating systems in computers and smart phones, including Windows, MAC, Android, or iOS. However, there may be some screen readers that are more suitable for a specific operating system or a software application. So, a user may at times be restricted to use only a specific brand or type of screen reader depending upon what smart phone, tablet, or computer operating system they have. Almost all the modern-day devices including computers, tablets and mobile phones already have built-in screen reading applications but only a very few are good enough to serve the needs of users. For users who like to use both speech and braille for learning, the screen readers can also produce braille to be displayed on RBD device or printed by embossers.

- Product Classification
  - APL (WHO Assistive Product Priority List): 35 (Screen readers)
  - ISO 9999:2022: 223912 (Software for output devices)
- Possible configuration variants
  - Headphones or earphones.
  - Braille display.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Using communication devices and techniques [d360].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (blindness or severe vision loss).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Deafblindness. *Unless used with variants: Braille display*
- Indicated environments

  *Specific environments in which the product should be used:*
  - Compatible computer operating systems (like any software application, it only works with the devices and related operating system versions indicated by the manufacturer for each product item).

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Noisy places (a quiet and noiseless environment is needed for a user to fully understand what they learn from screen readers; any amount of noise, especially in busy workplaces, can negatively affect their understanding). *Unless used with variants: Headphones or earphones*
  - Places with other people around who should not be disturbed. *Unless used with variants: Headphones or earphones*
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Conveying the contents displayed on the computer screen though braille. *Only if used with variants: Braille display*
  - Conveying the contents displayed on the computer screen though speech. *Only if used with variants: Headphones or earphones*
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - The choice of the screen reader product model depends on the needs of the user and the purpose for which the product is intended.
  - The screen readers are good to read almost all the text displayed on screen, but they are limited when there is some graphical information, diagram, or picture on the screen.
  - When reading text from webpages, screen readers do not consider the colors or layout of the webpage. This may cause some users to be confused as they try to understand the information received, if the colors are important for any particular piece of information.
  - The voice emitted from the screen reader may not be close to human voice, which may also cause comprehension issue for some users.
  - Some of the well-known and most user-friendly screen reading applications are expensive. It is not easy or affordable for most users with limited financial resources or users in poor countries to get it. There are some screen readers that are available as freeware which users can freely get but then their usability may depend on the type of users' hardware devices.
  - There are several technological issues involved when using screen readers, including product price – which is very high for good quality screen readers, price and availability of other applications and operating systems that are required for screen readers to work, price and quality of computer or mobile security application i.e. antiviruses.
  - Users need to be technologically literate to be able to understand and effectively use the software and hardware components of the screen readers. Users need to be trained for the use of technology.
- Points to be considered in product fitting
  - As the screen readers are electronic battery or electricity powered devices, users must be trained to properly manage them and replace or charge batteries when required.
  - Different people have different preferences and feel comfortable in using a particular type of screen reader depending upon the voice type, level of volume, language, speed of speech, and ease of using the software and hardware.
  - Training can help in making a user understand and operate the device effectively
- Points to be considered in product use
  - If used in an environment where there are other people, headphones would probably be required in order to avoid disturbing others.
  - Other issues include whether a user needs a RBD or audio output.
- Points to be considered in product maintenance / follow-up
  - Software updates must be installed regularly.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=223912

## 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.*

*ASPREX Fact Sheet*

# Simplified mobile phone

Mobile phone that is simplified in its functionality, user interface, and features. Primary product features include the ability to make and receive mobile phone calls and send and receive text messages. Simplified mobile phones require a subscription to cell phone service.

Additional features may include extra loud and clear sound, large accessible keys, and high contrast display. In addition to the basic features described above, simplified mobile phones can vibrate in response to incoming calls. Many mobile phones include the ability to have a phone book of contacts. In conjunction with a phone book, a mobile phone may have the capability of designating a few contacts with speed dial short cut keys. Phones can be water-resistant. Typical additional features of simplified mobile phones may include calendar, calculator, alarm, camera, flashlight, and stopwatch.

- Product Classification
  - APL (WHO Assistive Product Priority List): 36 (Simplified mobile phones)
  - ISO 9999:2022: 222407 (Devices mainly for speech communication)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Single emergency SOS button (to enable the person to activate a single key to summon emergency care).
  - Compatibility with hearing aids.
  - GPS locator.
  - Charging station.
  - Headset (the headset connection may be cabled or wireless, typically through Bluetooth).
  - Wi-Fi (a phone that includes wi-fi will enable the user to access the Internet and send and receive email).
  - Android Go (simplified version of the Android operating system, which gives users access to simplified version of apps such as YouTube, Google Maps, Facebook making them easier to use).
  - Voice output (to make navigating phone functions easier).
  - Voice recognition (voice commands simplify access to phone functions).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Using communication devices and techniques [d360].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Intellectual functions [b117].
  - Seeing [b210].
  - Hearing [b230].
  - Fine hand use [d440].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in fine hand use.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

*Environments in which the product may be inappropriate:*

- Areas with no or limited cell phone coverage.
- Places where electricity is not available to maintain battery charge.

- Other indicated factors

*Other factors or situations the product is intended to address:*

- Use by people with limited familiarity with modern technology.
- Phoning and messaging.
- Accessing the Internet

- Other contraindicated factors

*Other factors or situations in which the product may be inappropriate:*
None specified.

- Points to be considered in product selection
  - The size of the screen and the size of the font should be appropriate for the user's abilities.
  - The input technique and user interface should match the individual's functional abilities, i.e. the size of the buttons or the necessity of a physical keyboard.
  - A phone service must be available and paid for.
  - Appropriate emergency contacts must be identified.
- Points to be considered in product fitting
  - Configuring simplified interface.
  - Programming short cut keys.
  - Appropriate emergency texts and messages must be programmed. The user may require assistance to perform these tasks.
  - The user should be trained in the proper use, programming, and maintenance of the device.
- Points to be considered in product use
  - Person needs the psycho-social abilities to use the phone appropriately.
  - The phone battery must be kept sufficiently charged.
  - Language of the device should be familiar to the user.
  - Device should have good connectivity to the mobile service.
- Points to be considered in product maintenance / follow-up
  - Maintain good battery life.
  - Maintain phone service: user should have the ability to pay for the service.
  - Maintain appropriate emergency texts and messages.
  - Availability of electricity to maintain battery charge.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222407

## 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.*

*ASPREX Fact Sheet*

# Contact lenses

Thin, clear, and curved lenses made of plastic, that can be worn in eyes to improve vision. They float on a film of tears on the surface of eye. The lenses are given a slight tinge of color to make them easier for users to spot and handle. Contact lenses are primarily of two types: hard and soft. Just like spectacles, contact lenses are helpful in correcting and improving vision for people with refractive errors such as, myopia (nearsightedness), hyperopia (farsightedness), astigmatism, and presbyopia. Other than wearing contact lenses that are meant for vision correction, there are contact lenses which are used purely for cosmetic purpose as a fashion statement. All contact lenses - vision correcting and cosmetic ones - are regarded as medical devices, that are regulated by health departments and can be provided under prescription only. The reason being the possibility of an eye infection or inflammation due to the use of contact lenses.

Contact lenses can be categorized based on various criteria such as material, purpose, and duration of use. In relation to the material, there are two possible variants:

- Rigid Gas Permeable (RGP) Contact Lenses (Hard Contact Lenses); they are more durable and provide a clearer and sharper vision; handling RGP contact lenses is easier than soft lenses and they are also less likely to be torn than soft lenses; they maintain their shape firmly due to hardness but can also let oxygen flow through the lens to the eyes. RGP lenses are good for people with astigmatism as well as for people having keratoconus (progressive tinning of cornea) because they can provide sharper and crisper vision as compared to soft lenses; RGP lens is also good for people who have eye allergies or people who often get protein deposited on their contact lenses; however,, compared to soft contact lenses, they are not much comfortable to wear in first few weeks.
- Soft Contact Lenses: they are made of a soft gel-like, water-containing plastics called hydrogels; the thin material allows the oxygen to pass through to the cornea; the softness of the contact lenses makes it easier for users to adjust to them comfortably in a matter of few days; newer soft contact lenses are made of silicone-hydrogel and are more porous than hydrogel lenses; they allow more oxygen to reach the eyes; silicone hydrogel contact lenses are widely prescribed in the world now.

In relation to the duration of use, there are two possible variants:

- Daily Wear Contact Lens: they can be worn during the daytime but must be removed at night before sleeping.
- Extended Wear Contact Lens: they can be worn overnight and for several days without removing them. Some extended wear contact lenses are classified as continuous wear with time ranging up to 30 days; extended wear contact lenses are soft contact lenses.

- Product Classification
  - APL (WHO Assistive Product Priority List): 37 (Spectacles; low vision, short distance, long distance, filters and protection)
  - ISO 9999:2022: 220306 (Spectacles and contact lenses)
- Possible configuration variants
  - Lenses for long distance vision (concave in shape, available in different powers or diopters).
  - Lenses for short distance vision (convex in shape, available in different powers or diopters).
  - Bifocal lenses (lenses allowing focusing on objects both at a distance and at close-up).
  - Multifocal lenses (lenses allowing focusing on objects at long distance, medium distance and nearby; they are also called progressive lenses as they are capable of changing their power as the user changes focus).
  - Toric lenses.

    - Prosthetic lenses.
    - Bandage lenses.
    - Lenses for sport activities.
- Possible accessories or optional components
    - Lens case with two containers marked right and left.
    - Cleaning and disinfecting solution.
    - Soft tweezer.
    - Soaking solution.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
    - Seeing [b210].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
    - Seeing [b210] (difficulty due to eye refractive error).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
    - Eye infections.
    - Severe allergic reactions.
    - Inflammation of the eyelids.
    - Problems with eye lubrication (dry eye syndrome).
    - Difficulty in fine hand use.
- Indicated environments

  *Specific environments in which the product should be used:*

  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
    - Windy places.
    - Dusty places.
    - Dirty places.
    - Smoky places.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
    - Myopia. *Only if used with variants: Lenses for long distance vision*
    - Hyperopia. *Only if used with variants: Lenses for short distance vision*
    - Presbyopia. *Only if used with variants: Bifocal lenses, Multifocal lenses*
    - Astigmatism. *Only if used with variants: Toric lenses*
    - Refractive errors and X chrome for photophobia.
    - Corneal opacity. *Only if used with variants: Prosthetic lenses*
    - Need to control release of eye drops. *Only if used with variants: Bandage lenses*
    - Use in sport activity. *Only if used with variants: Lenses for sport activities*
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
    - Poor hygiene.
    - Inability to replace lenses at required interval.
- Points to be considered in product selection

- Age of the user: Using and handling contact lenses needs a special care and practice. Hence, they are not ideal for younger children. Middle-aged and older adults are at high risk of having a dry eye. Wearing contact lenses of any type can be uncomfortable for them .
- Cost of contact lens: Contact lenses are relatively expensive compared to spectacles and must be considered when prescribing to a person who might face difficulty in purchasing them.
- Surroundings or the environment of a user: The nature of work of a person or their surroundings must be considered when prescribing them contact lenses.
- Material of contact lens: Soft lenses are used by majority of the people all over the world as it is more comfortable to wear and quicker to adjust to.

- Points to be considered in product fitting
  - Wearing silicone hydrogel lenses may also reduce the symptoms of dry eye. This is because silicone allows more oxygen to flow to the eye, which is essential for producing healthy natural tears.
  - A trained eye health professional should prescribe contact lenses to people as different contact lenses are made from different materials and different sizes. One material and one size does not suit everybody. Some materials may cause discomfort or eye infections.
  - All contact lenses, even purely cosmetic ones, are considered medical devices and require a prescription.
  - Prescription of continuous-wear contact lens depends on lens type and users' tolerance for overnight wear.
  - The prescription of contact lenses is done on yearly basis and a user needs to be reexamined annually for fitting of new contact lenses.
  - Users need to be trained to properly use their contact lenses. They must be educated and trained on how to keep their contact lenses clean and safe and how to wear them or remove them.
- Points to be considered in product use
  - Users need some time to adjust to the contact lenses. They must be informed to be extra careful when wearing and using contact lenses .
  - Contact lenses have a risk of causing severe eye infections or injuries to eyes. These can be prevented through clean and safe handling of contact lenses. Following good hygiene (clean hands, eyes, and lenses) is of key importance in ensuring long-term use of contact lenses. Taking regular breaks from wearing lenses also helps.
  - Using contact lenses may cause various problems, such as stinging, burning, itching or any pain in eye, discomfort over time, excessive watering of the eyes, unusual secretions from eyes, redness of the eyes, sensitivity to light .
  - A user should immediately remove the contact lenses in such cases and contact their doctor.
  - Contact lenses should be replaced frequently to prevent any lens related deposits in the eye and contamination.
- Points to be considered in product maintenance / follow-up
  - The users need to be advised on proper method of cleaning the contact lenses.
  - Contact lenses, when not in use, should be stored in the relevant case for left and right eye lens, soaked in a special storage solution that keeps them from getting dried while stored.
  - The case must be rinsed with disinfecting solution to clean it of any dust before storing the lenses in it.
  - The contact lenses should never be cleaned or rinsed with water. They must be cleaned periodically as recommended by the eye care professional, and thoroughly rinsed with a good quality disinfecting solution to clean them of any dirt, or mucous.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=220306

## 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.*

# Spectacles

Vision correction devices, also known as glasses or eyeglasses, consisting of glass or hard plastic lenses (CR39 or Polycarbonate) mounted in a frame made of plastic or metal that holds them in front of a person's eyes, typically utilizing a bridge over the nose and legs (known as temples or temple pieces) which rest over the ears. Spectacles are used for vision correction of people with vision impairment due to refractive error. The selection of the lenses for a user depends on what type of vision impairment the user has, such as lens with plus diopters (for hyperopia or presbyopia), or minus diopters (for myopia), lens with spherical correction (for hyperopia, presbyopia or myopia), or lens with cylindrical correction (for astigmatism), and their preference in terms of the material of the lens.

As there are different types of refractive error, there are spectacles that serve different needs accordingly. We can categorize spectacles as spectacles for long distance vision, and spectacles for short distance vision. There are also special purpose spectacles that include filters and protective glasses that are meant to provide protection to eyes during activities that may harm them; these are classified within category 220303 (light / adsorption filters) of the ISO Classification.

Customized spectacles are made according to prescription of individual wearer and are ideal solution for correction of refractive errors.

Ready-made spectacles are spectacles with pre-fitted lenses with same power in both eyes, suitable for a significant proportion of people with refractive errors, particularly Presbyopia.

Self-adjusting spectacles are broadly grouped into two types: 1) liquid-filled systems that utilize the change in shape created when liquid is inserted into or drawn from a flexible membrane; 2) Alvarez type systems that use two lenses moving horizontally relative to each other in order to change spectacle lens power. Both groups of self-adjustable spectacles currently only provide spherical refractive error correction.

Safety spectacles provide eye protection from occupational injuries, infections, exposure to glare or radiation. They are made of break-proof plastic lenses. Nylon frames are usually used for protective eyewear because of their lightweight and flexible properties. Unlike most regular glasses, safety glasses often include protection beside the eyes as well as in front of the eyes.

Spectacles can also provide magnification that is beneficial for people with low vision or any particular educational and occupational needs. An example would be high powered plus lenses fitted in a spectacle frame to provide near vision magnification. Telescopes can also be fitted in spectacles for near and far viewing. The material of a lens can be of different types:

- glass lenses: this is an old traditionally used lens, a low-cost lens that is easily affordable, but its downside is that it is easily breakable and also heavy; due to the fact that a glass lens has a high risk of getting broken at a slight impact and could cause damage to one’s eyes, the glass lens is not advisable and very rarely used.
- plastic lenses, more commonly known as CR 39 lenses. It is much lighter than the glass lens, and more impact resistant; these are also low-cost lenses and easily affordable.
- polycarbonate lenses: they are much more impact resistant as compared to glass and CR39 lenses, and much lighter in weight; even though these lenses cost more than the CR39 lenses, they provide a lot of safety to the user; this is why they are mostly recommended for children and people who are engaged in any outdoor physical activity.
- high-index plastic lenses: they are lighter than all the other lens types and considerably more impact-resistant.

- Product Classification
  - APL (WHO Assistive Product Priority List): 37 (Spectacles; low vision, short distance, long distance, filters and protection)
  - ISO 9999:2022: 220306 (Spectacles and contact lenses)
- Possible configuration variants
  - Concave lenses (thinner in the center and thicker in the periphery: for people with myopia, that is near or shortsightedness).
  - Convex lenses (thicker in the center and thinner on the sides: for people with hyperopia, that is farsightedness along with difficulty to see things at a short distance).
  - Cylindrical lenses (more curved in one direction: for people with astigmatism, that is far farsightedness along with difficulty seeing things at a short distance).
  - Prism lenses (for prism correction in people with strabismus).
  - Bifocal lenses (lenses with two sections: the upper section helps focusing on objects at a distance and the lower sections on objects close up).
  - Trifocal lenses (lenses with three sections in the lens: the upper section helps focusing on objects at a distance; the middle section helps focusing on objects that are neither very far nor very close; the lower section helps users focusing on objects at a close distance enabling tasks that require close focus such as sewing or reading).
  - Progressive multifocal lenses (providing greater flexibility in all kind of tasks whether they need to focus on things at a distance or near-by; the term progressive multifocal means the lens can change its power as the focus changes; unlike bifocal and trifocal lenses, a progressive multifocal lens is a single lens but with an ability to change powers for various focal points).
  - Telescopes (for high magnification near and far viewing).
- Possible accessories or optional components
  - Carrying case.
  - Cleaning cloth.
  - Nose pads.
  - Cleaning liquid.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Seeing [b210].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (difficulty due to eye refractive error).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*

  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*

  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*

  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Myopia. *Only if used with variants: Concave lenses*
  - Hyperopia. *Only if used with variants: Convex lenses*
  - Astigmatism. *Only if used with variants: Cylindrical lenses*
  - Strabismus. *Only if used with variants: Prism lenses*

- Presbyopia. *Only if used with variants: Bifocal lenses, Trifocal lenses, Progressive multifocal lenses*
- Severe vision loss. *Only if used with variants: Telescopes*

- Other contraindicated factors

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

  None specified.

- Points to be considered in product selection
  - Age of the user: the selection of a frame depends on whether the user is child or adult.
  - Sex of the user: there are different designs of frames catering for the needs of male and female users.
  - Cost of the spectacles: there overall cost must be considered when prescribing them to a person who might face difficulty in purchasing them.
  - Use environment: the type of work the person does or the surroundings where the persons lives must be considered when selecting the appropriate lenses and the spectacles frame.
  - Frame material: the material of spectacle frame is primarily plastic or metal. Within the plastic category, there are various types of plastic that can be used ranging from a material known as Cellulose Acetate or Zyl (a lightweight, inexpensive and colorful material), to Polycarbonate and Nylon. The plastic frame is not as strong as a metal frame and can get broken easily if not cared for. The plastic may also get worn over long time with exposure to various weather conditions, mainly extreme heat. However, unlike metal frames, the plastic frames do not get warm in sunlight or extreme heat. Some people may also have allergic reaction to certain metals and therefore an eye health practitioner needs to check these before prescribing. The metal frame can also be of various metals including titanium, beryllium, stainless steel, aluminum, nickel and copper. Some more expensive options within the metal category are silver and gold, which are obviously not affordable for an ordinary user.
  - Frame style: In terms of style of frames, there are various types of frames that users may prefer depending upon their need, liking or that can be prescribed by an eye practitioner based on a patient's comfort and safety; some of the well-known types of frame styles are full-rimmed frames, semi-rimmed frames, rimless frames and low-bridge frames.
  - Factors Impacting the use of spectacles: even though spectacles are an important device that helps individuals in better seeing, there are several socio-economic factors that may prevent an individual from wearing or using spectacles. These socio-economic factors may include: 1) Cost of spectacles that may not be affordable for many poor people; 2) Spectacles are mostly available in private sector optical shops, which operate as a commercial enterprise outside the health systems; 3) Spectacles need to be prescribed by a trained eye health professional in a clinic equipped with the necessary hardware, however there is a global scarcity of eye health personnel who can undertake good quality refraction; 4) The prescription of the spectacles routinely changes, and client needs to be reexamined yearly for fitting of new spectacles; 5) Communities perceive often spectacles as fashion accessories that affect the cost of spectacles; 6) Community perceptions about women/girls wearing spectacles is sometimes negative and parent avoid getting spectacles for girls due to various socio-economic factors; 7) Another common perception is that spectacle wear makes vision worse; 8) Community or peer pressure that might make an individual embarrassed or uneasy wearing spectacles; 9) Many children have to face bullying or demeaning comments from other students, with regards to their use of spectacles; 10) Lack of, or unavailability of good spectacle provision services in remote areas; 11) Lack of trained spectacle technicians in remote areas.
- Points to be considered in product fitting
  - Users need to be trained to properly use their spectacles; on how to ensure the safety of spectacles and saving them from scratches.
  - Users also need to be made aware of the importance of eye health and the use of spectacles or other assistive devices so that they do not get discouraged by other members of their community.
- Points to be considered in product use
  - The spectacles when not worn must be kept in a hard case to avoid breakage.
- Points to be considered in product maintenance / follow-up
  - The lenses tend to get starched due to dust or friction from surfaces.
  - The users need to be advised on proper method of cleaning the spectacle frames and lenses.
  - The spectacle frame tends to lose adjustment and need to be regularly adjusted so that they maintain the correct placement on the face.

- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=220306

## 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.*

*ASPREX Fact Sheet*

# Adjustable standing frame

Device that provides support for standing posture. Ordinary standing frames support posteriorly, which is beneficial for those with limited trunk, head, and neck control. The primary support is at the pelvis and knee. Standing frames typically comprise hip supports, lateral supports, and head support. Additionally, footplates and kneepads are included. Standing frames are usually highly adjustable for multi-user settings or to accommodate growing children.

Variants include prone standing frames (which provide support anteriorly using the force of gravity on the head and neck to facilitate strengthening and increased control; these standing frames counteract extensor tone and allow for gradual progression to standing position) and mobile standing frames (which provide for standing posture; while not a mobility device, casters and wheels enable assisted movement). Product features may also include the ability to transfer the person from a seated position to the standing frame. Standing frames may also contain unique support systems, straps, and pads for varying user needs.

- Product Classification
  - APL (WHO Assistive Product Priority List): 38 (Standing frames, adjustable)
  - ISO 9999:2022: 044839 (Standing frames and supports for standing)
- Possible configuration variants
  - Prone standing frame.
  - Mobile standing frame.
- Possible accessories or optional components
  - Powered assists, i.e Hydraulic pump, to move the frame to a standing position.
  - Supportive tray that follows the user from sitting to standing.
  - Upper extremity resistance exercise (the adjustable resistance cylinders are accessible to the user while they are in the standing position, so they can easily adjust the resistance).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Maintaining body position [d415] (standing).
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Muscle tone functions [b735].
  - Transferring oneself [d420].
  - Changing body position [d410].
  - Maintaining body position [d415] (severe difficulty in standing).
  - Muscle power functions [b730].
  - Vestibular functions [b235]
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Limited hip, knee and ankle mobility.
  - Severe scoliosis.
- Indicated environments

  *Specific environments in which the product should be used:*

- Indoors.

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.

- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Risk of painful, problematic and costly secondary complications due to long-term sitting (especially of wheelchair users).
  - Conditions such as cerebral palsy and spina bifida.
  - Musculoskeletal factors such as tight hip, knee or plantar flexors and mild joint contractures.

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Standing is an effective way to ameliorate many of the negative effects of constant sitting. Enabling standing has a number of benefits including: maintaining vital organ capacity; reducing the occurrence of urinary tract infections (UTIs); maintaining bone mineral density; improving circulation; improving passive range of motion; reducing abnormal muscle tone and spasticity; reducing the occurrence of pressure sores; reducing the occurrence of skeletal deformities; enhancing psychological well-being. People who use standing frames often experienced improved self-esteem, self-confidence, and overall improved abundance of life. Additionally, studies show that wheelchair users have experienced significant reduction in spasticity and have suffered fewer pressure sores while using standers.
  - A musculoskeletal assessment: this includes assessing the range of motion of their hips, knees and ankles, and a postural assessment of the spine and pelvis.
  - The individual's mobility level.
  - The method of transfer to and from the standing frame.
  - The activities the user will pursue while in the standing frame.
  - The availability of care giver to position user.
  - The attitude of the user toward using a standing frame.
  - The type of stander to be used (anterior, posterior support) The environment the standing frame will be used in including the physical space available for the equipment.
  - The surfaces and attachments necessary to support the user.
  - The need for mobility of the standing frame.
  - Transportation of the equipment.

- Points to be considered in product fitting
  - Adjust standing frame for height of individual; special attention should be given to the fitting of the hip and knee supports.
  - Adjust seat depth, back angle, footplate height, and kneepad height and handle height.
  - Adjust resistance of exercise cylinders.
  - Adjust straps.

- Points to be considered in product use
  - Existing contractures: overstretching contracted muscles may cause harm, especially in a user with limited sensation.
  - Skeletal deformities: special accommodations may have to be provided for people with significant deformities, especially if those deformities are not flexible; skeletal alignment should be carefully observed while standing. In some cases of severe deformities, the use of standing frames may be contraindicated.
  - Lack of standing tolerance: standing tolerance should be assessed. For example, use may start in 10-minute intervals when assessing tolerance. In most cases, a one-hour limit should be placed on standing.
  - Bone Mineral Density (BMD) loss: existing BMD loss and osteoporosis might cause fractures if attempting to stand prematurely and without a well-designed progressive standing program.

    - Postural hypotension: blood pressure and dizziness should be checked while standing up, especially for individuals with recent injuries and who are new to a standing frame.
    - Ensure adjustments are tight and secure.
    - When positioning an individual in a standing frame secure pelvic and chest supports first.
    - When not being moved, lock wheels or casters.
    - Do not move over uneven surfaces.
    - Do not leave standing frame on a sloping surface.
- Points to be considered in product maintenance / follow-up
    - Maintain all upholstery and straps in good order.
    - Keep all surfaces and clean.
    - Maintain all adjustments in good order.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=044839

## 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.*

*ASPREX Fact Sheet (in construction)*

# Therapeutic footwear

Pair of shoes or sandals with a removable insole that adds extra depth and cushioning, or footwear that allows the use of custom-made insoles. They usually have adjustable closures to ensure a snug-fitting upper to hold the foot in place on the insole preventing restriction and shear forces on the skin; wide and deep toe boxes; a wide heel base; a cuff around the ankle with rolled seams to prevent friction; built-in forefoot rocker; rocker bottom soles; and adjustable straps or shoelaces.

- Product Classification
  - APL (WHO Assistive Product Priority List): 39 (Therapeutic footwear; diabetic, neuropathic, orthopedic)
  - ISO 9999:2022: 090342 (Shoes and boots)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Walking [d450].
  - Caring for body parts [d520].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Protective functions of the skin [b810].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Diabetic at-risk feet.
  - Neuropathic at-risk feet.
  - Foot deformities.
  - Ankle deformities.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection

  None specified.
- Points to be considered in product fitting

  None specified.

- Points to be considered in product use

  None specified.
- Points to be considered in product maintenance / follow-up

  None specified.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=090342

## 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.*

*ASPREX Fact Sheet*

# Timepiece

Device (typically a table clock or a wristwatch) that has the capability of primarily displaying the time and date; output can be a visual display, and/or auditory and vibratory; alarm function may be included. Time can be presented in either 12 hour or 24-hour formats. Stopwatch and countdown functions may be included.

Some time management products can receive information from other sources and present it to the user. Some devices utilize a remote signaling function such as a pillow vibrator. Some devices can be controlled by remote switches.

- Product Classification
  - APL (WHO Assistive Product Priority List): 40 (Time management products)
  - ISO 9999:2022: 222803 (Clocks and timepieces)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Carrying out daily routine [d230].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210].
  - Memory functions [b144].
  - Experience of self and time functions [b180].
  - Focusing attention [d160].
  - Orientation functions [b114].
  - Looking after one's health [d570].
  - Doing housework [d640].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in understanding basic concepts of dates, times, and task accomplishment.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Memory difficulties due to conditions such as traumatic brain injury, aneurysm, stroke, intellectual impairment or dementia.
  - Knowing the time.
  - Maintain a schedule and time events in the user's daily life.
  - Presenting the date and time in a simple, easily recognizable way.

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - What kind of display is best for the user by assessing the person's functional abilities.
  - Are alternative outputs, e.g. vibration or auditory, appropriate for user?
  - Should the device be worn, e.g. wristwatch or tabletop?
  - Are other options required, e.g. stopwatch, timer, alarm?
  - Should device be battery operated?
- Points to be considered in product fitting
  - Use of 12- or 24-hour time format.
  - Messages alarms, and reminders must be programmed to meet the specific needs of the user.
  - If used, photos, pictograms and graphics must be chosen and programmed.
  - Appropriate language must be chosen.
  - Appropriate output modality must be chosen.
- Points to be considered in product use
  - Reminders, messages, and alarms must be kept up to date.
  - Pictograms and graphic elements must be kept up to date.
  - Time and date must be kept up to date.
  - User must be trained to perform functions and programming of the device.
- Points to be considered in product maintenance / follow-up
  - Correct time and date must be maintained.
  - Battery must be maintained
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222803

## 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.*

*ASPREX Fact Sheet*

# Calendar-timetable

Electronic device with a display that shows the day of the week, and date. Additionally, it can display the time of day, reminders, messages, and lists, e.g. chores, to do lists, etc.

In addition to stand-alone devices, calendars and timetables can also be implemented on smart phones and tablets with appropriate software and apps. Reminders and prompts can be provided at specific dates and times through an automated telephone call service. In addition to text and numbers, calendars can consist of pictograms to indicate date and reminders. Some electronic calendars have also the ability to display photos and videos.

- Product Classification
  - APL (WHO Assistive Product Priority List): 40 (Time management products)
  - ISO 9999:20226: 222806 Calendars and timetables)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Carrying out daily routine [d230].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Experience of self and time functions [b180].
  - Orientation functions [b114].
  - Attention functions [b140].
  - Memory functions [b144].
  - Looking after one's health [d570].
  - Doing housework [d640].
  - Seeing [b210].
  - Experience of self and time functions [b180]
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in understanding basic concepts of dates, times, and task accomplishment.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Memory difficulties due to conditions such as traumatic brain injury, aneurysm, stroke, intellectual impairment or dementia.
  - Maintaining a schedule and time events in the user's daily life.
  - Presenting the date and time in a simple, easily recognizable way.

- Recording reminders.

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - What kind of display is best for the user?
  - Should device be battery operated?
  - Are other options required, e.g. ability to show photos, messages, tasks.Is internet connection desired/required?
  - Is alarm or reminder functions required?
  - Is an automated telephone service desirable?
  - Are pictograms necessary to represent different days or corresponding events, which can be understood intuitively?

- Points to be considered in product fitting
  - Use of 12- or 24-hour time format.
  - Messages alarms, and reminders must be programmed.
  - If used, photos, pictograms and graphics must be chosen and programmed.
  - Appropriate language must be chosen.
  - Appropriate output modality must be chosen.

- Points to be considered in product use
  - Reminders, messages, and alarms must be kept up to date.
  - Pictograms and graphic elements must be kept up to date.
  - Time and date must be kept up to date.

- Points to be considered in product maintenance / follow-up
  - Correct time and date must be maintained.
  - Battery must be maintained

- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222806

## 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.*

*ASPREX Fact Sheet*

# Memory support device

Cognitive aid that provides prompts and reminders. It can create lists of tasks organized with priorities, due dates, and tags based on information provided by the user.

Configuration of memory support products include small tabletop computerized devices as well as small tags, keychain fobs, pill dispensers, small wearable devices, and software and apps for smart phones and tablets. Some memory products can be connected to the Internet enabling prompts and information to be sent by family members and caregivers. Messages and prompts can be triggered by various sensors, e.g. motion sensors.

- Product Classification
  - APL (WHO Assistive Product Priority List): 40 (Time management products)
  - ISO 9999:2022: 222812 (Memory support products)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Carrying out daily routine [d230].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Orientation functions [b114].
  - Memory functions [b144].
  - Experience of self and time functions [b180].
  - Seeing [b210].
  - Focusing attention [d160].
  - Looking after one's health [d570].
  - Doing housework [d640].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in understanding basic concepts of dates, times, and task accomplishment.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Memory difficulties due to conditions such as traumatic brain injury, aneurysm, stroke, intellectual impairment or dementia.
  - Reminders and notifications for memory tasks such as taking medications.
- Other contraindicated factors

*Other factors or situations in which the product may be inappropriate:*
None specified.

- Points to be considered in product selection
  - What kind of display is best for the user?
  - What is the best input method?
  - Should device be battery operated?
  - Is there a need to track objects?
  - Dedicated device versus an app for a smart phone or tablet.
  - Are alternative outputs, e.g. vibration or auditory, appropriate for user?
  - Should device be wearable or tabletop?
  - Size of memory or number of reminders available.
  - Ability to dispense medications.
  - Is internet connection desired/required?
  - Ability to connect to email, text, IM, social media, and mobile notifications.
  - Is language other than English desired?
  - Are pictograms or other graphic elements necessary to represent tasks and reminders?
  - Are sensors, e.g. motion sensors, required to trigger reminders?
- Points to be considered in product fitting
  - Use of 12- or 24-hour time format.
  - Messages alarms, and reminders must be programmed.
  - If used, photos, pictograms and graphics must be chosen and programmed.
  - Appropriate language must be chosen.
  - Appropriate output modality must be chosen.
  - Appropriate input modality must be chosen and configured.
- Points to be considered in product use
  - Reminders, messages, and alarms must be kept up to date.
  - Pictograms and graphic elements must be kept up to date.
  - Time and date must be kept up to date.
  - Reassessment of user's cognitive abilities to ensure appropriateness of device.
- Points to be considered in product maintenance / follow-up
  - Correct time and date must be maintained.
  - Battery must be maintained.
- Examples of products available on the market
  - Live product search in the EASTIN website
    https://www.eastin.eu/en/searches/products/list?iso=222812

## 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.*

*ASPREX Fact Sheet*

# Portable travel aid

Electronic device for guidance that provides information to determine the user's relative position in a certain area. These assistive technology devices typically use GPS to inform the user about their location. Many utilize a smart phone or tablet as the hardware to run a proprietary app.

In addition to using GPS data, some devices enable the user and caregivers to create and upload customized content such as routes and landmarks. Points of Interest (POI) data can be uploaded from various sources such as, Apple, Foursquare and Open Street Map (OSM). Output can consist of a visual display as well as synthetic voice. Indoor maps can be created from building drawings to be used for navigation without the use of GPS. Possible accessories or optional components include algorithms to inform the user of information most useful to them; possibility to save positions and routes to be retrieved later: and voiceover is used to enable hands-free operation. Some devices use indoor positioning systems enabling wayfaring indoors.

- Product Classification
  - APL (WHO Assistive Product Priority List): 41 (Travel aids, portable)
  - ISO 9999:2022: 224503 (Assistive products for electronic orientation)
- Possible configuration variants

  None specified.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Moving around in different locations [d460].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Using transportation [d470].
  - Seeing [b210].
  - Intellectual functions [b117].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in understanding basic concepts of dates, times, and task accomplishment.
  - Difficulty in fine hand use.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Situations obstructing the GPS signals (such as places surrounded by tall building, bad weather, or indoors spaces of buildings that are not equipped with GPS repeaters or indoor positioning systems).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Assisting navigation.

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - The need for and access to an appropriate smart phone or tablet.
  - The need for outdoor and/or indoor navigation.
  - The ability of the user to manipulate the device.
  - The ability to program and/or upload appropriate information.
- Points to be considered in product fitting
  - Use of appropriate smart phone or tablet.
  - Uploading of appropriate data for navigation.
  - Appropriate output to accommodate user abilities and impairments.
  - Appropriate input method to accommodate user abilities and impairments.
- Points to be considered in product use
  - Batteries must be maintained and charged.
  - Operating system of smart phone or tablet must be up to date.
  - Point of interest data must be up to date.
  - For indoor navigation, appropriate tags or data must be up to date.
  - For outdoor navigation, access to GPS signal is necessary.
- Points to be considered in product maintenance / follow-up
  - Batteries must be maintained.
  - Operating system of smart phone or tablet must be up to date.
  - Point of interest data must be up to date.
  - For indoor navigation, appropriate tags or data must be up to date.
- Examples of products available on the market
  - Live product search in the EASTIN website
    https://www.eastin.eu/en/searches/products/list?iso=224503

## 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.*

*ASPREX Fact Sheet*

# Walking frame

Walking support device, composed of a height-adjustable and width-adjustable four-leg rigid or foldable frame, with rubber ferrules on the bottom of all legs to prevent the frame from slipping, and two handgrips.

- Product Classification
  - APL (WHO Assistive Product Priority List): 44 (Walking frames/walkers)
  - ISO 9999:2022: 120603 (Walking frames)
- Possible configuration variants
  - Contoured handgrip.
  - Wheeled front legs.
- Possible accessories or optional components

  None specified.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Walking [d450].
  - Moving around in different locations [d460].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450] (severe difficulty in standing).
  - Maintaining body position [d415] (severe difficulty in standing).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Severe difficulty in grasping/gripping. *Unless used with variants: Contoured handgrip*
  - Ability to use only one hand.
  - Lack of arms strength.
  - Severe difficulty in holding things.
  - Severe difficulty in lifting objects. *Unless used with variants: Wheeled front legs*
  - Severe difficulty in standing (due to contractures or deformities in the lower extremities).
  - Moderate difficulty in walking.
  - Mild difficulty in walking.
  - Moderate difficulty in standing.
  - Mild difficulty in standing.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Stairs.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  None specified.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Ensure that the chosen equipment is suitable for the person's weight (check in the product documentation or with the provider what is the maximum person's weight the stick can bear).
  - Ensure that the handgrips can be firmly held by the person.
- Points to be considered in product fitting
  - Ensure that the frame is adjusted to the correct height: the handgrips should be at the wrist level, when the person is standing with shoulder relaxed, a slight bend in elbow (about 15°), and wearing shoes.
  - Ensure that the frame is adjusted to the correct width: the arms should have a comfortable width apart when holding the handgrips.
- Points to be considered in product use
  - When walking, footwear should be well fitted, secure on the feet and supportive.
  - When walking, place the frame just in front of the body, step the weaker (or only) leg forwards into the middle of the frame, step the other leg to meet the first leg, then lift the frame and move it forward for the next step.
  - When rising from a chair or bed, put the walking frame in front of you; don't pull on the walking frame to stand up as it may tip over; move to the edge of the chair/bed, place feet under knees and lean forward; push up with the hands on the arms of the chair or on the bed to stand up, and only take hold of the walking frame once standing.
  - When sitting down, stand in front of the chair or bed, with back of legs touching it; reach back with the hands to hold onto the chair/bed and slowly sit down.
  - Persons who are at risk of developing a foot wound should not hop.
- Points to be considered in product maintenance / follow-up
  - Regularly inspect the ferrules and change them when worn.
  - Regularly inspect the handgrip and change it when worn.
  - Replace the device with a new one if the frame is broken or damaged.
  - Carry out follow-up checks about every six months and in case the frame seems to be not used any more, consider the following possible reasons: the frame is broken and needs replacement; it hasn't been fit correctly; the user has not learned correct use; there are health problems affecting the user's mobility; the environment makes it difficult to use the device; the user needs support from others to use the frame but does not have the support.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=120603

## 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.*

*ASPREX Fact Sheet*

# Talking watch

Watch that informs about time through sound, when required. The sound produced by the watch is a synthesized sound that resembles a human voice. The speakers are loud enough for the user to hear the time. Some talking watches also have the feature to set alarms and dates. The time and date are announced when a user presses a certain button. The physical features of a talking watch include its material, which can be plastic or metal depending onthe manufacturer's design; the watch usually also has a larger dial as well as an LED lights and colors to illuminate the hands, numbers/dots, and the background of the face, creating a good contrast between all elements to facilitate people with low vision. The talking watch is available in both analog and digital types and the internal technology of the watch is based on quartz crystals that are battery operated. The talking watch can either have one language or multiple language options, male or female voice option as well as both 12 and 24-hour formats. Talking watches are water resistant and therefore can be also used in extreme weather.

- Product Classification
  - APL (WHO Assistive Product Priority List): 45 (Watches, talking/touching)
  - ISO 9999:2022: 222803 (Clocks and timepieces)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Setting of alarms and dates.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Carrying out daily routine [d230].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (blindness or severe low vision).
  - Fine hand use [d440].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Meeting rooms or classrooms when a meeting or a class is in progress (the volume may be loud enough to be heard by the other people in the room).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Knowing the time.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection
  - Check the battery quality and life (talking watches are battery-operated quartz watches: it may be difficult for some users to keep changing the battery of their watch frequently after every few months)
  - Check whether a comprehensive operating and user manual is available for the watch, containing instructions on how to properly use and maintain their watches, in the user language or in one of the most

popular and widespread languages; a braile or audiorecorded version of the manuals may be very useful in some cases.
    - Check whether the operating manual also includes instructions for people who repairs the watch whan needed.
    - A talking watch should be able to work in all kinds of weather and temperature, especially in territories where rain is frequent or there is extreme cold due to year-round snowfall.
    - A talking watch should be resistant to water and shocks.
    - Consider whether a talking watch is really the most efficient solution, or a smart phone having built-in feature of announcing time to users might be more useful; phones with voice recognition features may also allow users with sight impairment to ask their phone about the time and get a voice response.
    - A technological advancement of present times is the emergence of smart phones that have a built-in feature of announcing time to users. As the phones also have a voice recognition feature, a user with vision impairment can ask their phone to tell the time, which will respond by announcing the time. With the increased use of smart phone all over the world, the use of talking or touching watches and even other watches is decreasing.
- Points to be considered in product fitting
    - Users need to learn the methods of operation of the talking watch so they must be trained to use it effectively.
- Points to be considered in product use
    - Users need to learn to re-set the watch for local time zones.
- Points to be considered in product maintenance / follow-up
    - A user manual, preferably in braille, should be provided to users when they buy the watch, so they could learn instructions for setting up and using the watch safely. Instructions, such as how to maintain the watch, how to keep it clean and safe, usage patterns that prolong battery life, and when to go for battery replacement, should be clearly communicated.
- Source / references
    - https://watchranker.com/talking-watches-visually-impaired/
    - https://grayton-watches.com/blogs/urban-diaries/automatic-vs-quartz-and-what-to-expect-from-your-watch
    - https://www.lssproducts.com/category/talking-watches
    - https://www.bbc.com/news/magazine-26920782

*ASPREX Fact Sheet*

# Touching watch

Watch with a tactile display, which enables a user to read the time through touch. The most usual configuration features an analog display, with raised tactile minute and hour-markings and robust hands, which are not affected by frequent touching. The watch-hands may be illuminated, to assist users with low vision. The watch face has a protective glass or plastic cover which can be flipped open to touch the clock face. The internal working of the touching-watch is based on quartz crystal, which is battery operated with a 12-hour time format. Touching watches are water resistant and therefore can be also used in extreme weathers.

- Product Classification
  - APL (WHO Assistive Product Priority List): 45 (Watches, talking/touching)
  - ISO 9999:2022: 222803 (Clocks and timepieces)
- Possible configuration variants
  - Digital braille display (raised dots resembling braille, continually changing their position to reflect the changing time; the dots are powered by magnets or electrical signals; the user can read the time by touching the dots).
- Possible accessories or optional components
  - Carrying case.
  - Cleaning cloth.
  - Spare batteries.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Carrying out daily routine [d230].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (blindness or severe low vision).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in fine hand use.
- Indicated environments

  *Specific environments in which the product should be used:*
  None specified.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - Dusty places (a touching watch may be at risk of catching dirt or dust when the upper cover is open especially if the user is outdoors).
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Ability to read Braille. *Only if used with variants: Digital braille display*
  - Knowing the time.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Considering the people who use touching watches, the makers of the watches should provide comprehensive operating and user manuals along with the watches that include complete instructions on how to properly use and maintain their watches.
  - A good idea is to provide the manual in the form of braille or as audio recording and in two or three popular and widely spoken languages if not in multiple languages.
  - The user manuals should also have instructions for people who repair the watches if required.
  - Touching watches should be able to work in all kinds of weathers and temperatures, especially in territories where there is more frequent rain or extreme cold due to year-round snowfall.
  - Touching watches should be resistant to water and shocks.
  - Touching watches are quartz watches that are battery operated; when selecting the product one should check the battery quality and life; it is difficult for some users to keep changing the battery of their watch frequently after every few months.
  - A technological advancement of present times is the emergence of smart phones that have a built-in feature of announcing time to users. As the phones also have a voice recognition feature, a user with vision impairment can ask their phone to tell the time, which will respond by announcing the time. With the increased use of smart phone all over the world, the use of talking or touching watches and even other watches is decreasing.
- Points to be considered in product fitting
  - Managing the touching watch effectively depends on the size and weight of the watch.
  - The size or radius of the dial and height of tactile arms or dots on analog watch should be manageable for a user.
  - Users also need to be trained in taking care of or maintaining their watches, especially in keeping track of the time when the batteries need to be replaced.
  - The strap of a watch must be adjustable.
- Points to be considered in product use
  - There are a number of manufacturers producing a wide variety of touching watches with new designs for males, females and children.
  - Technology used in making touching watches is also rapidly changing with a focus on ease of use, longevity of the device, its robustness, prolonged life of batteries, and usability in all weathers.
  - Users must stay aware of the technological advancements in touching watches that fulfill their basic need and also provide them the ease of use.
- Points to be considered in product maintenance / follow-up
  - Touching watches, both with braille display and analog, need regular cleaning and care.
  - They need to be protected from water and dirt and must be cleaned frequently with a special purpose microfiber cleaning cloth.
  - The batteries must be replaced at the end of their life.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=222803

## 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.*

*ASPREX Fact Sheet*

# Manual wheelchair

Mobility device with seating support, which relies on the occupant to provide power for the operation or may be also propelled by an assistant if equipped with push handles. Consists of a folding or rigid frame, a seat base, a backrest, two rear wheels equipped with tires, push-rims and brakes, two front castor wheels, two armrests and two detachable and swing-away height-adjustable footrests. The sizes of all components (frame, seat, backrest, rear wheels, push-rims, front wheels, armrests, footrests) can be chosen according to the individual body size, functional needs and use in various environments.

- Product Classification
  - APL (WHO Assistive Product Priority List): 46 (Wheelchairs, manual for active use)
  - ISO 9999:2022: 122203 (Bimanual handrim-drive wheelchairs)
- Possible configuration variants
  - Bimanual lever-drive (in which case the product is classifiable within ISO category 122206).
  - Double handrims on one side able to push both wheels (in which case it is classifiable within ISO 122209).
  - Low seat height allowing foot propulsion (in which case it is classifiable within ISO 122215).
  - One front wheel instead of two (as in the case of sport wheelchairs).
  - Propulsion by an assistant (featuring push handles and brakes located in a suitable position for the assistant to reach on the seat canes or under the push handles).
  - Stand-up system (to allow standing up and extending the reach ability of the user).
- Possible accessories or optional components
  - Rigid frame with solid seat base and drop in backrest.
  - Seat with a rake (a slope from front to back).
  - Cushion (to improve seating comfort).
  - Seatbelt.
  - Adjustable backrest to seat angle (to better support the sitting position).
  - Height-adjustable armrests.
  - Swing-away armrests.
  - Rear wheels with quick release mechanism.
  - Rear wheels with adjustable axle position (to alter wheelbase footprint).
  - Rear wheels with adjustable wheel camber or rake (to angle inwards and to influence wheelbase stability and ergonomics of push force).
  - Foot support made of two swing-away height adjustable foot plates.
  - Foot support made of a fixed foot bar.
  - Anti-tip bars (to avoid the wheelchair tipping over backwards).
- 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] (impossibility or severe difficulty).
  - Changing body position [d410]. *Only if used with variants: Stand-up system*
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*

- Neuromuscular condition that may impact capacity to self-propel. *Unless used with variants: Propulsion by an assistant*
- Cardiovascular conditions may impact capacity to self-propel. *Unless used with variants: Propulsion by an assistant*
- Respiration conditions may impact capacity to self-propel. *Unless used with variants: Propulsion by an assistant*
- Cognitive difficulty that may impact safe use and wayfinding. *Unless used with variants: Propulsion by an assistant*
- Inability to sit well without any postural deformities or abnormalities.
- Difficulty in using both arms. *Unless used with variants: Low seat height allowing foot propulsion*
- Difficulty in using one arm. *Unless used with variants: Double handrims on one side able to push both wheels, Low seat height allowing foot propulsion*

## Indicated environments

*Specific environments in which the product should be used:*
None specified.

## Contraindicated environments

*Environments in which the product may be inappropriate:*

- Environments without a relatively smooth and sufficiently wide continuous path of travel.
- Environments that may impact the operability and longevity of the product (such as ice, salt, dust, heat, unless the components are made of material especially designed for those environments).

## Other indicated factors

*Other factors or situations the product is intended to address:*

- Use in sport activity. *Only if used with variants: One front wheel instead of two*

## Other contraindicated factors

*Other factors or situations in which the product may be inappropriate:*
None specified.

## Points to be considered in product selection

- Each user has a unique set of needs; these needs can be categorized as: physical (the user's health situation and postural and functional needs), environmental (where users live and where they need to use the wheelchair), and lifestyle (the things users need to do in the wheelchair to engage in their chosen activities and participations).
- To meet the user's physical, environmental, and lifestyle factors, wheelchairs must feature proper fit and postural support; wheelchairs must be safe and durable; and should be affordable and able to be obtained and maintained locally.
- Seat width: the seat should fit the user comfortably and ensure the hips are not touching the seat rail; this prevents skin breakdown.
- Seat depth: sufficiently deep to fully support thighs but ensure there is a space of two to three finger-widths between the front seat edge and the popliteal fossa (back of the knees); this enables even weight distribution across the sitting surfaces of the body but also protects the skin and important vessels behind the knee.
- Seat height: when seated, the knees should be approximately level with the hips; this can be achieved by adjusting the footplates or foot bar height; ensure there is clearance between the footplate/ foot bar and the ground.
- Seat rake: rake refers to the angle between the front and back of the seat and also relates to the angle of the backrest. Active users may prefer an acute angle (smaller than 90 degrees) to support the pelvis and spine in an active position. An optimal seat rake angle may decrease the need for a high backrest, as the skeletal system is configured for stability. However, a strong seat rake (i.e. higher front of wheelchair) may make front transfers more effortful.
- Seat Base: a slung seat base offers some shock and vibration absorbency and provides a smoother ride. A slung seat base will however hammock or sag over time and may cause the legs to roll inwards, and impact on the supportiveness of a seat cushion. A rigid base provides a solid foundation for a cushion.

- Cushion: some slung seats contain foam padding, but if the wheelchair is used regularly a cushion with pressure relieving properties will be required.
- Slung backrest: the backrest is slung between the seat canes and may be at varying heights, but lower than the apex of the shoulder blade to ensure the shoulders are not restricted for self-propulsion.
- Push handles are optional and may be useful for users to brace the shoulder when reaching for items or when doing a pressure care lift.
- Propulsion: bimanual lever-drive. Users who do not have sufficient shoulder range of movement or wrist dexterity to propel a bimanual handrim drive wheelchair, may find it easier to use a lever-drive wheelchair, as the range of motion is decreased and the hand positioning is more linear.
- Propulsion: single side handrim drive. If users are only able to use one upper limb to propel, they will not be able to manage a bimanual handrim drive chair this is because pushing one rim will direct the wheelchair around in circles, and reaching both rims with one hand is effortful and involves significant body rotation; alternatively, a single-side set of handrims on the functional side will enable the user to grasp and push both rims at once with one hand, selecting individual rims to direct the wheelchair left and right. Note, all asymmetrical propulsion methods may affect posture and body alignment.
- Propulsion: single-side lever-drive. Users who do not have sufficient shoulder range of movement or wrist dexterity to propel a bimanual handrim drive wheelchair, may find it easier to use a single-side lever-drive wheelchair controlling both wheels. However, all asymmetrical propulsion methods may affect posture and body alignment.
- Propulsion: foot propulsion. Foot-propulsion is possible in a wheelchair with a low seat height, enabling the wheelchair to be propelled and steered by contact of the occupant's foot or feet with the floor. Note, all asymmetrical propulsion methods may affect posture and body alignment.
- Rear wheels (with push rims) various size; may be quick release wheels.
- Brakes: may be scissor action or push rod brakes, to be within mid-range of the upper limb and present on both wheels.
- Armrests are optional. Armrest height should be approximately 2.5 cm higher than the resting forearm, with a relaxed shoulder and the elbow bent to 90 degrees. The armrest length may provide a support surface which is the length of the forearm or be shorter to enable access under a table or desk. Armrests maybe detachable or swingaway to enable transfers.
- Footrest (footplates or footbar) should be adjusted to comfortably suit leg length and support the feet. Ensure the feet are approximately at right angles and there is clearance between the footrest and the ground.
- The net weight of the wheelchair (with and without accessories / disassembled) will impact the person in the short and long term. Lighter weight manual wheelchairs require less effort to propel, leading to less fatigue and preserving shoulder function in the longer term.
- The weight capacity of the wheelchair must be sufficient to bear the occupant and any accessories; postural issues can be caused when the fit between the wheelchair and the person is incorrect.
- Wheelchair and seating system too wide: inability to reach wheels to self-propel; encourages pelvic obliquity or unstable sitting base – hips and thighs tend to be abducted.
- Wheelchair and seating system too narrow: encourages pelvic obliquity and instability; leads to discomfort, increases risk of pressure sores thus decreased independent functioning.
- Wheelchair and seating system too long: pulls person forward in chair, increasing pressure on sacrum, increases slumping and instability, compromises lower limb circulation, does not support spine causing limitation in use of hands, pressure ulcer development.
- Wheelchair and seating system too short: encourages instability by reducing base of support, increases pressure on thighs and supporting area, causing pressure ulcer development, unstable sitting base impacts use of hands and dynamic balance.
- Armrests too high: elevate shoulders resulting in discomfort; encouragement of kyphosis and hyperextension of neck; reduces ability to use arms thus impacts capacity to self-propel.
- Armrests too low: encourages slumping forward or sideways to reach support, may lead to reduced respiration capacity, instability impacts functional performance.
- Footplates too high: causes discomfort in hips and knees can lead to abduction of hips or adduction and internal rotation of hips leading to increased risk of dislocation, increases pressure on buttocks and sacrum and reduces base of support.

- Footplates too low: may hit front castors or pavement curbs, pulls pelvis forward and encourage slumping and poor sitting stability.
- Wheelchair transfers: fixed footbars cannot be swung away so are not suitable for a person doing a standing transfer. Footplates which can be swung away enable the feet to reach the floor and weightbear during standing transfers. Slideboard and hoist transfers are not affected by footplate design, but armrests must be swingaway or detachable to enable slide transfers.
- Slideboard and hoist transfers are not affected by footplate design, but armrests must be swingaway or detachable to enable slide transfers.
- Frame: a folding frame will flex slightly during use, this may offer some shock and vibration absorbency and provide smoother ride but also absorbs some of the propulsion force of the user. A rigid frame is sturdier as it has fewer moving parts and effectively translates propulsion force. The mechanisms of dismantling for transportation are different and the capacities of different users must be considered.
- Wheelbase: the wheelbase (footprint of the wheelchair) impacts maneuverability and stability. The wheelbase with must be sufficiently wide to fit the occupant but sufficiently compact to fit in the environment e.g. through doorways. Wheelchair width: Very wide users may need the wheelchair to be reconfigured internally (e.g. maximize space between the wheels) rather than making the wheelchair wider. Wheelchair length: some models have adjustable axle positions to enable the front to rear wheelbase length adjustment and alter the position of the weight of the user in relation to the center of gravity. Consider whether the trunk is positioned above, outside or inside the wheelchair footprint, when evaluating wheelchair stability. A shorter wheelbase (with the user's trunk positioned above or slightly forward of the rear axle) will enable the user to tip the front castors more easily and do a 'wheelie'. This is both more maneuverable and less stable and is a feature to be matched to user experience and developing competence. Users with an altered center of gravity for example, with lower limb amputation, will require a longer wheelbase to provide stability (that is, with the user's trunk positioned slightly behind the rear axle). Novice wheelchair users will require a longer (more stable) wheelbase but may move to a shorter wheelbase which enables more maneuverability, as they gain wheelchair skills.
- Moving parts such as removable armrests and footrests have some disadvantages: removable components can get lost; and mounting locations can become bent or damaged, making them difficult to put on and take off.
- Rear wheels: they may come in different sizes. The rear wheel should be in a position that allows the user to have the best push stroke as possible and keeps the user safely balanced according to his or her skill level and ability. The position of the rear wheels should allow the user to have a good push stroke and provide the necessary stability.
- Tires: Harder tires (which deform less) have lower rolling resistance on smooth ground than softer tires, all other factors being equal. Solid tires cannot be punctured, but harder/solid tires provide little shock absorption.
- Wheel camber (rear wheels): camber brings the wheels closer to the user and more in line with the user's forward push stroke, thus making it easier to push. Camber may be adjustable to influence wheelbase stability and ergonomics of push force.
- Front castor wheels: smaller castors are more maneuverable but will be impacted by obstacles such as small stones or uneven terrain. Large castors (these may be solid or pneumatic) will overcome obstacles and uneven terrain but require a larger turning circle.
- Anti-tip bars are options to prevent the wheelchair tipping backwards on steep slopes or where the front wheels come off the ground. They will prevent the wheelchair being tilted e.g. to get up a kerb.
- A lap belt is optional for security.
- Reaching and moving objects requires the wheelchair to pull up close to surfaces and objects: How close users can get to surfaces and objects they cannot roll under, such as toilets, low tables, counter tops, center-post tables and bathtubs, is determined by how far the wheelchair extends both forwards and to the side of the seat. A user can get closer to surfaces and objects if the wheelchair is shorter in height.
- Working at a work surface requires the wheelchair to fit under surfaces. The user's ability to pull up to a table is determined by the height of the user's knees (the length of the user's lower leg plus the minimum safe height of the footrest above the ground). Some types of fixed armrest also prevent users from pulling up to tables and counters.

- Points to be considered in product fitting

- Trained personnel prepare the wheelchair for the initial fitting; depending on the product and service facilities, this may include assembly and possible modification of products supplied by manufacturers or production of products in the service workshop.
- During fitting, the user and competent personnel together check that: the wheelchair is the correct size; the wheelchair is correctly adjusted for the user; any modifications or postural support components are fitting correctly; and the wheelchair meets the user's mobility and postural support needs and minimizes the risk of the user developing secondary deformities or complications.
- The user tries the wheelchair; final adjustments are made to ensure the wheelchair is correctly assembled and set up; if modifications or postural support components are required, additional fittings may be necessary.
- Maneuverability around obstacles determines the user's ability to maneuver in an environment with confined spaces, such as a toilet with a narrow door and very limited space. The narrowest space through which a wheelchair can pass is determined by its width, measured from the outermost point on each side and considering position of user's hands during propulsion.
- Turning around in confined spaces: the smallest area in which a wheelchair can turn around is determined by its maximum diagonal measurement, and this measurement should be taken in fitting the wheelchair to the person and their environment
- Mobilizing on soft terrain (soft ground) such as mud, sand, grass, gravel, and snow, depends on the area of contact that the wheels have with the ground and the amount of weight on the wheel. Increasing the width, diameter and softness of the castor wheel will increase the contact area and prevent the wheelchair from sinking into soft ground. This requires a wide wheel with a raised point on the center of its tread can combine low rolling resistance on hard surfaces with good flotation over soft ground. Less weight on the front wheels will reduce the rolling resistance of the front wheels, allowing the wheelchair to roll more easily. However, increasing the contact area of the castor wheel with the ground can make turning more difficult, especially in tight, slow turns.
- Moving the front caster wheel(s) forward will reduce the weight they carry, and prevent the wheelchair from digging into soft ground, but making the overall wheelchair length longer will make it harder to maneuver in confined spaces.
- Increasing the width, diameter and softness of the rear wheels will increase the contact area, preventing the wheelchair from sinking into soft ground. However, wider and softer rear wheels can make it more difficult to turn, especially in tight, slow turns. Larger-diameter rear wheels make the wheelchair more difficult to transport. Moving the rear wheels forward in relation to the user to reduce the weight on the front castor wheel(s) and make it less likely to sink into soft ground. More of the user's weight on the rear wheels will provide more traction to the rear wheels to drive through soft ground. This will reduce the tendency to turn downhill on side slope, which requires less energy from the user to correct for downhill turning. The user will have better access to the hand rim and a longer push stroke, making it easier to push the wheelchair with the upper extremities. It is also easier to perform "wheelies" to negotiate obstacles, and the wheelchair is easier to maneuver in confined spaces. However, the wheelchair will have reduced rearward stability.
- Castor size: Maneuvering over raised obstacles, such as bumps, curbs or rocks is impacted by the size of the castor wheel, the distance of the castor wheel from the user's center of gravity and the springiness of the castor wheel. Castor flutter is also a result of hitting bumps at speed.
- The user should try the wheelchair in real environments of use as an important step in troubleshooting and verifying the wheelchair choice and setup.

- Points to be considered in product use
  - A wheelchair without a cushion or with an inadequate cushion can cause pressure sores; this in turn may require the user to spend many months in bed; without appropriate care and treatment this often leads to bedsores, secondary complications and even premature death.
  - Unstable wheelchairs can tip and lead to users falling and injuring themselves.
  - Wheelchairs that are too wide or are unduly heavy can cause shoulder injuries.
  - Sharp edges on surfaces can cause cuts that in turn can lead to infection.
  - Poor design can result in places on the wheelchair where fingers or skin of users or others may be pinched on moving parts, or between wheelchair and environment
  - Wheelchairs that cannot endure daily use in the user's environment may fail prematurely and can injure the user.

- Users with central nervous system disturbance such as stroke, may find the tone or tightness of their affected side is increased with effortful propulsion through their more functional side; if this is the case, a powered wheelchair may be more appropriate.
- Wheelchairs with incorrectly calibrated center of gravity may leave the user at risk of tipping

- Points to be considered in product maintenance / follow-up
  - The user and caregivers are instructed on how to safely and effectively use and maintain the wheelchair.
  - Key areas of user training include: how to transfer in and out of the wheelchair, how to handle the wheelchair; basic wheelchair mobility; how to stay healthy in the wheelchair – for example prevention of pressure sores; how to look after the wheelchair and cushion and, if appropriate, dismantle and reassemble the wheelchair; and who to contact in case of problems.
  - Follow-up appointments are an opportunity to check wheelchair fit and provide further training and support.
  - Follow-up should include a review of: how well the wheelchair has worked for the user; if they are experiencing muscle soreness or pain related to posture or wheelchair propulsion; any problems the user has had in using the wheelchair; the wheelchair's fit, in particular checking that the wheelchair is providing good postural support for the user; the user's skills, and whether further training is required; the condition of the wheelchair and whether any adjustments or repairs are required; and the user's ability to care for and maintain the wheelchair, and whether any further training is required.
  - The frequency of follow-up will depend on the individual needs of the user. Some users should be followed up more frequently than others should. As a guide, follow-up appointments are usually made within six months of receiving a wheelchair. It is appropriate to carry out follow-up activities at the community level as much as possible. If the wheelchair is found to be no longer appropriate, a new wheelchair needs to be assessed for and supplied.
- Examples of products available on the market
  - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=122203

## 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.*

*ASPREX Fact Sheet*

# Transportation chair

Device for short distance transportation of a person in a seated position, propelled and controlled by an assistant. General product features include the wheel configurations, which is designed to enable short-term safe and rapid access in difficult areas, a seat and backrest combination, safety belts, seatbelts or harness to secure the occupant during emergency evacuation or carriage in specific areas such as stairs. As transportation chairs are designed for emergency use, independence for the user is not a priority and often the transport chair will be too low or have a configuration of foot supports that means assistance is also required to transfer on and off the transportation chair.

- Product Classification
  - APL (WHO Assistive Product Priority List): 47 (Wheelchairs, manual assistant-controlled)
  - ISO 9999:2022: 122704 (Transportation chairs)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Gearing mechanism to enable manual propulsion up and down stairs.
  - Power-assisted propulsion.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Moving around using equipment [d465].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450] (severe difficulty).
  - Consciousness functions [b110] (necessitating emergency removal).
  - Using transportation [d470].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  None specified.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Emergency evacuation pathways (for example through stairwells of buildings).
  - Airports and airplanes.
- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  None specified.
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Emergency evacuation.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.
- Points to be considered in product selection

    - Transportation chairs are often located in the environment of use, may be utilized occasionally only, and likely to be utilized for multiple users over time.
- Points to be considered in product fitting

  None specified.
- Points to be considered in product use
    - The mechanism of use is for assistants trained in use of the transportation chair to approach the user, implement a safe transfer onto the transportation chair and secure the occupant, propel the transportation chair and utilize any power and safety features to negotiate the path of travel, then safely transfer the occupant to the destination surface.
- Points to be considered in product maintenance / follow-up
    - A regular schedule of maintenance should occur, and in-service training to familiarize personnel with their use.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=122704

## 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.*

*ASPREX Fact Sheet*

# Postural support for wheelchairs

Seating system with postural features to be fitted onto a manual or powered wheelchair in addition to the basic seat and backrest. It may also consist of components which can be added to the basic seat and backrest. Modular seating systems are based on a framework whose position can be adjusted to achieve a particular seat configuration; components to be attached to the framework may include back supports, seat cushions, arm supports, head supports and neck supports, leg supports and foot supports, trunk supports and pelvic supports. Manual wheelchairs which are suitable for the addition of postural support components are bimanual handrim-drive wheelchairs (provided that the postural support components which support the body do not also restrict the ability to actively self-propel the wheelchair), or push wheelchairs, or powered-assisted push wheelchairs. Postural support can also be added to powered wheelchairs. All aspects of the wheelchair provision remain the same beyond the postural components.

- Product Classification
  - APL (WHO Assistive Product Priority List): 48 (Wheelchairs, manual with postural support).
  - ISO 9999:2022: 1225 (Accessories for wheelchair seating).
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Seat cushion (a product for under the bottom and thighs that may involve pressure relieving surface, a contoured postural support surface, or both; designed to protect tissue integrity) [ISO 043303].
  - Back supports (a product to support the trunk, which may extend up to the neck region, and may be contoured to the individual including for example lumbar and thoracic supports) [043304].
  - Trunk support and pelvic support (wedges or contoured inserts intended to support or stabilize a person's shoulders, torso, hips or pelvic region when sitting) [181018].
  - Head and neck supports (accessories bolted to the backrest which provide cervical - neck - and occipital - back of head - support and positioning to maintain the head in a functional position) [181012].
  - Leg supports (include stump supports, abductors pommels (to maintain lower limb alignment and security within wheelchair), adductors (to position the legs together), and knee separators (to align and separate the knees and hips) [181015].
  - Arm supports (includes arm troughs to position and support the arms) [181009].
  - Harnesses (pelvic strap, shoulder harness, seatbelts, foot straps or calf straps to secure the body in the wheelchair and stabilize extremities) [ISO 090703].
  - Wheelbase: rigid wheelchair frame (postural supports require a firm base to secure them into the wheelchair and to ensure the postural support they offer is effective).
  - Wheelbase: folding wheelchair frame (if the wheelchair has a folding frame then the postural support will need to be removed when dismantling or transporting the wheelchair).
  - Wheelbase: tilt and recline features (tilt functions: where the entire seat pivots on its axis but maintains the persons sitting angle).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Moving around using equipment [d465].
  - Maintaining body position [d415] (postural seating support).
  - Caring for body parts [d520] (pressure care management).
- Indicated impairments

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

- Maintaining body position [d415] (difficulty in maintaining a functional seated body position).
- Mobility of joint functions [b710].
- Stability of joint functions [b715].
- Protective functions of the skin [b810].
- Repair functions of the skin [b820].
- Sensation related to the skin [b840].

## Contraindicated impairments

*Difficulties for which the product may be inappropriate:*
None specified.

## Indicated environments

*Specific environments in which the product should be used:*
None specified.

## Contraindicated environments

*Environments in which the product may be inappropriate:*

- Environments that may impact the operability and longevity of the product (such as ice, salt, dust, heat, unless the components are made of material especially designed for those environments).
- Stairs.
- Environments without a relatively smooth and sufficiently wide continuous path of travel.
- Extreme slopes.

## Other indicated factors

*Other factors or situations the product is intended to address:*

- Risk of postural deformities and related pressure injuries.
- Conditions such as cerebral palsy and spina bifida.
- Musculoskeletal factors such as altered muscle tone and mild joint contractures.
- Difficulty in maintaining a functional seated body position.

## Other contraindicated factors

*Other factors or situations in which the product may be inappropriate:*
None specified.

## Points to be considered in product selection

- The use environment largely depends on the user's abilities and on the wheelchair materials and configuration. It is important that the wheelchair meets the demands of both the person, and the environment.
- Each user has a unique set of needs. These needs can be categorized as: physical – the user's health situation and postural and functional needs; environmental – where users live and where they need to use the wheelchair; lifestyle – the things users need to do in the wheelchair to engage in their chosen activities and participations.
- To meet the user's physical, environmental, and lifestyle factors, wheelchairs and postural support must be individually fitted
- Seat width: the seat should fit the user comfortably and ensure the hips are not touching the seat rails; this prevents skin breakdown.
- Seat depth: sufficiently deep to fully support thighs but ensure there is a space of two to three finger-widths between the front seat edge and the popliteal fossa (back of the knees)
- Seat height: when seated, the knees should be approximately level with the hips.
- Footrest: (footplates or footbar) should be adjusted to comfortably suit leg length and support the feet; ensure the feet are approximately at right angles and there is clearance between the footrest and the ground.
- The net weight of the wheelchair (with and without accessories / disassembled) will impact the person in the short and long term; lighter weight manual wheelchairs require less effort to propel, leading to less fatigue and preserving shoulder function in the longer term.

- The weight capacity of the wheelchair must be sufficient to bear the occupant and any accessories.
- Wheelchair and seating system too wide: inability to reach wheels to self-propel
- Wheelchair and seating system too narrow: encourages pelvic obliquity and instability and leads to discomfort, increased risk of pressure sores and decreased independent functioning.
- Wheelchair and seating system too long: pulls person forward in chair causing sacral sitting and instability, compromises lower limb circulation and may cause pressure ulcer development. Unstable seating position and flexed posture may limit use of hands and impact upon respiratory and gastrointestinal functions.
- Wheelchair and seating system too short: encourages instability by reducing base of support, increases pressure on thighs and supporting area, causing pressure ulcer development, unstable sitting base impacts use of hands and dynamic balance.
- Armrests too high: elevates shoulders resulting in discomfort. Armrest height should be approximately 2.5 centimeters higher than the resting forearm, with a relaxed shoulder and the elbow bent to 90 degrees. The armrest length may provide a support surface which is the length of the forearm or be shorter to enable access under a table or desk.
- Armrests too low: encourages slumping forward or sideways to reach support, may lead to reduced respiration capacity, instability impacts functional performance.
- Transporting the wheelchair to a car or for storage is made easier if components are removeable (i.e. postural support surfaces, wheels, footrests, armrests).

- Points to be considered in product fitting
  - Trained personnel should prepare the wheelchair for the initial fitting; depending on the product and service facilities, this may include assembly, and possible modification, of products supplied by manufacturers or production of products in the service workshop.
  - During fitting, the user and competent personnel together check that: the wheelchair is the correct size; the wheelchair is correctly adjusted for the user; any modifications or postural support components are fitting correctly; and the wheelchair meets the user's mobility and postural support needs and minimizes the risk of the user developing secondary deformities or complications.
  - The user tries the wheelchair. Final adjustments are made to ensure the wheelchair is correctly assembled and set up. If modifications or postural support components are required, additional fittings may be necessary.
  - The user should try the wheelchair in real environments of use as an important step in troubleshooting and verifying the wheelchair choice and setup.
  - If the wheelchair has a folding frame, then the postural support will need to be removed when dismantling or transporting the wheelchair.
  - All body contact surfaces provide seating and postural support. Together, these parts of the wheelchair help the user to maintain a comfortable and functional posture and to provide pressure relief. If modifications or postural support components are required, additional fittings may be necessary. Users with postural deformities, reduced skin sensation and problems with muscle tone (for example spasticity) will require an assessment conducted by personnel with appropriate skills and knowledge and will require regular follow-up and support. The significance of good seating and postural support can mean the difference between the user being active and an independent member of society and the user being completely dependent and at risk of serious injury or even death.
- Points to be considered in product use
  - Postural support surfaces can provide significant assistance in maintaining aligned and functional positioning; however, the presence of close-fitting surfaces can also cause problems and requires a number of precautions. Closely fitting seating systems may limit ventilation of the skin and impact on the management of sweating, which can lead to skin breakdown. This is a particular issue with people who cannot move easily and people who have difficulty with temperature control (such as people with spinal injuries, neurological conditions, or amputations).
  - A wheelchair without inadequate pressure relieving surfaces can cause pressure sores. This in turn may require the user to spend many months in bed; without appropriate care and treatment, this may lead to secondary complications and even premature death.
  - Orientation: tilt versus recline options have some advantages and disadvantages. Tilt functions (where the entire seat pivots on its axis but maintains the persons sitting angle) keeps the seated position intact and ensures support surfaces remain fitted to the body during orientation change, but may not facilitate resting postures or assist digestion as much as a recline function. Recline functions (where the backrest is reclined

and the legrests elevated, therefore opening the sitting angle), can however cause shear forces (slippage between support surfaces and body).
    - The presence of athetosis, tone or uncontrolled movements will influence the strength of any fastening within the postural support system, and also the need to protect and pad any hard surfaces or edges on the postural support system and wheelchair.
    - The presence of spasticity and reflex activity means care must be taken in positioning the overall body, to avoid stimulating reflex activity and to manage (break up) patterns of tone.
    - Poor design can result in places on the wheelchair where the user or others can get their fingers or skin pinched.
    - Wheelchairs that cannot endure daily use in the user's environment may fail prematurely and can injure the user
- Points to be considered in product maintenance / follow-up
    - Instruct users and caregivers on how to safely and effectively use and maintain the wheelchair. Key areas of user training include: how to transfer in and out of the wheelchair, how to handle the wheelchair; basic wheelchair mobility; how to stay healthy in the wheelchair – for example prevention of pressure sores; how to look after the wheelchair and cushion and, if appropriate, dismantle and reassemble the wheelchair; and who to contact in case of problems.
    - Key areas of user training include: how to transfer in and out of the wheelchair, how to handle the wheelchair; basic wheelchair mobility; how to stay healthy in the wheelchair (for example prevention of pressure sores; how to look after the wheelchair and cushion and, if appropriate, dismantle and reassemble the wheelchair); and who to contact in case of problems.
    - Follow-up appointments are an opportunity to check wheelchair fit and provide further training and support. Users with postural deformities, reduced skin sensation and problems with muscle tone (for example spasticity) will require more frequent follow-up and support.
    - Follow-up should include a review of: how well the wheelchair has worked for the user; any problems the user has had in using the wheelchair; the wheelchair's fit, in particular checking that the wheelchair is providing good postural support for the user; the user's skills, and whether further training is required; the condition of the wheelchair and whether any adjustments or repairs are required; and the user's ability to care for and maintain the wheelchair, and whether any further training is required.
- Examples of products available on the market
    - Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=1225

## 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.*

*ASPREX Fact Sheet*

# Scooter

Mobility device, usually with 3 or 4 wheels. There is a seat for the user. It is directed by a tiller that controls the direction of the front wheels. The device consists of one or two motors that drive either the back or front wheels. The device is battery operated. A typical mobility scooter uses regenerative braking, sometimes referred to as an electro-mechanical dynamic scooter brake. The device can be disassembled for transporting. Scooters can disengage the motors to free the wheel.

Wheels on scooters can be of different sizes. Larger and pneumatic wheels make it easier to traverse rough terrain. Some scooters incorporate suspension components for a smoother ride. Seats can incorporate headrests as well as armrests. Control displays presenting scooter information.

- Product Classification
  - APL (WHO Assistive Product Priority List): 49 (Wheelchairs, electrically powered)
  - ISO 9999:2022: 122303 (Electrically powered wheelchairs with manual direct steering)
- Possible configuration variants

  None specified.
- Possible accessories or optional components
  - Adjustable tiller to suit user's needs.
  - Electronic speed control to reduce speed around turns.
  - Hand brakes.
  - Brake lights.
  - Baskets.
  - Smartphone holder.
  - Seat elevator mechanisms.
  - Windscreen.
  - Seat swivel (to facilitate transfers).
  - Flip up armrests (to facilitate transfers).
  - Seat belts.
  - Puncture-proof tires.
  - Bumpers.
  - Rear-view mirrors.
  - Rain covers.
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Moving around using equipment [d465].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Walking [d450].
  - Blood pressure functions [b420].
  - Respiration functions [b440].
  - Heart functions [b410].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*

- Cognitive difficulty that may impact safe use and wayfinding.
- Difficulty in transferring independently to a seating position.
- Need for significant postural support in seating.
- Need for adequate pressure relief when seated.
- Progressive condition likely to compromise the ability to sit and drive safely and comfortably within a short period of time.

- Indicated environments

*Specific environments in which the product should be used:*
None specified.

- Contraindicated environments

*Environments in which the product may be inappropriate:*
- Small indoor spaces (due to its relatively large turning radius, the product is not ideal for small environments).
- Adverse weather conditions (such as excessive rainfall or snow, which may affect the performance of power packs)
- Steep or sloping terrain.
- Terrains with many curbs and ramps (the low ground clearance of the wheelbase means it is difficult to maneuver a scooter).

- Other indicated factors

*Other factors or situations the product is intended to address:*
- Use by elderly people with moderate outdoor mobility limitations.

- 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 abilities of the user to operate a scooter, particularly a tiller.
  - The need to navigate curbs, footpaths, tram and railway crossings, street crossings, etc.
  - The need for portability of the scooter, e.g. ability to disassemble.
  - Seat requirements, e.g. headrest, swivel, height, etc.
  - The need for armrests, e.g. adjustable height, foldable.
  - Need for 3 or 4 wheels.
  - Wheels, e.g. size, pneumatic.
  - Controls, e.g. T bar handle, power gauge, and horn.
  - The need for brakes.
  - Load capacity.
  - Maximum speed.
  - Maximum range.
  - Type of charger, e.g. separate or integral.
  - Need for suspension.
  - Due to their relatively large turning radius, scooters are not ideal for home or small indoor environments.
- Points to be considered in product fitting
  - Maximum speed of scooter e.g. user's ability to handle speed of scooter.
  - Seat features, e.g. headrest, armrests, swivel.
  - Capacity of scooter, e.g. weight of user.
- Points to be considered in product use
  - Batteries must be maintained and charged.
  - Ease of disassembly for transport.
  - Turning radius of scooter is appropriate for environment.

- Points to be considered in product maintenance / follow-up
    - Batteries must be maintained.
    - Check tires regularly, e.g. inflation.
    - Keep moving parts lubricated.
    - Scooters should regularly be serviced by a professional, e.g. control module, castors and steering, scooter frame, batteries, motors, final drive, charger, accessories.
    - Scooter 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=122303

## 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.*

*ASPREX Fact Sheet*

# 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.*

*ASPREX Fact Sheet*

# Power pack for manual wheelchairs

Device to be installed on a compatible manual wheelchair to provide additional power for propulsion. It can assist the wheelchair user or an assistant in making the wheelchair easier to propel. These additional power elements can take the form of units attached to the main driving wheels, usually through the hub: the motors are housed in the wheels and support the movement in proportion to the force applied to the push rims and allow the user to actively participate in the movement of the chair. Additional power elements designed to assist assistants usually consist of motors and wheels that are attached to the wheelchair, usually at the back of the wheelchair and typically controlled with remote control unit.

- Product Classification
  - APL (WHO Assistive Product Priority List): 49 (Wheelchairs, electrically powered)
  - ISO 9999:2022: 122409 (Propulsion units for manual wheelchairs)
- Possible configuration variants
  - Motors housed in the wheelchair wheel hubs, with attached power packs.
  - Power pack attached to the back of the wheelchair (including motor and wheels).
  - Power pack with a tiller steering mechanism attached to the front of the manual wheelchair (including motor and wheels).
- Possible accessories or optional components
  - Battery charger: mounted to the wheelchair.
  - Control interface: wristband.
  - Charger for automobiles.
  - Control interface: integral to the push rim of the wheel.
  - Control interface: push button switches.
  - Control interface: joystick.
  - Control interface: tiller.
- 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].
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Cognitive difficulty that may impact safe use and wayfinding. *Unless used with variants: Power pack attached to the back of the wheelchair*
- 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:*
  - Mitigating the possibility of overuse injuries (such as shoulder injuries from manual propulsion of the wheelchair). *Only if used with variants: Motors housed in the wheelchair wheels, with attached power packs*
  - Providing additional power to the wheelchair users (to navigate longer distances, rough surfaces, thick carpet, uneven terrain or up slopes and ramps).
  - Reducing the strain of the attendant of pushing the wheelchair (including assistance when climbing slopes and ramps and navigating rough surfaces, thick carpet, uneven terrain, or up slopes). *Only if used with variants: Power pack attached to the back of the wheelchair*
  - Retaining the possibility of driving the wheelchair manually independently. *Only if used with variants: Power pack with a tiller steering mechanism attached to the front of the manual wheelchair, Motors housed in the wheelchair wheels, with attached power packs*

- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  None specified.

- Points to be considered in product selection
  - Consider the physical abilities of the user to operate a manual wheelchair, and the need for power assist to compensate for functional limitations and requirements of the environment.
  - Consider the need for portability of the power pack and the ability to mount it onto the wheelchair.
  - Consider the compatibility of the power pack with the manual wheelchair on which it has to be mounted, as well as the compatibility of other wheelchair features such as its tilt-in-space.
  - Consider the capacity, the range and the maximum speed of the power pack (in relation to the use environment and the size and weight of the user).
  - Consider the configuration of the user interface.
  - Consider the need for braking function.
  - Consider the type of battery charger (e.g. separate or mounted to wheelchair), the need for car charging converter and battery gauge.
  - Consider the type of tires to be used in the intended environment.

- Points to be considered in product fitting
  - The user interface needs to be configured, mounted, and programmed in relation to the maximum speed of power pack and the user's ability to handle the speed of wheelchair.
  - Product must be properly installed on manual wheelchair.

- Points to be considered in product use
  - Consider the ease of installation on detachment for transportation.
  - Observe whether the product hinders transfers.

- Points to be considered in product maintenance / follow-up
  - Batteries must be maintained and charged.

- Examples of products available on the market
  - Live product search in the EASTIN website
    https://www.eastin.eu/en/searches/products/list?iso=122409

## 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.*

*ASPREX Fact Sheet*

# White cane

Long cane painted white or coated with reflective white tape. It has a lightweight shaft (collapsible or straight), usually constructed from aluminum, graphite, carbon fiber or fiberglass, approximately one half inch in diameter with a rubber, plastic, leather or wood hand grip at one end and a nylon, plastic or metal tip at the other (which can be pointed, or rounded with the shape of a cylinder or roller tip). The collapsible canes are commonly known as folding or telescopic canes.

Possible configuration variants include the guide cane (a shorter cane that extends from floor to a user's waist, helping in scanning for kerbs or steps; it can also be used diagonally across the body for protection as it warns the user of obstacles), the identification cane (lighter and shorter cane used to alert others that a user is visually impaired but not to the extent where they require a long cane or other variant), the support cane (offering stability to user, however with very limited potential as an orientation device), the kiddie cane (same as the long cane, but designed to be used by children; it is smaller and lighter) and the green cane (used in some countries by users with low vision). The grip of the cane may be straight or curved, and it may also have a short rope loop for better grip. The tip of the cane can be replaced also.

- Product Classification
  - APL (WHO Assistive Product Priority List): 50 (White canes)
  - ISO 9999:2022: 120803 (Guide canes)
- Possible configuration variants
  - Hard tip (suitable for rough pavements, for tapping the ground unlike rolling on it).
  - Rolling tip (suitable for smooth pavements: it never leaves the ground and offers maximum protection to users).
- Possible accessories or optional components
  - Bag (in which the cane can be put after folding it; it saves the cane from getting dirty when not in use).
  - Wrist lace (for better grip).
- Product goals

  *Activities or functions the product is mainly intended to support, according to WHO ICF Classification:*
  - Perceiving [b156].
  - Moving around in different locations [d460].
  - Walking [d450].
- Indicated impairments

  *Difficulties the product is mainly intended to address, according to the WHO ICF Classification:*
  - Seeing [b210] (blindness, or severe low vision, or severe constriction of peripheral vision, or deaf blindness).
- Contraindicated impairments

  *Difficulties for which the product may be inappropriate:*
  - Difficulty in fine hand use.
- Indicated environments

  *Specific environments in which the product should be used:*
  - Smooth pavements. *Only if used with variants: Rolling tip*
  - Rough pavements. *Only if used with variants: Hard tip*

- Contraindicated environments

  *Environments in which the product may be inappropriate:*
  - In the snow.
  - Uneven ground. *Unless used with variants: Hard tip*
- Other indicated factors

  *Other factors or situations the product is intended to address:*
  - Detecting obstacles and steps while walking or moving around.
  - Echolocation.
  - Orientation and way-finding (by finding, verifying and discriminating landmarks; it helps establish the line of direction of travel and also helps the blind traveler relax when walking with an inexperienced sighted guide; it takes the focus off the feet when crossing a street; it grounds a blind person in space).
  - Vision substitution (by replacing optical perceptual flow with tactile perceptual flow).
  - Deafblindness.
- Other contraindicated factors

  *Other factors or situations in which the product may be inappropriate:*
  - Use while moving on a wheelchair which needs to be propelled with both hands.
  - Use while walking with crutches with both hands.
- Points to be considered in product selection
  - A white cane is inexpensive, handy and has adjustable length.
  - Each cane should be individually prescribed for a user's height, length of stride and comfort; the length traditionally extends from the floor to the user's sternum.
  - For a user who has limited or reduced dexterity, it is better to use a cane that is light in weight.
  - The white cane techniques are simple and universal and can be applied even in a relatively unknown environment.
  - It enables the vision-impaired person to seek a variety of jobs and expedites their economic rehabilitation.
  - The collapsible white cane can be folded and put in a handbag while travelling in public transport or while at work
  - Choose the shape of the tip (pointed or rolling) depending on the user’s mobility habits.
- Points to be considered in product fitting
  - In order to ensure effective use of the white cane, the user should undertake an individual training program by a trained mobility instructor.
  - The areas of instruction for orientation and mobility with white cane include: 1) Environmental concepts 2) Gross and fine motor skills related to independent travel 3) Sensory awareness, stimulation, and training 4) Spatial concepts 5) Sighted guide/ human guide procedures 6) Basic protective and information gathering techniques 7) Orientation skills 8) Cane skills (the length of the cane should be adjusted according to the walking speed of a user) 9) Urban, suburban, and rural travel 10) Travel in business districts 11) Procedures for crossing streets including how to deal with traffic control signals 12) Use of public transportation systems 13) Procedures for travel and independent functioning in places of public accommodation 14) Daily living skills 15) Sensory/motor skills in coordination with the physical or occupational therapist and teacher of visually impaired (TVI) 16) Skills for independent living.
- Points to be considered in product use
  - The basic technique for cane travel, the "touch technique," requires the cane user to move the tip of the cane in an arc across the front of his body, thus assuring a safe space for the next footstep.
  - When moving in crowded places, users can decrease the length of the cane by adjusting the shaft length and grip position.
- Points to be considered in product maintenance / follow-up
  - The tips of the canes may get worn over time. They must be replaced promptly avoid any accidents.
  - In folding/collapsible canes, the joints could get unstable or lose over time; the elastics that hold the joints, must be replaced to ensure the joints keep functioning effectively.
- Examples of products available on the market

- Live product search in the EASTIN website https://www.eastin.eu/en/searches/products/list?iso=120803

## 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.*