GREENCARE DB1 – STABILITY & SAFETY

Tip out accidents in wheelchairs usually occur in dynamic situations, more than one factor being the cause. Steep slope, wet surface, obstacle climbing, foot propelling outdoors, body position change, additional or offset loading, loss of control and going to fast, or adverse combinations of these. Simply lifting the occupant legs can cause shift of C of G and rearwards tip over.
Assessment of user and environment is important. We generally advise.
Maximum safe slope of 8 degrees up to 150Kg occupant weight.
Maximum safe slope of 3 degrees up to 200Kg occupant weight.
Configuring a wheelchair to meet the identified needs of the user can reduce possibility of occupant tip out. Greencare continue to review feedback and introduce new developments to improve specifications for users.

REARWARD STABILITY & DB1 CONFIGURED BUILD DATA

ISO 7176 stability test is a performance comparison indicator. (see gcqa045).
Weight distribution determines propulsion effort and static rearwards stability.
Seat depth is measured from front centre of seat to back support upholstery.
Frames have a build choice of two seat depths with a difference of 50mm
Width sizes overlap to provide for the different sizes of individual people.

Wheelchair Frame	**Short depth**	**Long depth**	**Width range**
XS extra short 100Kg max occ	330mm(13 inch)	380mm(15 inch)	330mm(13inch) up to 355mm(14inch)
S short 125Kg max occ	380mm(15 inch)	430mm(17 inch)	330mm(13inch) up to 480mm(19inch)
L long 150Kg max occ	430mm(17 inch)	480mm(19 inch)	380mm(15inch) up to 555mm(22inch)
XL and XXL extra long builds 175Kg max occ 200Kg max occ	480mm(19 inch)	530mm(21 inch)	505mm(20inch) up to 650mm(26inch)
Rearwards stability range	**8deg to 17deg**	**4deg to 13deg**	**Rearward stability unaffected by width**

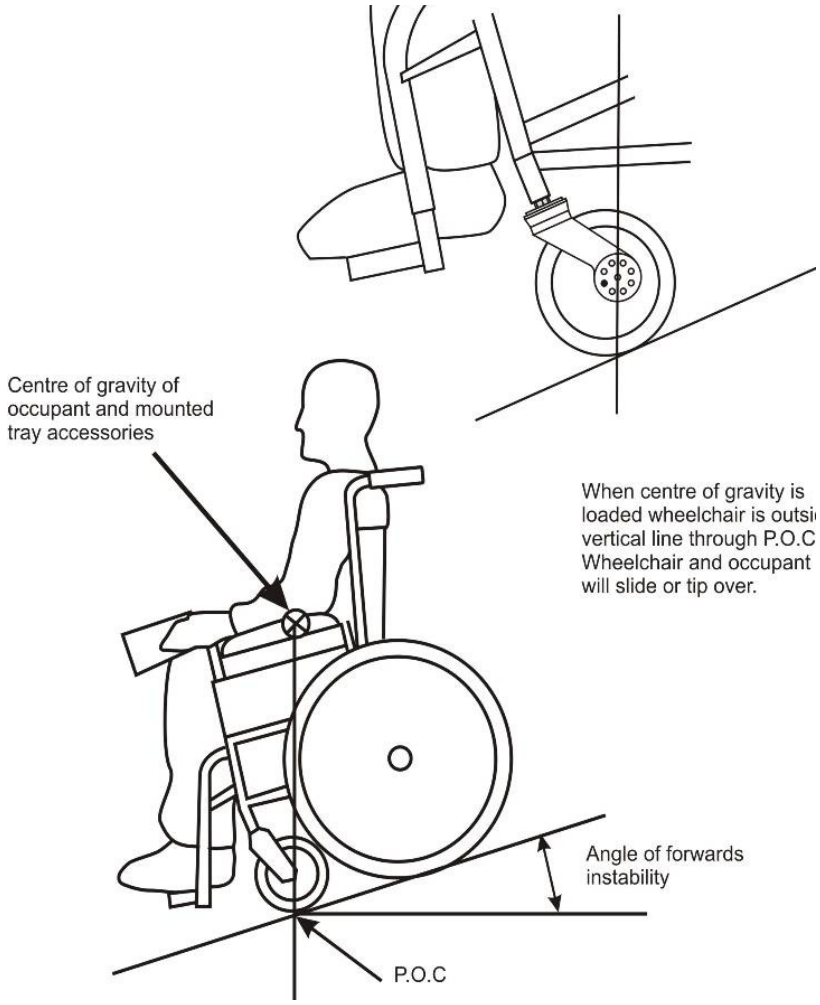
Back support position and occupant shape determine effective seat depth.
The measurement between the back support position and the centre of the rear wheel determines the effective rearwards stability as follows.
Increasingly stable with rear wheel centre behind back support,
Increasingly unstable with rear wheel centre in front of back support.

Standard Greencare build is mid stability of 12 degrees.
Chairs with rearward stability less than 12 degrees are easier to propel.
For amputees centre of gravity is higher, and stability is accordingly reduced.
Similarly a more reclined back support reduces rearward stability.
For less than 12 degrees rearward stability, anti tippers should be initially fitted to reduce possibility of accidental rearwards tip out.
Chair configuration can be changed if occupant needs change, individual assessment using a test ramp and supervised trials in the usage environment are recommended for complex individual builds.

GREENCARE DB1 – STABILITY & SAFETY (cont)

FORWARD STABILITY & DB1 CONFIGURED BUILD

Forward stability becomes critical when an occupant frequently reaches out forwards and in doing so shifts centre of gravity position forwards. When this is combined with forwards movement of the chair, a forward tip out can result. The diagram shows factors affecting forward stability



A grabbing aid can reduce occupant need to reach forwards or sideways.
A larger diameter castor wheel reduces effect of frontal impact with obstacles.
A lower seat to ground height build will increase stability generally.
A correctly fitted seat belt will help to control the occupant position.

Wheelchairs with a short wheelbase are more likely to have a potential for forward instability than those with a long wheelbase. A chair can be optimised for maximum forward stability with the front castor wheel in the compact offset position in the castor fork, and using a type A forward castor connector.

Loss of control, by an attendant carer, with a heavy occupant on a slope can result in a forward crash. For this reason we advise a standard max safe slope angle of 8 degrees, and 3 degrees with attendant controlled hub brakes in the configured builds of wheelchairs for heavy occupants.

GREENCARE DB1 – STABILITY & SAFETY (cont)
SIDEWAYS STABILITY & DB1 CONFIGURED BUILD

Traversing a slope with a wheelchair, creates a significant adverse camber effect, and offset loading, bringing all round stability issues into consideration. Sideways instability can result with loss of directional control. When travelling straight, 8 degrees is a concern, but even a 4 degree slope becomes a major issue when traversing across it, particularly with a heavy occupant. Traversing sideways on a slope should be avoided.

Sideways stability is a concern for tall occupants in chairs with narrow seat widths. An important factor of assessment information is the height of the occupant CofG. A small width seat frame chair below 405mm (16inches) with a tall occupant, can result in sideways instability. The narrow access occupant propelled build options of DB1 are therefore not applied to seat widths below 405mm, and a wider wheelbase axle fitting, or lower seat height build is recommended for these.

On heavy occupant chairs, above 150Kg, the smaller diameter rear wheels are less suitable, as they require increasing effort to push. We advise use of double rim occupant propelling wheels for increased side strength against offset loading and hub brakes for attendant control on slopes.

Methods of lowering C of G can be applied to configured builds of DB1.

A type B low castor connector, shown left, and 315mm rear wheel will lower front seat to ground height from 495mm to 460mm.

For side stability concerns, a type B low castor connector increases the front wheel track. It is most effective when the occupant weight distribution makes a 150mm front castor wheel size acceptable for general manoeuvrability. This set up is also a practical solution for indoor foot propellers.

A stepped front frame adaptation, shown left, introduced in 2013 will lower front seat to ground height to 430mm, with a 190mm or 200mm front castor wheel, and even lower to 380mm with a 150mm front castor wheel.

Note that low seat height builds require the rear wheels in a high axle position in the rear module, maintaining an acceptable seat to ground in the range 4deg to 7deg.