

This is your one-stop guide install a DDA compliant handrail. It is based on the guidance given in Part M of the Building Regulations for buildings other than dwellings. See Further Help section for important notes.

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Site-specific variables

Please enter the following variables from your system design, it is important to write all measurements as millimetres. Call our office if you are unsure on 020 8254 2626.

We've given each measurement a letter so that we can refer to it through the document.

Variable name	Your answer	Letter for reference
Target handrail height for Ramps/Stairs (measured from the pitch line of staircase or ramp to the top surface of rail)	mm	R
Target handrail height for landings and flat areas (measured from the walking surface to the top surface of rail)	mm	F
Maximum upright spacing (measured from centre to centre) This is NOT the length of your horizontal tubes	mm	C

Clamp codes for reference

These are the most commonly used clamps for our DDA systems. We refer to them by the codes below each image. Some rarer configurations require additional clamps which we will detail in the instructions.

			
A06	A02	A12	G12
			
AD747	AD725	D797	A09
			
D009	A15	A35	A14
			
A34	A04	A22	D745

Section 1 – Cutting the upright tubes

The top handrail will sit between 80mm and 120mm higher than the top of your uprights. You can vary this by how much you slide the top A06 fitting onto the upright. We have calculated the following pages assuming that the top clamp A06 will be pushed fully onto the upright.

For uprights fixed to the walking surface using A12 or G12 clamps:

To calculate your cut tube length for ramps and staircases take your intended final height **R** and subtract 80mm for the top clamp and 10mm for the base flange.

$$\text{Ramp/Stair upright} = \mathbf{R} - 90\text{mm}$$

To calculate your cut tube length for ramps and staircases take your intended final height **F** and subtract 80mm for the top clamp and 10mm for the base flange.

$$\text{Flat area upright} = \mathbf{F} - 90\text{mm}$$

Example, for R of 1000mm:

$$1000\text{mm} - 90\text{mm} = 910\text{mm cut tube length}$$

For uprights being concreted or core drilled into walking surface

To calculate your cut tube length you need to add the length of tube that will be buried. We suggest a minimum of 250mm. You then need to subtract the 80mm for the top clamp:

$$\text{Ramp/Stair upright (buried)} = (\mathbf{R} + [\text{amount to be buried}]) - 80\text{mm}$$

$$\text{Flat area upright (buried)} = (\mathbf{F} + [\text{amount to be buried}]) - 80\text{mm}$$

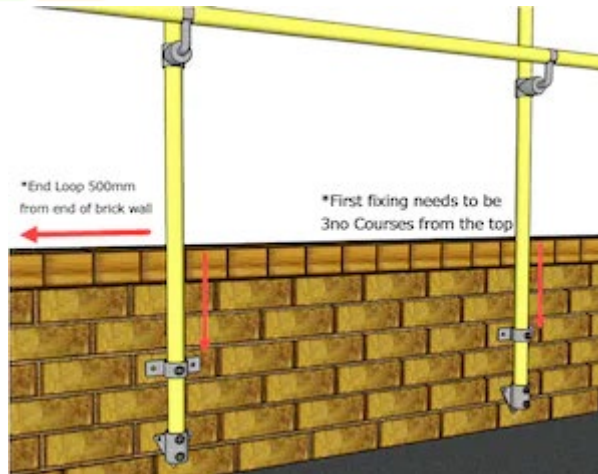
Example, for R of 1000mm with 250mm in the ground

$$(1000 + 250) - 80\text{mm} = 1170\text{mm cut tube length}$$

For Uprights fixed to the side of a wall/ramp/staircase

This method usually uses the A15 base and the A35 fixing bracket to keep the upright as close to the surface as possible. Alternatively use the A14 and A34 to stand the upright away from the wall slightly. This upright measurement will depend a lot on the specific arrangement for your site.

It is very important you don't apply forces to the top levels of bricks or near the top of any wall, your first fixing (A34 or A35) should be at least 3 courses of brick or 250mm from the top of the wall. The bottom fixing (A14 or A15) should be at least a further 150mm below that.



If fixing to a surface below the walking level, take your **R** or **F** value, subtract the 80mm for the clamp at the top and add on the amount of tube you need going down the wall.

Upright fixed below ramp walking level = $R - 80 + [\text{length required below pitch line}]$

Upright fixed below landing/walkway level = $F - 80 + [\text{length required below floor}]$

Worked example for R of 1000mm:

$1000\text{mm} - 80 + 400 = 1320\text{mm}$ cut tube length

Section 2 – Base Fixing detail

The fixing detail is critical to the overall strength of the system.

Using Base Clamps (A12 or G12)

A12 base clamps are used for flat areas and shallow gradients up to about 3.5°

G12 base clamps are used to fix to gradients of between 4° and 10°

The strongest fixing method is usually a chemical anchor. Use the fixings provided or use galvanised M12 threaded rod with at least 150mm below the surface. Allow the resin to fully cure before tightening nut and washer on top of the base clamp. Generally, expansive fixings should be avoided because they put sideways forces on the fixing hole which can cause cracking over time. Please follow the instructions of the manufacturer of the fixing.

Burying upright into concrete or wall

Core drill the top of the wall and fix the tube directly inside using chemical anchor resin. The tube should go at least 250mm (or 3 brick courses) into the wall. The hole should be large enough to allow the anchor resin to surround the tube.

OR

Dig out an area at least 400mm by 400mm by 400mm and concrete the tube directly into the centre, postfixing premixed concrete is ideal for this. At least 250mm of the tube must be set into the concrete.

Fix to the side of the Stairs, ramp, or wall (using A15+A35 or A14+A34)

If the wall goes above the height of the handrail, you can fix the horizontal rail directly to it using the D745 wall clamp to give you the correct gap between wall and handrail.

OR

If the wall stops lower than your required height or you are fixing to the side of the raised walking surface, use two fixings to tie the upright back to the wall. The top fixing should be at least 3 courses of brick or 250mm from the top of the wall, with a bottom clamp to fully cup the end of the upright several courses (at least 150mm) further down. Use [A15/A35](#) if you want the upright tube as close to the brick as possible or [A14/A34](#) clamps if you want a small gap (perhaps to allow for conduit or similar obstacles already on the wall).

The fixing detail here will vary a lot depending on the makeup of the wall itself. If possible use galvanised M10 threaded rod (the side fixing clamps have fixing holes that vary from 11mm to 14mm) and chemical anchor resin, again ensure at least 150mm is buried in the wall. Consult a fixings expert if you are unsure.

Section 3 – Locating your uprights

As well as the maximum upright spacing, your value **C** from page two, there are several other factors to consider before you start fixing your uprights in place.

Rules for upright locations

- I. Maximum gap between uprights is your figure **C**. This can be measured around a corner or gradient change provided that there is one upright within 500mm (see rule III).
- II. Uprights cannot be located directly at corners or gradient changes.
- III. Corners and gradient changes need to be within 500mm of an upright
- IV. At the beginning and end of a ramp/stairs, you will need an upright after any gradient change back to the level. In practice this is almost always on the landing or floor at each end, allowing it to support both the gradient change on one side and an end loop on the other.

Section 4 – Attaching handrail directly to a wall

If you have a wall that is higher than the required handrail height, you can fix directly to the wall using the D745 clamp. The spacing you chose for these will depend mostly on strength of fixing you can achieve but most common is to have them spaced at 1100mm centre to centre.

You need to attach these clamps one at a time, inserting your horizontals as you go, if you don't you won't be able to attach the horizontal tube if the clamps at both ends are fixed in place.

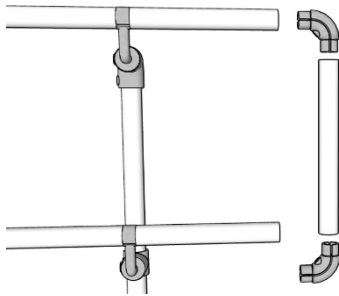
Section 5 – Terminating your handrail

End Loops or D Sections

According to Part M of the Building Regulations, handrails must not be terminated in a way that causes clothing to be easily caught as a user passes. This is most often achieved by fitting an end

loop at the start and finish of each run of handrail. Fitting the end loop early in the construction process is helpful because it sets where your mid rail will sit.

This loop uses two AD725 corner clamps to form the D shape. Usually, the horizontal tube section is 300mm, fitted to an upright support at one end and the corner clamp at the other. It is best practice to fit D797 sealing rings to all inline clamps such as the AD725. They ensure the smoothest joint between clamp and tube.



To be able to calculate the length of the vertical piece of tube, you need to decide the height of your mid-rail. In almost all cases this is 600mm from the pitch line or floor to the top surface of the rail. The vertical tube length is then calculated by taking the mid-rail height, adding 60mm to account for the space occupied by the corner clamps, and subtracting that answer from your top-rail height **F**. End Loops are normally fitted once the handrail has returned to the level so it is unusual to calculate this based on your **R** value.

End Loop vertical component = $F - ([\text{mid rail height}] + 60)$

Worked example for F of 1000mm with 600mm mid-rail:

1000 – 660 = cut tube length of 340mm

Wall Returns

For handrail fixed directly to a wall, the D005 (not pictured on page 2) is a speciality clamp designed to provide a smooth return to the wall for a handrail fixed using D745 clamps. This clamp attaches to the end of your handrail run using an A09 in-line joiner and preferably two D797 sealing rings.



For handrail supported on upright tubes, the gap to a wall is unlikely to match the D005. In this case use a D725 90° corner clamps to turn your top and mid rail towards the wall, measure and cut a section of tube and fix to the wall using A10 flanges:



Section 6 – Corners and Gradient changes

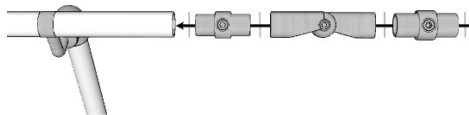
As per section 3, corners and gradient changes need to sit within 500mm of an upright or wall fixing. It is also important that when your handrail starts or finishes at the end of a ramp, you return the rail to the horizontal before the last upright and the end loop. This usually ensures the gradient change will be less than 500mm from an upright too.

Gradient detail

As mentioned in section 7 below, the precise length of tube to attach to either side of the gradient change will need to be measured once you have the uprights fixed in place. This is because the exact position of the D009 will be set by where the gradient tube meets the level tube, to preserve the two required handrail heights. If you pre-cut these lengths, you might end up with a gradient that does not match that of the ramp or stairs.

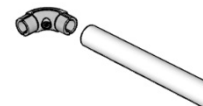
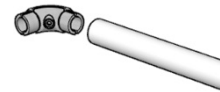


To form a gradient change, for each horizontal you need a D009 gradient change clamp, two of A09 internal joiners and four D797 sealing rings

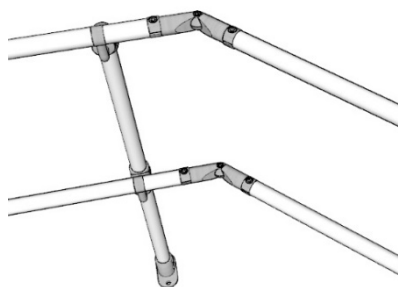


90° Corner detail

To form a 90° corner, you need one AD725 clamp and two D797 sealing rings per rail. Remember that the corner needs to be within 500mm of a support



Obtuse or Acute corner detail



If you have a corner that is not quite 90°, you can use a D009 gradient change elbow as an obtuse or acute angle elbow as well. Ensure the tightening grubscrew is facing downwards to maintain a smooth rail. Unlike the 90° elbow, to use the D009 you will also need two of A09 internal joiners and four D797 sealing rings.

Section 7 – Cut horizontal tubes

We can separate this into standard and non-standard horizontals. Standard horizontals fit between your uprights when spaced at your maximum upright spacing value (**C**), this will be the case for

most sections. Nonstandard horizontals are used where you have a shorter distance between uprights or because you have a gradient change or corner to accommodate between uprights.

Standard Horizontals

To work out the length of horizontal tubes required, we have to account for the width of the fixing into the tube on the D747 or D745. In both cases this is 27mm. Your standard horizontal tube length should be your value **C** minus the 27mm.

Standard Horizontal tube length = **C** – 27mm.

Worked example for C of 1093mm:

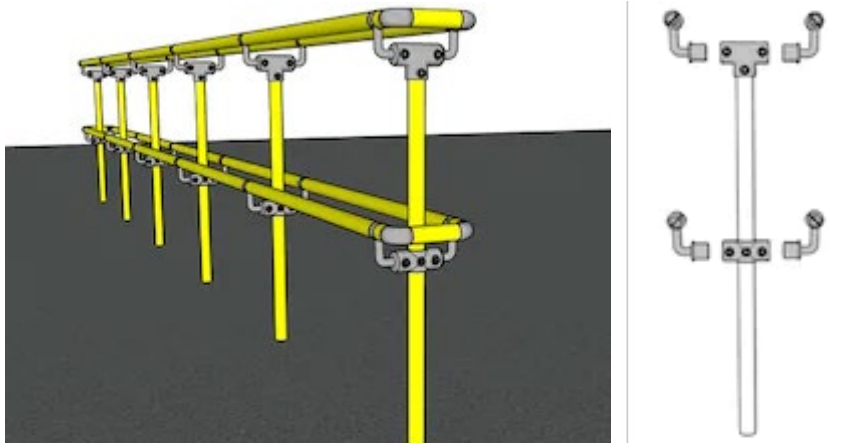
1093 – 27 = 1066mm cut tube length

Nonstandard Horizontals

It is easier to install the uprights and measure these nonstandard sections in the real world before cutting, but in theory you can measure between the **centres** of any two uprights, subtract 27mm and have a tube that will fit. Horizontals leading into corners or gradient changes need to be measured in the real world rather than calculated.

Section 8 – Double-sided handrails for wide access routes

To build a double handrail your upright and horizontal calculations remain the same as for a single rail, you just need different clamps to secure the AD747 to the upright. Replace the A02 clamp with an A22 for the mid rails and replace A06 with A04 at the top



Protecting your powder coating during installation

If your system has been specified with a powder coated finish, there are some steps you can take to minimise damage during installation.



Cutting tubes:

When cutting tubes apply tape either side of the cut to minimise chipping. You can also lightly score around the proposed cut with a sharp blade to further minimise chipping. This is most important where the cut end will be visible.

Use a fine-toothed, sharp blade to minimise heating during cutting. If you have a large number of cuts to achieve, then consider using a cutting compound to cool the blade.

Any cut to a section of tube will expose a raw steel edge, after deburring it is essential to apply a layer of cold galvanising spray (sometimes called Zinc spray). For aesthetic purposes it is then best to apply several coats of a colour matched spray paint. These are available while ordering power coating and we can also send out extras afterwards, just contact us with a RAL colour code.

Fixing clamps

It is inevitable that fully tightening a grub screw to the recommended torque of 39Nm will mark the tube. It is therefore a good idea to measure each clamp position before you tighten it. Again, it is useful to have some colour matched touch-up spray paint on hand.

Similarly if you try and slide a clamp over a powder coated tube ensure this is done carefully and the grub screw is not slightly tightened to the point where it will scratch the coating of the tube on the way down.

Avoid transporting a tube/upright with loose clamps on, if they slide around, it may score the surface.

Further help and advice

We are available on the phone or via email if you have any questions, we would be more than happy to work with you on your project.

sales@alvinkeyclamp.co.uk

020 8254 2626

This document is based on the guidance given in Part M of the Building Regulations for buildings other than dwellings. Each project varies so it is important that you are familiar with the full set of requirements, which are set out clearly in this document that is freely available from gov.uk (check pages 22 & 23):

<https://www.gov.uk/government/publications/access-to-and-use-of-buildings-approved-document-m>