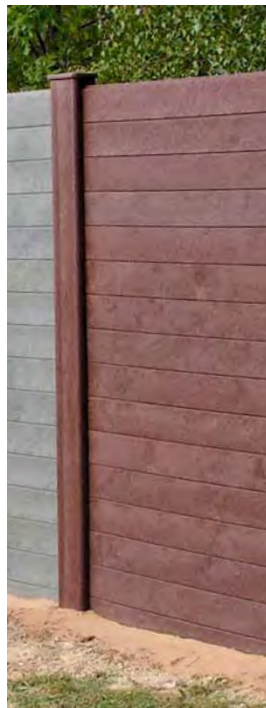
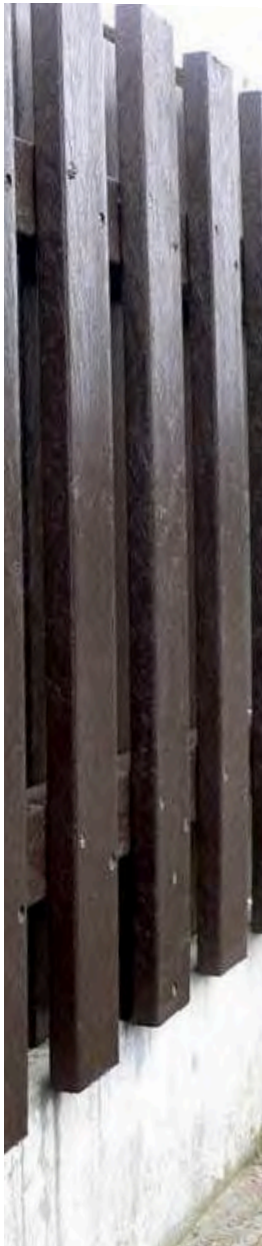




FENCING SPECIFICATION GUIDE

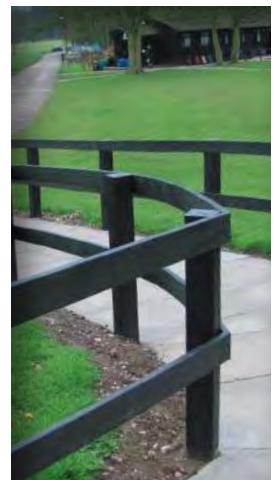


KEDEL

ECO-FRIENDLY PLASTIC PRODUCTS

100% RECYCLED PLASTIC

- Maintenance Free
- Easy Installation
- Durable & Vandal Resistant
- Splinter Free
- Aesthetically Pleasing
- 100% Recycled & 100% Recyclable



KEDEL

ECO-FRIENDLY PLASTIC PRODUCTS

100% RECYCLED PLASTIC

What is Kedel Mixed Plastic ?

Kedel's Recycled Mixed Plastics are well engineered blends of recycled plastics, manufactured to a high standard and independently tested. Our material specifications make our profiles reliable, maintenance free, long life solutions, suitable not only for high quality fencing, but for a wide range of building and construction applications.

Kedel's Mixed Plastic is a unique blend of recycled plastics carefully formulated to offer the appropriate balance of properties for fencing applications. Its formulations are a mixture of polyolefin compounds, which consist of hydrocarbons and contain no softeners, chlorides, cadmium or other additives. They are inert and safe to use even in sensitive nature reserves and do not leach any chemicals into the soil.

Its mixed polymer composition combines the stiffness of polystyrene with the impact resistance of polythene. Manufactured with a unique patented process, it boasts a wide range of advantages over traditional materials such as wood, metal, concrete and virgin plastics, offering a cost effective high performance, long-life solution.

Benefits

- Maintenance Free
- Easy Installation
- Durable & Long Lasting
- Splinter Free
- Aesthetically Pleasing
- Weather Resistant
- Light Weight
- 100% Recycled & 100% Recyclable



Kedel Mixed Plastic Tech Data

| Test | EN Standard | Result | | | Ductile Spec | Ultra Spec |
|--------------------------|----------------------------|----------------------------------|-------------|-------------------|------------------------|-------------------------|
| 3 Point Bend | DIN EN ISO 178 | Flexural Stress | -5°C | MPa | 21.2 | 35.1 |
| | | Bending E-Modulus | -5°C | MPa | 1,289 | 2,261 |
| | | Flexural Stress | +23°C | MPa | 11.6 | 24 |
| | | Bending E-Modulus | +23°C | MPa | 581 | 1,424 |
| | | Flexural Stress | +65°C | MPa | 4.6 | 16.5 |
| | | Bending E-Modulus | +65°C | MPa | 162 | 856 |
| Tensile | DIN EN ISO 527-2 | Strength | - | MPa | 9.65 | 15.6 |
| | | Elongation | - | % | 13.8 | 1.7 |
| | | Tensile E-modulus | - | MPa | 659 | 1,490 |
| Timed Tensile | DIN EN ISO 899-1 | Tensile E-modulus | 1 hour | MPa | 316 | 1,043 |
| | | Tensile E-modulus | 24 hours | MPa | - | 975 |
| | | Tensile E-modulus | 100 hours | MPa | 202 | 852 |
| Timed 3 Point Bend | DIN EN ISO 899-2 | Bending E-Modulus | 1 hour | MPa | 380 | 1,159 |
| | | Bending E-Modulus | 24 hours | MPa | 271 | 943 |
| | | Bending E-Modulus | 100 hours | MPa | 235 | 816 |
| Pressure Characteristics | DIN EN ISO 604 | Compression Strength | 1% Stretch | MPa | 1.8 | 2.5 |
| | | Compression Strength | 2% Stretch | MPa | 3.3 | 5.3 |
| | | Compression Strength | 10% Stretch | MPa | 13.3 | 27.9 |
| | | Compression Strength | 20% Stretch | MPa | 18.2 | - |
| | | Compression Strength | At yield | MPa | - | 29.0 |
| | | Pressure E-Modulus | - | MPa | 271 | 815 |
| Charpy Test | DIN EN ISO 179 | Impact Resistance | - | kJ/m ² | 412 | 12 |
| Impact Shore Hardness | DIN EN ISO 868 | Shore Hardness | - | - | 53 | 62 |
| Density Test | DIN EN ISO 1183-1 | Density | - | g/cm ³ | 1.0062 | 1.0529 |
| Water Absorbtion | DIN EN ISO 62 | +23°C, 50% R.I | - | % | <1 | <1 |
| | | +23°C in water | - | % | <1 | <1 |
| | | +100°C in water | - | % | <1 | <1 |
| Resistance | DIN IEC 60093 ⁴ | Surface Resistance | - | Ω | 3.2 x 10 ¹³ | 1.5 x 10 ¹⁴ |
| | | Specific Surface Resistance | - | Ω | 3.2 x 10 ¹⁴ | 1.5 x 10 ¹⁵ |
| | | Flow/Contact Resistance | - | Ω | 9.0 x 10 ¹³ | >2.0 x 10 ¹⁴ |
| | | Specific Flow/Contact Resistance | - | Ω | 4.5 x 10 ¹⁴ | >8.4 x 10 ¹⁴ |
| | | Resistance | - | - | - | - |
| Ball Striking Test | DIN EN ISO 2039-1 | Ball Striking Hardness | - | N/mm ² | 18.44 | 39.52 |
| Thermal Expansion | - | Coefficient of Thermal Expansion | - | 1 / °C | 0.00018993 | 0.0001510648 |
| Screw Pull Out Force | - | Drilled Material | - | N | 7,500 | 8,230 |
| | | Non Drilled Material | - | N | 7,500 | 8,140 |

KEDEL

ECO-FRIENDLY PLASTIC PRODUCTS

100% RECYCLED PLASTIC

Kedel Mixed Plastic fencing offers aesthetically pleasing boundaries, with the added benefit of a long product lifetime and zero maintenance. Impact and chemical resistance make it virtually vandal proof. An attractive, cost effective fencing option, for commercial contracts in general and more specifically for education, local authorities and housing associations.

Durable & Vandal Resistant

- Formulated for strength, durability and stability
- Typical lifetime up to 50 years
- Resistant to chemicals such as cleaning products, oils and grease; graffiti is easy to remove

Aesthetically Pleasing

- Brown & black
- A Natural, smooth finish
- A variety of sizes and pale top styles

No Maintenance

- Weather resistant - will never rot
- Waterproof and mould resistant
- No painting, staining or preservative required

Easy Installation

- Light weight
- Easy cut, screw or bolt on site

Reduced Life Costs

- Maintenance free
- Whole-life costs halved when compared to wooden fencing

Eco-Friendly

- 100% recycled and recyclable
- Inert and safe to use in any environment, including sensitive nature reserves



Comparison of Fencing Types

Kedel Ultra vs Wood

| Fencing Material Properties | Kedel Ultra Fencing | Wood - Oak | Wood - Pine |
|---|--|------------------------------|------------------------------|
| Lifetime | 30 to 50 years | 5 to 15 years | 5 to 15 years |
| Strength MPa* | 30 | 30 | 18 |
| Material Density g/cm³ | 1.05 | 0.64 | 0.37 |
| Recycled Material | Yes | No | No |
| Regular Painting/ Staining/Treatment | No | Yes | Yes |
| Cleaning | Can be easily cleaned. Water and chemical resistant | Absorbs chemicals & moisture | Absorbs chemicals & moisture |
| End of Life Disposal | Recyclable | Rot/Landfill | Rot/Landfill |
| Colours | Brown & black | Various (stained colours) | Various (stained colours) |

Kedel Ultra vs Other Plastic Materials

| Fencing Material/ Properties | Kedel Ultra Fencing | Polyethylene | Polystyrene | Wood Plastic Composite (WPC) | PVC/ Vinyl |
|------------------------------|---------------------|----------------|-----------------------------|----------------------------------|------------------------------|
| Lifetime | 30 to 50 years | 30 to 50 years | 30 to 50 years | 10 to 25 years | 30 years |
| Form | Solid | Solid/hollow | Foamed | Solid/hollow | Hollow/ foamed |
| Strength MPa* | 30 | 16 | 30 | 34 | 39 |
| Workable Like Wood | Yes | Yes | Yes | Some forms | No (Preformed) |
| Impact Resistance | Good | Good | Brittle | Tending to be brittle | Hollow section makes it weak |
| Cleaning | Good | Good | Poor resistance to solvents | Depends on matrix. 3% absorption | Limited resistance |



ECO-FRIENDLY PLASTIC PRODUCTS

100% RECYCLED PLASTIC

Whole Life Cost

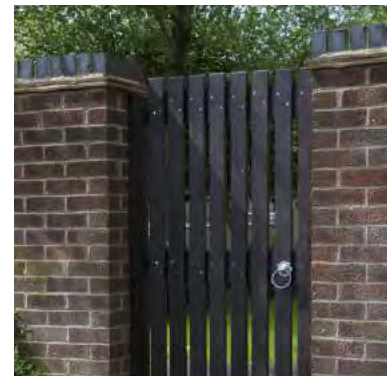
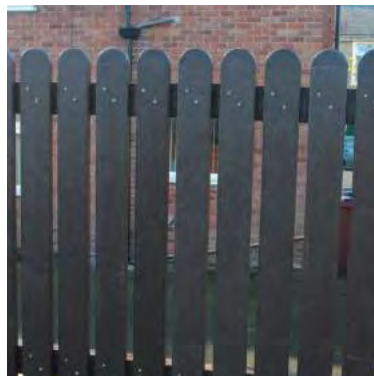
What does it mean, "Whole Life Cost"?

When planning an investment in any long-term outdoor fixture, the initial installation is not the only expense. Maintenance, Replacement and End-of-Life Disposal all carry very significant cost implications. For a true comparison with traditional materials, it makes sense to include these ongoing costs in your calculations. That's what is meant by Whole-life cost.

Why Choose Fencing Made from Kedel Mixed Plastic?

Although the initial cost of installing Kedel Recycled Mixed Plastic fencing may be greater than wood, over the course of a fence lifetime wood can be up to twice the cost. Wood needs to be treated every couple of years and will still need replacing in as little as 7 years, according to a cost comparison study conducted by WRAP*. Kedel's recycled plastic fencing requires no treatment whatsoever, yet lasts for decades. And it stays looking good year in year out.

* WRAP (Waste Resources Action Programme). Set up in 2000 to promote sustainable waste management and initially funded by all 4 UK Governments. An independent charity since 2014.



Cost of Kedel Mixed Plastic vs Timber

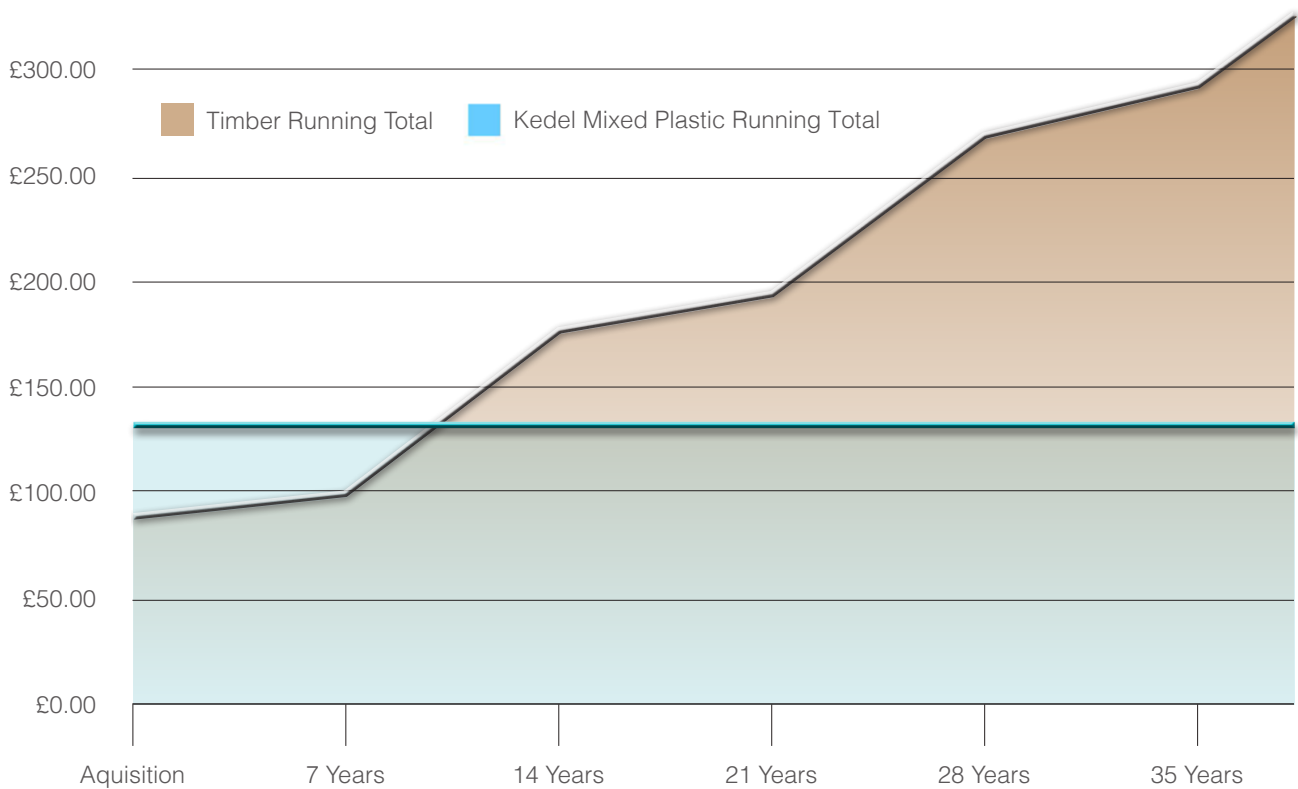
| Cost of Kedel Mixed Plastic Vs Timber per Linear Metre | Kedel Ultra | Treated Timber |
|--|-------------|----------------|
| Cost per Linear Metre* | £53.03 | £19.00 |
| Cost of Intallation per Linear Metre* | £81.00 | £62.00 |
| Replacement Period | N/A | 7-14 years |
| Cost of Maintenance per Linear Metre* | N/A | £13.00 |
| Maintenance Period | N/A | 7 years |

*2015 prices

Cost of Kedel Mixed Plastic vs Wood (per Linear Metre)

| Life of Fence | Aquisition | 7 Years | 14 Years | 21 Years | 28 Years | 35 Years |
|----------------------------|------------|----------|----------|----------|----------|----------------|
| Period Cost of Kedel Ultra | £134.03 | £0.00 | £0.00 | £0.00 | £0.00 | £0.00 |
| Running Total* | £134.03 | £134.03 | £134.03 | £134.03 | £134.03 | £134.03 |
| Maintenance/Replacement | - | Maintain | Replace | Maintain | Replace | Maintain |
| Period Cost of Timber* | £81.00 | £13.00 | £81.00 | £13.00 | £81.00 | £13.00 |
| Timber Running Total* | £81.00 | £94.00 | £175.00 | £188.00 | £269.00 | £282.00 |

*2015 prices

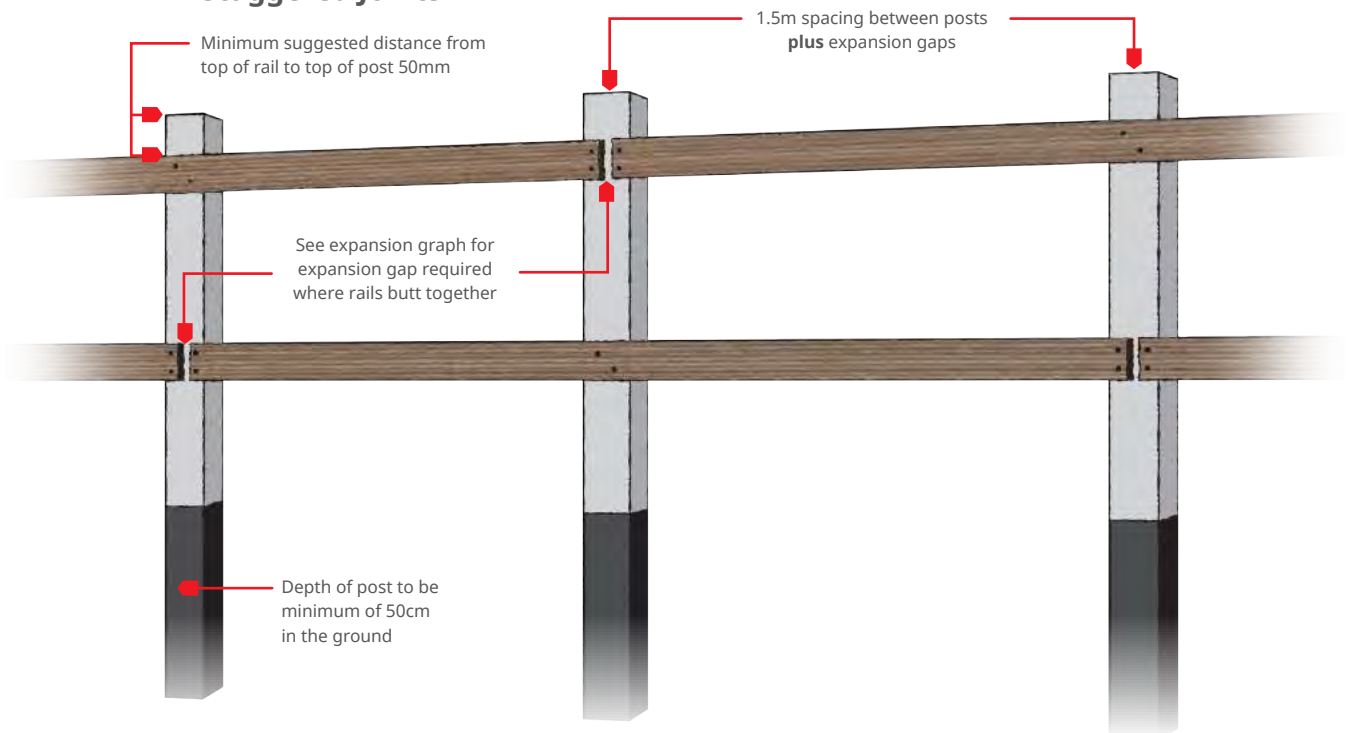


Fencing Profiles Post and Rail

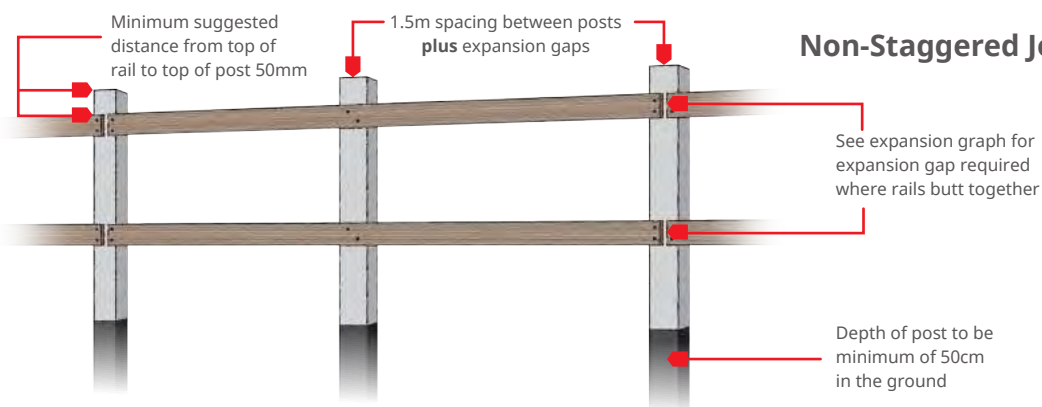
Post and 2 Rail Components

| Height | Post | Rails | Colour |
|--------|-----------------|------------------|---------------|
| 100cm | 10 x 10 x 150cm | 5.0 x 10 x 300cm | Brown & Black |

Staggered Joints



Non-Staggered Joints



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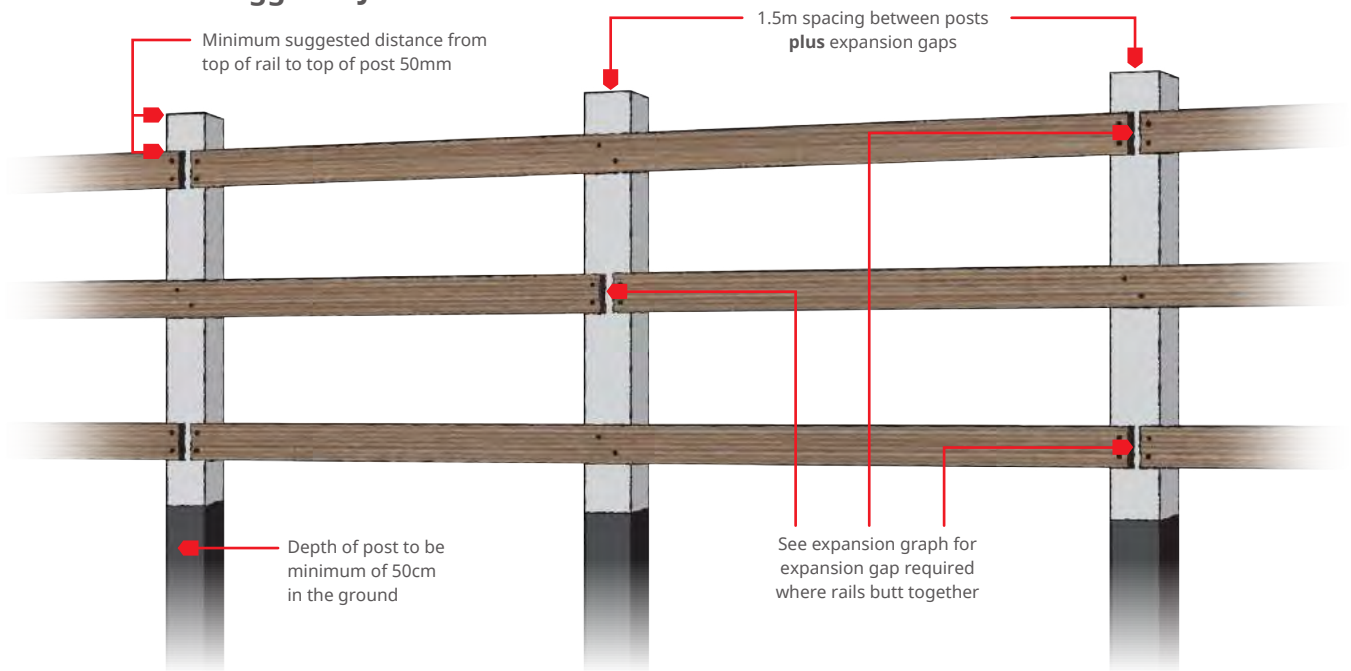
Fencing Profiles Post and Rail

Post and 3 Rail Components

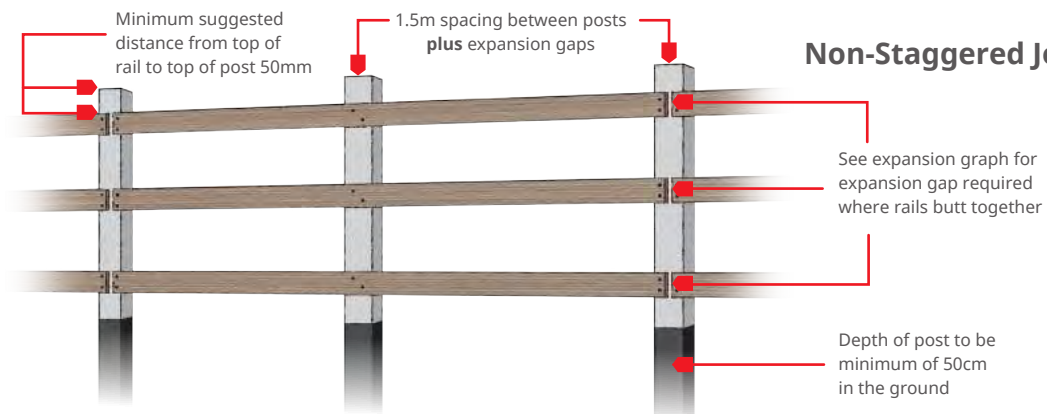
| Height | Post | Rails | Colour |
|--------|-----------------|------------------|---------------|
| 125cm | 10 x 10 x 175cm | 5.0 x 10 x 300cm | Brown & Black |



Staggered Joints



Non-Staggered Joints





ECO-FRIENDLY PLASTIC PRODUCTS

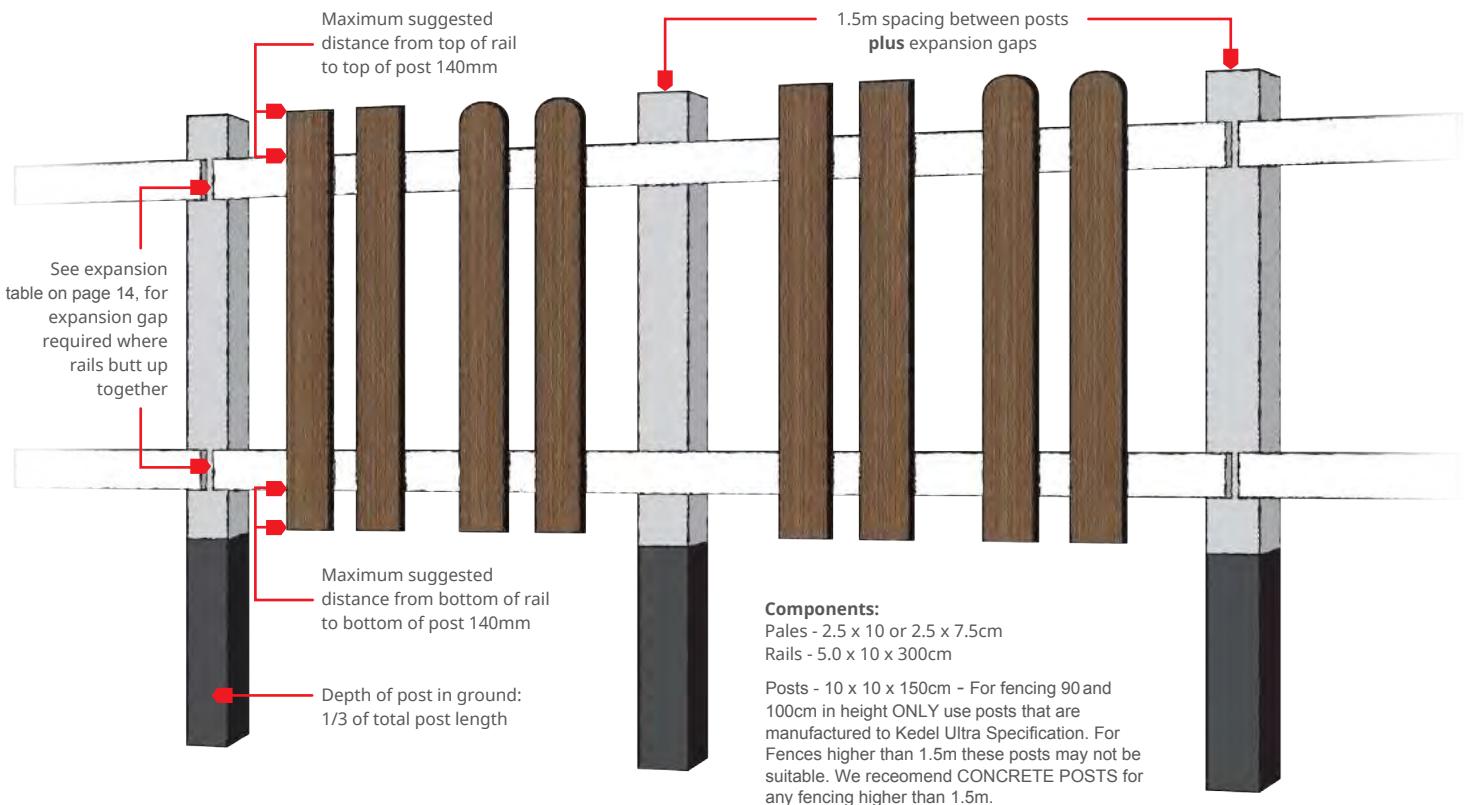
100% RECYCLED PLASTIC

Fencing Profiles 90cm & 100cm High

Detailed below are the most popular profile options for fencing applications. For all available options please see our website - www.kedeltrade.co.uk.

90cm & 100cm High Fencing Components

| Height | Pales | Top | Rails | Posts | Colour |
|--------|-------------|-----|-----------------------------------|-----------------|---------------|
| 90cm | 2.5 x 7.5cm | - | 5.0 x 10 x 300cm (2 per panel) | 10 x 10 x 150cm | Brown & Black |
| | 2.5 x 10cm | | | | |
| 100cm | 2.5 x 7.5cm | - | 5.0 x 10 x 300cm (2 per panel) | 10 x 10 x 150cm | Brown & Black |
| | 2.5 x 10cm | - | | | |





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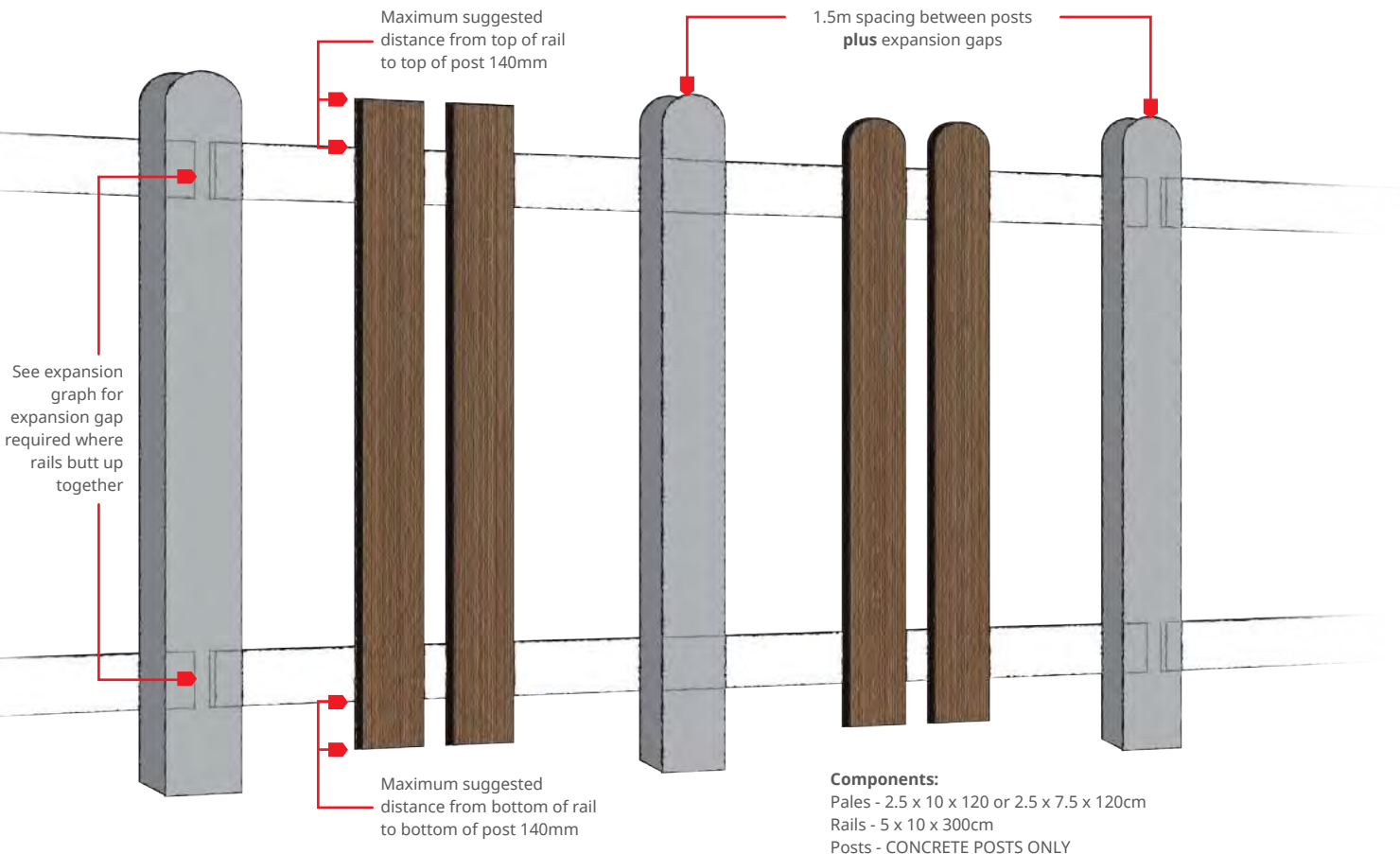
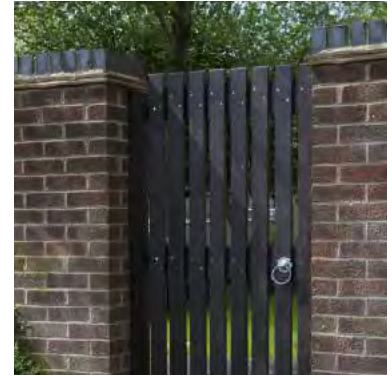
ECO-FRIENDLY PLASTIC PRODUCTS

100% RECYCLED PLASTIC

Fencing Profiles 120cm High

120cm High Fencing Components

| Height | Pales | Top | Rails | Posts | Colour |
|--------|------------|---|-----------------------------------|----------|---------------|
| 120cm | 2.5 x 10cm |   | 5.0 x 10 x 300cm (2 per panel) | Concrete | Brown & Black |










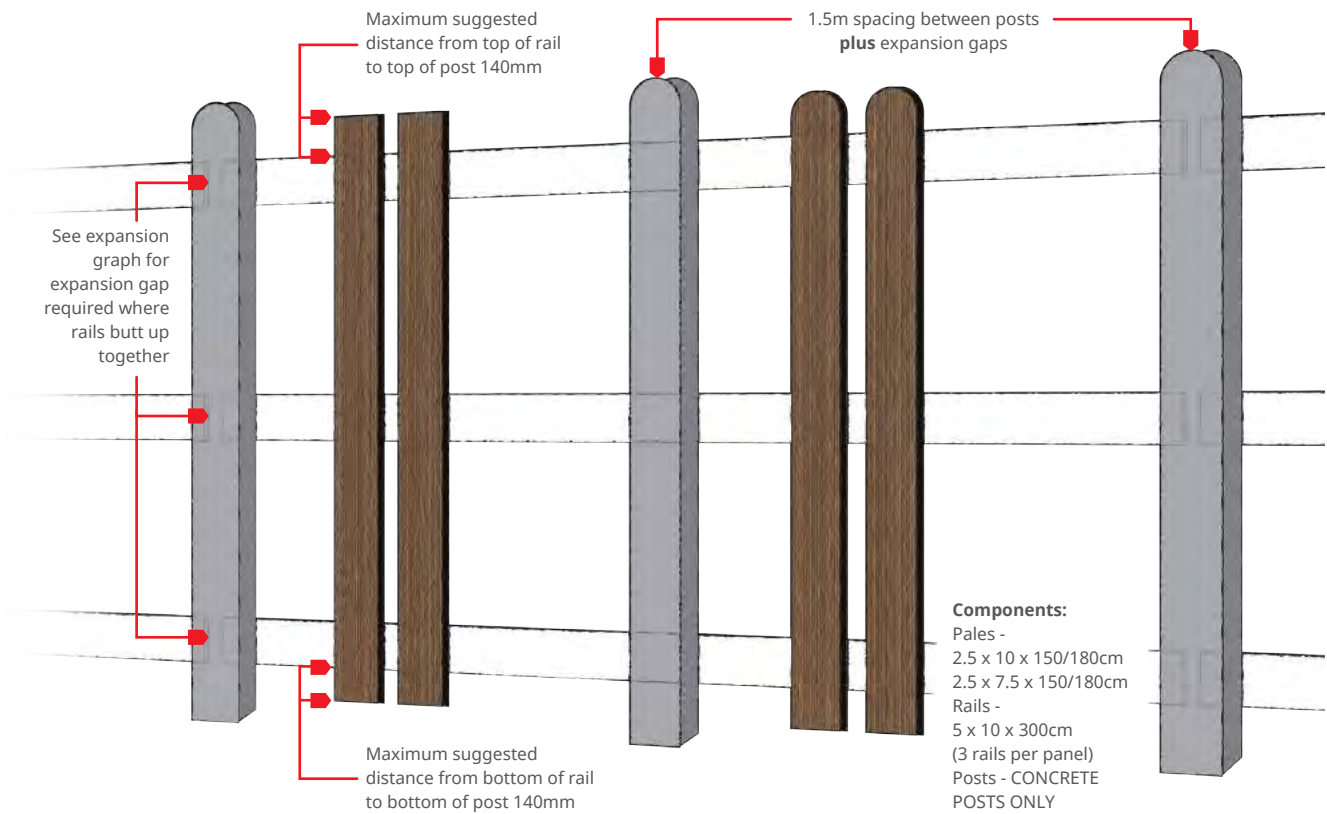
ECO-FRIENDLY PLASTIC PRODUCTS

100% RECYCLED PLASTIC

Fencing Profiles 150cm & 180cm High

150cm & 180cm High Fencing Components

| Height | Pales | Top | Rails | Posts | Colour |
|--------|-------------|---|-----------------------------------|----------|---------------|
| 150cm | 2.5 x 7.5cm | -  | 5.0 x 10 x 300cm (3 per panel) | Concrete | Brown & Black |
| | 2.5 x 10cm | -  | | | |
| 180cm | 2.5 x 7.5cm | -  | 5.0 x 10 x 300cm (3 per panel) | Concrete | Brown & Black |
| | 2.5 x 10cm |   | | | |



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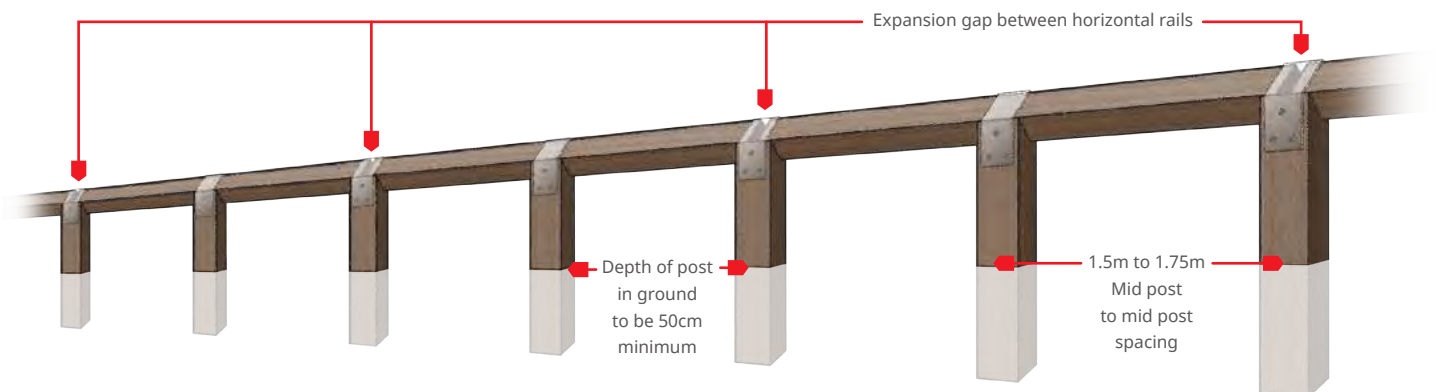
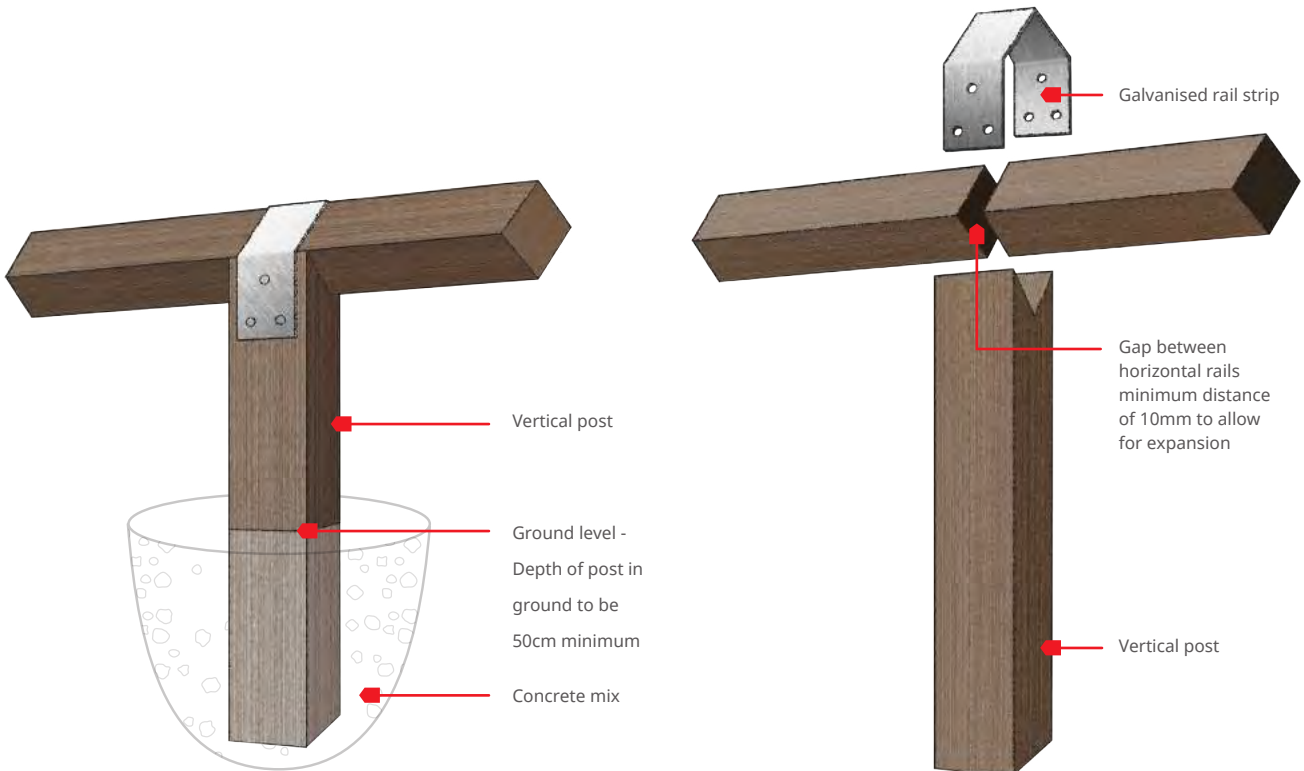
ECO-FRIENDLY PLASTIC PRODUCTS

100% RECYCLED PLASTIC

Fencing Profiles Knee Rail

Knee Rail Fence

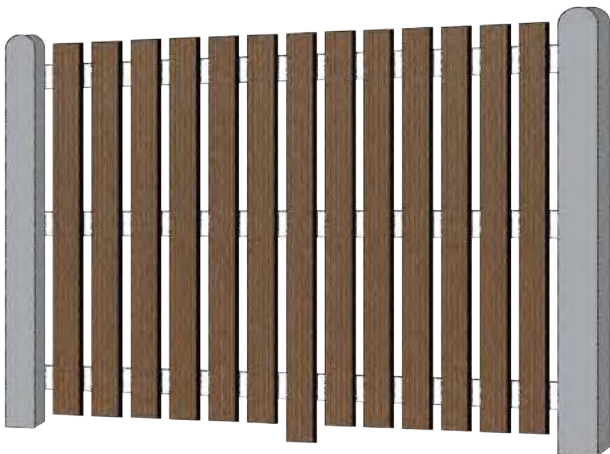
| Range | Post with Moulded V-top | Rail | Colour |
|------------|-------------------------|-------------------------|---------------|
| Standard | 10 x 10 x 125cm | 8 x 8 x 300cm | Brown & Black |
| Heavy Duty | 14 x 10 x 150cm | 10 x 10 x 150/175/300cm | Brown & Black |



Standard woodworking equipment is generally sufficient for installing Kedel fencing. However, we recommended that you avoid high cutting speeds when using power tools to prevent meltback from friction heat. Below we give more detailed advice to ensure a successful installation.

Post Spacing

Spacing between posts should be 1.5 metres plus gaps to allow for expansion. They should not be further apart than recommended. The middle pale of the panel should be extra long, touching the ground, to provide additional support. (see image below)



For Kedel fencing pales higher than 1m, only concrete posts should be used. Posts for gates of any height should also be concrete.

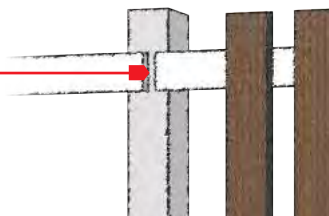
Rail Expansion & Contraction

Plastic is subject to linear thermal expansion and contraction, hence it's important to make allowances within the design of any Kedel fencing installation.

There are a number of design options available that will allow for thermal movement of the rails.

Expansion gap

A gap should be left where the rails butt up.



Allow for the maximum expansion with regard to the temperature at the time of installation. The higher the temperature at the time of installation, the smaller the maximum expansion will be. The lower it is, the larger the maximum expansion.

See examples below of maximum expansion per running metre at different installation temperatures:

| Expansion Table | | | | | | | | |
|--|----------|--------|----------|--------|----------|--------|----------|--------|
| Maximum expansion (contraction) occurring per running metre: | | | | | | | | |
| 0°C | 5°C | 10°C | 15°C | 20°C | 25°C | 30°C | 35°C | 40°C |
| +7mm | +6.5mm | +6mm | +5.5mm | +5mm | +4.5mm | +4mm | +3.5mm | +3mm |
| (-2mm) | (-2.5mm) | (-3mm) | (-3.5mm) | (-4mm) | (-4.5mm) | (-5mm) | (-5.5mm) | (-6mm) |

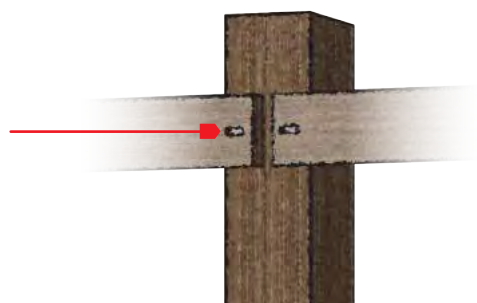
Minimum temperature in Western Europe = -20°C; maximum temperature in the sun of e.g. black boards = 50°C. Assuming that the installation is normally done at a temperature between 10°C to 20°C, the maximum temperature difference will be in the region of +40°C (expansion) and in the region -40°C (contraction). This demonstrates the importance of taking expected expansion and contraction into account.

Expansion brackets with slotted holes

Brackets with slotted holes allow the rails to move.



Slotted holes in the rails





Fixing Rails to Posts

Rails can be attached to the posts with galvanized or stainless steel coach bolts. Counter-sinking the head into the rail will enable the pales to fit over them.

Coach bolts should also be used to connect all fencing to corresponding posts.

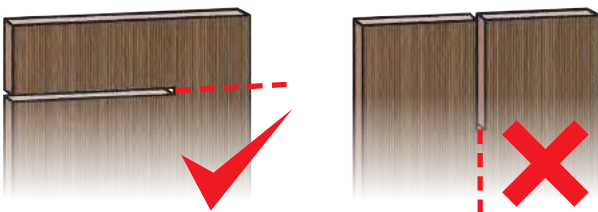
Fixing Pales to Rails

Pales should be fixed to the rails with screws. Stainless steel screws are preferable, but zinc passivated or galvanized are also adequate. Splitting could occur if screwed within 25mm of an edge.

Cutting and Sawing

Standard wood working equipment is suitable i.e. handsaw, circular saw or chainsaw. Speeds must be kept low. A coarse blade and wide teeth are recommended, e.g. 500mm diameter blade with 34 teeth.

IMPORTANT: Do not cut down the length of the material (the grain) as severe distortion and bowing can occur due to internal stresses inherent in the plastic.



Screw Fixings

Kedel Mixed Plastic profiles have very good screw retention properties. Use a minimum of 5mm diameter screw. As a general rule Pozi drive screws will suffice although Torque Head screws will give a better bit grip. Counter-sinking is recommended to ensure the screw sits flush with the surface of the profile. We always advise drilling pilot holes and countersinking to avoid mushrooming of the material and to give a better finish to the job.

Nails are not recommended, due to the high density of the plastic, which makes it difficult to penetrate.

If stainless steel screws are used, a pilot hole is advisable thus preventing undue stress on the screw.

Maintenance

Very minimal maintenance is required. We only recommend a cleaning regime of occasional washing with a medium-pressure hose, simply for aesthetic reasons.

Alternatively it's possible to manually wash the plank surfaces with warm water and a standard household detergent such as washing up liquid, using a non-abrasive cloth.

Please note that cleaning with a pressure washer on a low power is recommended, however the use of a steamer is not advisable.

As Kedel Mixed Plastic fencing is not porous, graffiti will sit on the surface of the material and not be absorbed into the plastic. Thinners applied to a cloth can be used to rub it off.

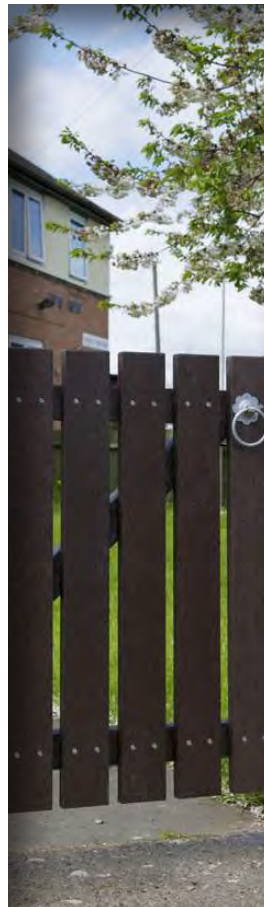
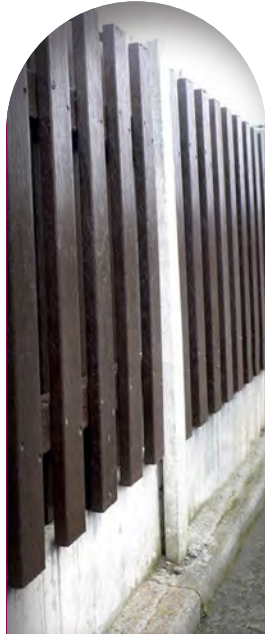
Waste Disposal

Kedel Mixed Plastic fencing is 100% recyclable.

25 Year Guarantee

All Kedel Mixed Plastic products come with a 15 year guarantee. For further details about the guarantee and more information about other Mixed Plastic products please contact Kedel Limited.





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ECO-FRIENDLY PLASTIC PRODUCTS

100% RECYCLED PLASTIC



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