Plastic Piling

and retaining systems

Uniclass L151:P7113	EPIC A41:X724

CI/SfB	(17.1)	Hn6	

Liniar

What is **plastic piling?**

Manufactured by HL Plastics in the UK since 1994, Liniar plastic piling is made from recycled PVCu and can be used for a wide variety of applications.

Plastic "vinyl" piling originated in the USA, where it was first recognised as an effective alternative for marine applications – overcoming problems both with the corrosion associated with steel, and the rotting effects of timber piles. The benefits soon translated to the UK, with Liniar piling the only range to be fully designed and manufactured in-house in Derbyshire.

Available in a variety of styles and lengths ex-stock, plastic piling provides an eco-friendly barrier for ground or water retention. Liniar piling is versatile enough to be used for permanent applications such as pond and lake reinforcement, or for temporary use; for example, trench shoring.

The unique design of Liniar log pile results in an attractive finish with no maintenance, offering landscapers a cost effective alternative to traditional retention methods and materials.

All styles of Liniar plastic piling are surprisingly strong, and can be tied back for even greater strength. For full details see the engineering values for each product.

Each project is different, so contact our experienced sales team to find out whether plastic piling could be suitable for your needs.

Why plastic piling?

Plastic piling is suprisingly strong and offers a wide range of benefits over traditional steel, timber or concrete piling.

Manufactured from recycled, lead-free PVCu, the main advantages to using this type of piling for your project include cost, durability, ease of handling and environmental benefits. With five types of piling to choose from, the Liniar system includes a versatile range of ancillaries, including connectors, driving caps and the facility for tying back and creating 90° corners.

In summary, Liniar plastic piling:

- Is manufactured from recycled plastic
- Will not rot or rust
- Is designed and manufactured in the UK at Liniar's own factory
- Is resistant to the majority of chemicals
- Is not affected by salt water
- Is lighter than steel, so easier to transport and handle
- Is maintenance free
- Is resistant to rodent and marine borer attack
- Has a wood composite fascia* – a hard engineering solution with a soft engineering appearance
- Can be manually handled and installed
- Has no risk of sparking
- Can be easily cut or bored
- Carries a Class 1Y Fire Rating
- Is available ex-stock (bespoke lengths available, subject to minimum order quantity)
- Has been installed to depths of more than 11 metres
- Has the ability to create curved walls
- 90° corner pile is available

* Liniar Log Pile only

CPD seminar available

Liniar offers a free of charge seminar – providing group training sessions at your premises to ensure your team is educated about the benefits of plastic piling. Contact us to find out more.

About Liniar

Liniar's range of fully recycled PVCu piling is designed and manufactured at its state-of-the-art extrusion facility in the heart of the East Midlands.

Part of the Flamstead Group of companies under American-owned parent company Quanex Building Products, Liniar initially formed in 1974 under the name HL Plastics as a specialist PVCu extrusion company, with its piling range developed in 1994.

An award-winning company, Liniar prides itself on leading the industry in innovation and investment, but also values its position on being an environmentally-friendly extrusion company with several products being fully or partially recycled. Liniar also boasts ISO14001 accreditation for its Environmental Management Policy.

Despite its considerable growth, the company retains a flat structure and a friendly approach. This means it is able to react to customers in a fast, effective way as well as being responsive to feedback. With its own transport and national coverage, Liniar is able to deliver anywhere within the UK.

At a glance...

- Part of Quanex Building Products, a NYSE-listed company
- £90m+ group turnover
- 400,000ft² purpose-built facilities
- Capital investment of £10m+ per annum
- Accredited with ISO 9001 and ISO 14001
- > 500 employees
- 2017 Winner of the Queen's Award for Enterprise in Innovation
- 2019 Manufacturer of the Year - Midlands Business Awards
- 2019 PVC Company of the Year - National Fenestration Awards


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Styles and installation

Styles

As it's designed and manufactured in-house, Liniar plastic piling is available to order in a wide range of styles and lengths, direct from our UK factory.

Liniar piling is produced from 100% lead-free recycled materials and is generally grey in appearance (log pile in sandy brown) – however, it can also be manufactured in other colours to suit individual requirements, subject to minimum order quantities.

NB: Piling will weather naturally over time to blend with its natural surroundings. Log pile with timber composite fascia can be stained with water-based wood treatment if required.

Liniar piling is available in the following styles:

Log Pile
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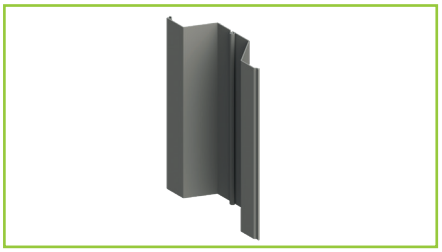
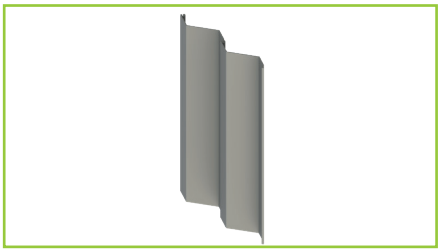


Standard Pile - Box Format
Page 10



Standard Pile - Z Ribbed
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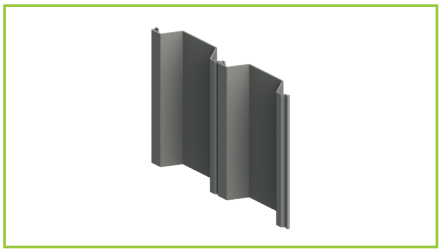

Full Pan Pile
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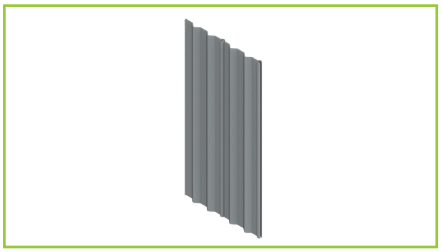

Trench Pile
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Accessories
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Installation

Liniar piling is lightweight to transport or carry to site and can be installed manually or mechanically. In many situations, particularly when shorter lengths are required, plastic piling can be inserted into the ground using a maul and pile cap.

When installing longer lengths, or where the ground conditions are more challenging, a piling hammer may be used – although driving in with a digger bucket is often possible. Liniar piling has so far been driven down to depths of 11.5 metres using specialist machinery.

The Liniar team will be able to advise you on the most suitable installation method for your application and put you in touch with an appropriate machinery rental supplier.

Piling **applications**

Liniar's plastic piling is extremely versatile and can be used in a number of applications across different industry sectors, including (but not limited to):

- Garden landscaping
- Riverbank, stream, pond, lake and reservoir bank retention and restoration
- Fishing lake and fish farm bank reinforcement
- Flood defence and control
- Erosion control and slope stabilisation
- Inland marina and waterway walls and banks
- Creating well defined drainage culverts and channels for agricultural land and house/urban development
- Blocking of ditches on peat bogs and other nature reserve situations
- Bund reinforcement
- Trench shoring
- Permanent shuttering/land remediation cut-off walls
- Highway applications
- Newt and pest control fencing
- Track-side refuges/shelters for the rail industry
- Land reclamation
- Caravan/Lodge base retention
- Play areas

Log **pile**

Log pile was designed in-house by the Liniar team following many months of research and development. Unique in construction, log pile is intended to replicate the appearance of timber logs.

Comprising three 'logs' extruded together from PVCu, with a wood composite finish, log pile is ideal for applications where a 'hard engineering' solution is required but there is a desire for a 'soft engineering' appearance.

Liniar's log pile is covered externally with a timber composite finish to give it a natural look and to enable algae or moss to grow on it. Made from 100% recycled material, it's perfect for use in situations where traditional piling options are not practical and equally suitable in natural habitats. Designed to weather naturally, just as natural wood, the fascia of log pile can be treated with a water-based wood stain if necessary.

Log Pile Technical Engineering Values						
Material PVC	Weight (sheet) kg/m 11	Weight (wall) kg/m² 25.6	Modulus of Elasticity N/mm² 2300	Moment of Inertia cm⁴/m 3306	Allowable Moment kNm/m Log Pile Only 6.67	Allowable Moment kNm/m Log Pile + Softwood Post 8.27
Width mm 429	Material Thickness mm 6	Depth/Diameter of Section mm 132	Tensile Yield Strength N/mm² 40	Section Modulus cm³/m 551	Allowable Moment kNm/m Log Pile + Hardwood Post 11.87	Allowable Moment kNm/m Log Pile + Steel Tube 17.15
Physical Properties			Mechnical Properties			

Engineering Values represent results of testing when Piling is installed in the format as illustrated above only. Calculations are based on Tensile Strength of material = 40N/mm². Allowable moment = $\frac{\text{Tensile Yield Strength x Section Modulus}}{\text{Factor of Safety} = 3}$ 3

Log pile 'a godsend' for garden rescue project

The original timber retaining structure in the garden of a home in South Wales had rotted and fallen to pieces, meaning that the deck and garden above it was in serious danger of collapsing. The developer called in a sub-contractor to rectify the issue and specified Liniar log piling as the ideal product to replace the existing wooden support.

The Contracts Manager on the project commented: "Liniar log piling proved an absolute godsend! Once we'd removed all of the rotten wood the piling was nice and easy to install – much quicker than building a brick wall.

"We simply dug a trench then sat the piles in concrete and, because they are hollow, it enabled us to fill them with in-situ concrete mix to create an incredibly sturdy structure. "As they're plastic, they won't rot like timber, so they will be there for the long term and the homeowners were delighted with the finished job because they look really nice too. They have a wood polymer composite on the front surface for added aesthetic appeal. I'd definitely use Liniar log piling again and would highly recommend it."

To read the full details and find our latest case studies visit www.liniar.co.uk/case-studies

Installing Log Pile

A minimal amount of 'toe-ing in' is required to install Liniar log pile. To provide extra anchorage, timber or metal stakes can be driven through the hollow tubes and into the ground to provide additional stability, without the need for specialist equipment. The number and frequency of stakes required is dependent on the individual application.

Liniar log pile can be set in concrete in a pre-dug trench. The tubes can also be filled to create even more strength or can be filled with man-made or other natural materials, or can even have plants growing out of them, depending upon the application. Alternatively, the log pile can be capped off using Liniar's top cap.

There is movement within the connecting ball and socket arrangement to allow for curves and a 90 degree corner profile is also available.

Ordering

Liniar log pile is available to purchase ex-stock in lengths of 750mm, up to 2.5 metre. Bespoke lengths can be ordered – please contact us for details at sales@liniar.co.uk.

Standard **pile** (Box Format)

Liniar standard piling is offered in two formats, with box format offering the strongest sheet pile configuration with the deepest profile.

Due to its supreme strength, standard piling is generally used in box format for higher retained heights or where greater strength is required.

Used in a wide variety of applications, from environmental peat bog blocking to water and bank retention – please ask our expert sales team whether standard pile would be suitable for your project.

Standard piling is produced in-house at Liniar's own manufacturing plant, and is available in a wide variety of lengths for multiple applications. Standard pile is produced using 100% recycled PVCu materials and is offered in grey as standard – however it can also be manufactured in other colours, subject to minimum order quantities.

Standard Pile - Box Technical Engineering Values						
Material PVC	Weight (sheet) kg/m 3.23	Weight (wall) kg/m² 10.77	Density kg/m² 1450	Initial Tan Modulus kN/mm² 2.55	Moment of Inertia cm⁴/m 2626	Maximum Moment kNm/m 14.2
	Material Thickness mm 5	Width (sheet) mm 315o/a	Tensile Yield Strength N/mm² 40	Secant Modulus kN/mm² 2.15	Section Modulus cm³/m 357	Allowable Moment kNm/m 4.73
Physical Properties			Mechnical Properties			

Engineering Values represent results of testing when Piling is installed in the format as illustrated above only. Calculations are based on Tensile Strength of material = 40N/mm². Allowable moment = $\frac{\text{Tensile Yield Strength x Section Modulus}}{\text{Factor of Safety = 3}}$ 3

Ceteau Piling

One of CeTeau's initial challenges was to find a way to drive the piling up to 5m deep into the ground – something they achieved with an innovative solution from their engineers. And that method has proved to be such a huge success that they have now managed to install the piling at more than double that original target – an incredible 11.5m!

It was necessary for CeTeau to get down to that depth during their latest project - the construction of a 270 metre long wall in Samut Prakan, Thailand. This was to form a seepage barrier designed to protect the foundations of a monument structure near the Chao Phraya River.

CeTeau Managing Director, Tijl Pieter de Zwart, commented: "Because of the high water content in the soil in the area, it was necessary to get the piling deeper than we had previously attempted. I know that some thicker sheet pile has been installed in the US to a similar depth, but nothing as thin as the Liniar piling has been achieved before. We are confident that this is a world first! But we never doubted that we could successfully drive that far as it's an outstanding, strong product and has never let us down."

To read the full details and find our latest case studies visit www.liniar.co.uk/case-studies

Installing Standard Pile

In many situations, particularly when short lengths of plastic piling are being installed, it can be inserted into the ground using a maul and pile cap. This is often the case in peat land areas, where the ground conditions are more favourable.

When installing longer lengths, or where the ground conditions are more difficult, a piling hammer should be used. A mandrel or leader rig should be used on longer lengths to aid installation and prevent deflection of the piles.

The Liniar team can help you choose the most suitable type dependent on the application, and refer you to an appropriate rental supplier.

Ordering

Liniar standard pile is available to purchase ex-stock in half-metre increments, up to 6 metre lengths. Bespoke lengths can be ordered – please contact us for details at sales@liniar.co.uk.

Standard **pile** (Z-Ribbed)

A general purpose medium strength pile, Z-ribbed piling covers slightly more ground per pile than box format.

Liniar Z-ribbed piles have a shallower front-on profile, interlocking to form a solid web.

With a variety of applications, Z-ribbed piling is predominantly used in retaining and floodwall applications where bending strength governs the design and no deflection (swing) between sheets is required.

Providing a low-cost alternative to steel, Z-ribbed piling is also ideal for the construction of bridges, drainage systems, manholes and tunnels. Ask our experts which type of Liniar piling is recommended for your specific project. Manufactured in-house by Liniar, piling can be supplied in different lengths to suit – please ask for more details.

Standard Pile - Z Ribbed Technical Engineering Values						
Material PVC	Weight (sheet) kg/m 3.23	Weight (wall) kg/m² 9.79	Density kg/m² 1450	Initial Tan Modulus kN/mm² 2.55	Moment of Inertia cm⁴/m 510	Maximum Moment kNm/m 4.0
	Material Thickness mm 5	Width (sheet) mm 330o/a	Tensile Yield Strength N/mm² 40	Secant Modulus kN/mm² 2.15	Section Modulus cm³/m 100	Allowable Moment kNm/m 1.33
Physical Properties			Mechnical Properties			

Engineering Values represent results of testing when Piling is installed in the format as illustrated above only. Calculations are based on Tensile Strength of material = 40N/mm². Allowable moment = $\frac{\text{Tensile Yield Strength x Section Modulus}}{\text{Factor of Safety = 3}}$ 3

Z-ribbed success in raising water levels

Peat bogs are a rare and declining habitat in Britain and often very important for a large number of rare plants and insects – but since the 19th century these have witnessed a dramatic decrease of 94%.

Suppressed or fluctuating water levels from drainage or surrounding land has been one of the major factors behind this decline, leading to scrub and tree invasion and colonisation by bramble and bracken.

One such area affected in this way was Wem Moss Nature Reserve in Shropshire. The Wildlife Trust have been working with other organisations across the region to restore this fragmented wetland for both the wildlife and people that live there – and Liniar piling has proved pivotal to the success of the project. Utilising Liniar's standard pile in Z-ribbed format, the Trust blocked up drainage networks to restore water levels and Wem Moss is now described as an outstanding example of a lowland raised bog. Extremely versatile and easy to install, the lightweight qualities of Liniar Z-ribbed piling make it simple to transport to hard-to-reach areas and, because it doesn't rot, rust or leach chemicals into the water, it's perfect for environmental applications.

To read the full details and find our latest case studies visit www.liniar.co.uk/case-studies

Installing Standard Pile

In many situations, particularly when short lengths of plastic piling are being installed, it can be inserted into the ground using a maul and pile cap. This is often the case in peat land areas, where the ground conditions are more favourable.

When installing longer lengths, or where the ground conditions are more difficult, a piling hammer should be used. A mandrel or leader rig should be used on longer lengths to aid installation and prevent deflection of the piles.

The Liniar team can help you choose the most suitable type dependent on the application, and refer you to an appropriate rental supplier.

Ordering

Liniar standard pile (Z-Ribbed) is available to purchase ex-stock in half-metre increments, up to 6 metre lengths. Bespoke lengths can be ordered – please contact us for details at sales@liniar.co.uk.

Full Pan **pile**

Designed to replicate the look of steel sheet piling, Liniar full pan pile is extremely versatile and easy to install.

With its distinctive flat back profile, Liniar full pan pile is perfect for bank retention and restoration in a wide range of projects.

Also ideal for temporary work during civil engineering projects, it can prove more economical to use PVCu full pan pile as it can be left in situ after work has been completed.

Full pan pile can also be easier to install by the non-professional, requiring no mechanical handling equipment where ground conditions are favourable. Available in various different lengths to suit your application, full pan pile can also be manufactured in other colours, subject to minimum order quantities – please ask our sales team for more details.

Full Pan Pile Technical Engineering Values

Material PVC	Weight (sheet) kg/m 3.35	Weight (wall) kg/m² 10.50	Density kg/m² 1450	Initial Tan Modulus kN/mm² 2.55	Moment of Inertia cm⁴/m 688.5	Maximum Moment kNm/m 7.38
	Material Thickness mm 5	Width (sheet) mm 310o/a	Tensile Yield Strength N/mm² 40	Secant Modulus kN/mm² 2.15	Section Modulus cm³/m 184.7	Allowable Moment kNm/m 2.46
Physical Properties			Mechnical Properties			

Engineering Values represent results of testing when Piling is installed in the format as illustrated above only. Calculations are based on Tensile Strength of material = 40N/mm². Allowable moment = $\frac{\text{Tensile Yield Strength x Section Modulus}}{\text{Factor of Safety} = 3}$ $\frac{}{3}$

Plastic piling helps fish farm return to full productivity

The Environment Agency's fish farm in Nottinghamshire is an important centre, breeding thousands of fish to re-stock rivers and still waters around the UK.

In 2009, the banks of its purpose-built ponds, built to stock larvae until fully grown before being released into the wild, had begun to erode. The original linings of the ponds had slipped, causing the pond walls to disintegrate and reducing each pond's capacity.

The Agency undertook a major refurbishment project to restore the inefficient infrastructure, selecting Liniar full pan pile as the ideal product to use on the project Its lightweight nature meant it was easy to handle on site, durable and cost effective, as well as being made from 100% recycled PVCu.

The results were outstanding – the ponds still have neat, vertical walls with no erosion, and full productivity restored. In fact, according to a press release*, the fish farm in Calverton had a record-breaking year in 2015, with almost half a million fish bred for release.

To read the full details and find our latest case studies visit www.liniar.co.uk/case-studies

Installing Full Pan Pile

In many situations, particularly when short lengths of plastic piling are being installed, it can be inserted into the ground using a maul and pile cap. This is often the case in peat land areas, where the ground conditions are more favourable.

When installing longer lengths, or where the ground conditions are more difficult, a piling hammer should be used. A mandrell or leader rig should be used on longer lengths to aid installation and prevent deflection of the piles.

The Liniar team can help you choose the most suitable type dependent on the application, and refer you to an appropriate rental supplier.

Ordering

Liniar standard pile is available to purchase ex-stock in half-metre increments, up to 6 metre lengths. Bespoke lengths can be ordered – please contact us for details at sales@liniar.co.uk.

* https://www.gov.uk/government/news/almost-2-million-fish-released-into-englands-rivers

Trench **shoring**

Liniar's plastic piling provides a low cost, user friendly and sustainable alternative to steel or timber for temporary works at shallow depths.

Either Liniar's trench or full pan pile can be used - the trench pile having a thinner footprint but the full pan having greater strength.

Plastic piles for temporary shoring are a cost effective, user friendly and environmentally sound alternative to traditional materials. Lighter than steel, the sheets can be manually handled without the need for lifting equipment and negate any issues with transport. They are made from recycled plastic and carry a class 1Y fire rating, will not create sparks, are reuseable and do not rust or splinter.

Our corner pile allows for rectangular configurations and they can easily be cut on site as required.

Trench Pile Technical Engineering Values						
Material PVC	Weight (sheet) kg/m 2.31	Weight (wall) kg/m² 7.70	Density kg/m² 1450	Initial Tan Modulus kN/mm² 2.55	Moment of Inertia cm⁴/m 343.6	Maximum Moment kNm/m 1.96
	Material Thickness mm 5	Width (sheet) mm 240o/a	Tensile Yield Strength N/mm² 40	Secant Modulus kN/mm² 2.15	Section Modulus cm³/m 49	Allowable Moment kNm/m 0.65
Physical Properties			Mechnical Properties			

Engineering Values represent results of testing when Piling is installed in the format as illustrated above only. Calculations are based on Tensile Strength of material = 40N/mm². Allowable moment = $\frac{\text{Tensile Yield Strength x Section Modulus}}{\text{Factor of Safety = 3}}$ 3

Ordering

Liniar trench pile is available to purchase ex-stock in half-metre increments, up to 6 metre lengths. Bespoke lengths can be ordered – please contact us for details at sales@liniar.co.uk.

Full Pan Pile Technical Engineering Values						
Material PVC	Weight (sheet) kg/m 3.35	Weight (wall) kg/m² 10.50	Density kg/m² 1450	Initial Tan Modulus kN/mm² 2.55	Moment of Inertia cm⁴/m 688.5	Maximum Moment kNm/m 7.38
	Material Thickness mm 5	Width (sheet) mm 310o/a	Tensile Yield Strength N/mm² 40	Secant Modulus kN/mm² 2.15	Section Modulus cm³/m 184.7	Allowable Moment kNm/m 2.46
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Accessories

Capping Strip

Fixes through the face of the piles to cap off the open tops.

Corner Pile

Connects 2 sheets of any piling at 90°.

2-Way Connector Pile

The Connector Pile allows 2 parallel runs of sheets to be connected to each other.

3-Way Connector Pile

Allows for sheets to be tied behind at 90° to the main wall, removing the need for steel tie bars.

Mini Pile

A much smaller sheet often used in domestic situations for lawn edging or raised beds retention.

Log Pile Cap

Providing an attractive finish to log pile installations.

Log Pile Driving Cap

To aid installation of log pile.

Sheet Pile Driving Cap

To aid installation of plastic sheet piling.

All piling ranges are subject to change at Liniar's discretion.

Please contact us for a quotation to your exact requirements – email sales@liniar.co.uk.

As Liniar plastic piling is manufactured from recycled materials, we cannot guarantee the consistency of colour shades between batches, unless a bespoke order is made (subject to MOQ).

The information provided represents average values, which are believed to be accurate. No warranty of any kind is made as to the suitability of Liniar plastic piling for any particular application or the results obtained there from.

7 **great reasons** to choose Liniar

Made in Britain – Liniar piling is designed, manufactured and available ex-stock from our state-of-the-art facility in Derbyshire.

Sustainable – Made from 100% recycled and lead-free PVCu, Liniar piling won't rot or rust.

Surprisingly Strong – Lightweight enough to be handled manually, Liniar piling is strong and robust.

Independently Tested – Liniar piling has been tested independently by the TRL for strength, durability and quality.

Supported – A team of experts can advise on the type of piling and installation required for your project.

Quality Assured – The Liniar production facility is backed with ISO 9001 accreditation for your peace of mind.

Accessorised – A range of ancillaries is available to accompany Liniar piling, including caps and connectors.

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