Pietrucha
Established 1960

Proudly Polish,
Truly International

www.pietrucha.pl

ISO 9001

GEOTECHNICAL SOLUTIONS FOR CIVIL ENGINEERING

The Pietrucha Group

We are a Polish family business with over 60 years' history. We specialize in the manufacturing and distribution of high quality geotechnical profiles and comprehensive solutions for civil and hydrotechnical engineering.

Over 30 years' track record in the processing of thermoplastic materials.

Advanced machine park and own research and development division.

ISO 9001:2015 quality.

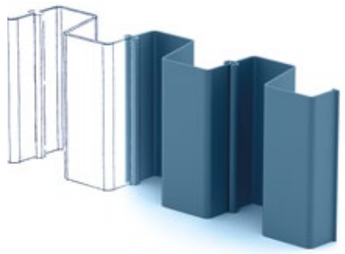
Presence in nearly 40 countries on 5 continents.

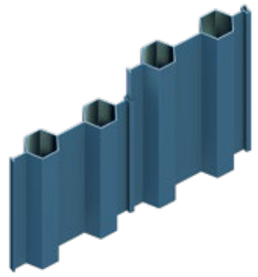
Technical and design support

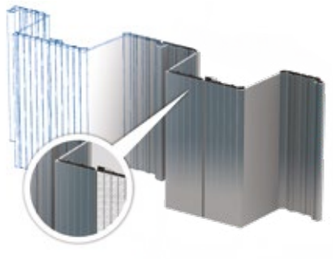
In cooperation with a specialized design office, we offer technical and project design support. For civil engineering specialists, we created Designer 3.0, our online calculation platform which comprises three calculation tools dedicated to the products from the Group portfolio to facilitate civil engineering calculations of cut-off and retaining walls parameters, required soil stabilization and flood prevention solutions.

Designer 3.0 by Pietrucha

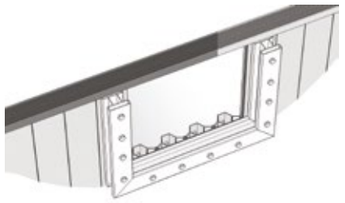
GEOTECHNICAL PROFILES

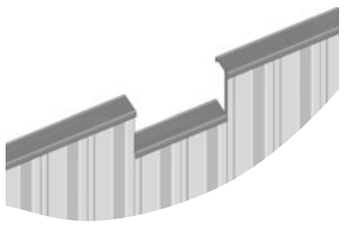




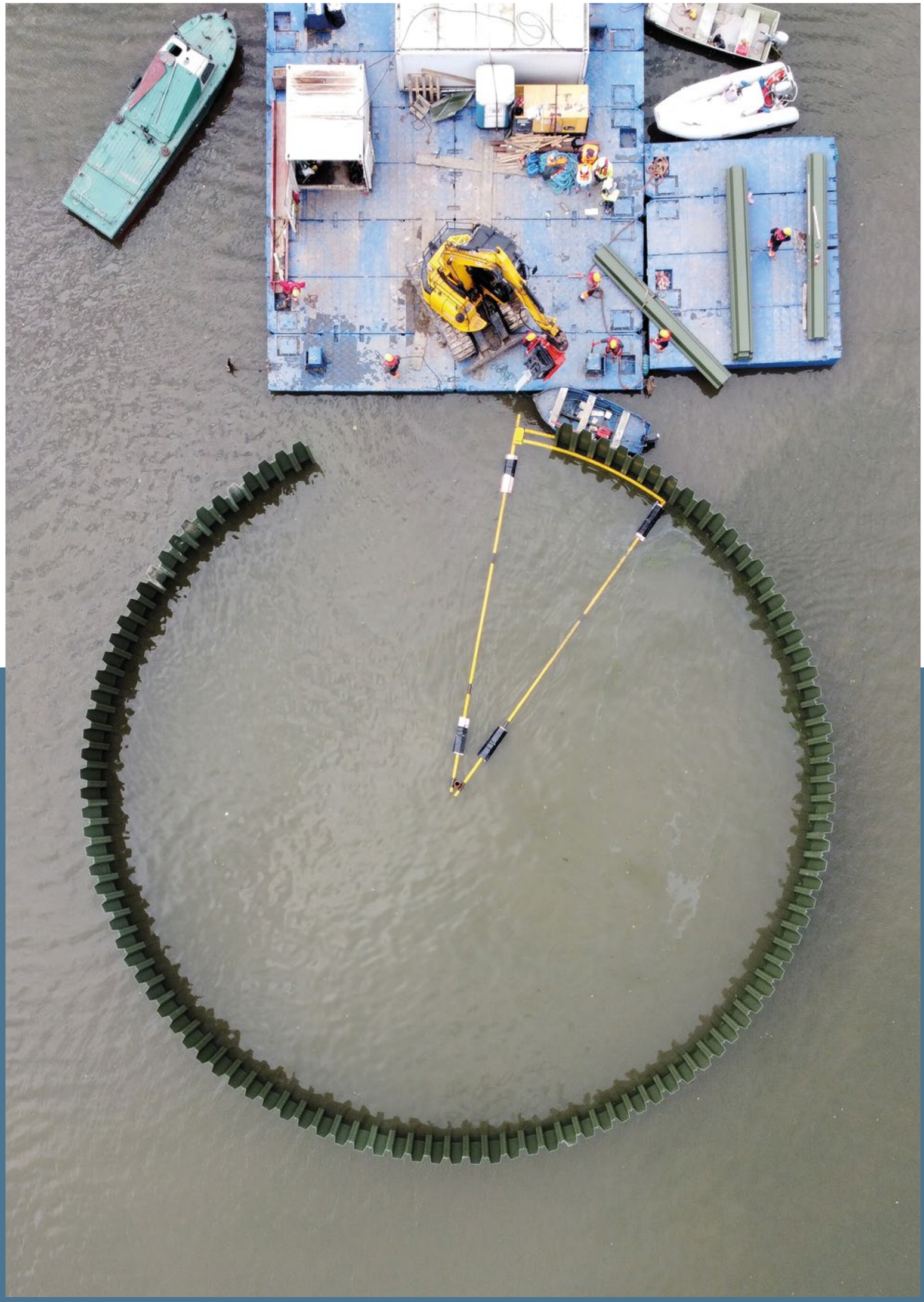


WATER RETENTION SOLUTIONS





GEOTECHNICAL PROFILES



THE GOCZAŁKOWICE LAKE, POLAND: CONSTRUCTION OF AN ARTIFICIAL BIRD ISLAND.

The EcoLock vinyl sheet piles and the SuperLock hybrid sheet piles

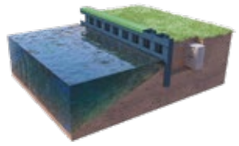
Environmentally friendly, lightweight and economic alternative to traditional materials such as steel, wood or concrete.

CZĘSTOCHOWA, POLAND: REINFORCEMENT OF A FLOOD EMBANKMENT.

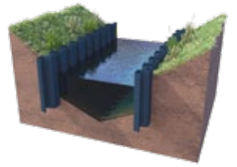
Advantages of using vinyl and hybrid sheet piles

- The profiles are corrosion--proof and resistant to the impact of atmospheric and biological factors including UV radiation, sea water.
- They are resistant to mechanical damage such as scratches, cracking and abrasions.
- Vinyl and hybrid sheet piles are costs efficient in transport due to their low weight.
- Their installation is simple and involves using standard equipment.
- They are environmentally friendly and have low carbon footprint.
- As certified by the National Institute of Hygiene, the material of the profiles is neutral to drinking water.

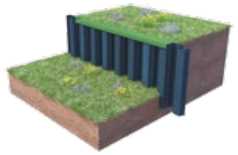
Application



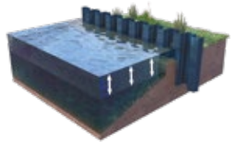
Retaining and cut-off walls with anchoring systems



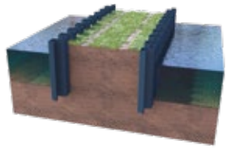
River bank protection and regulation



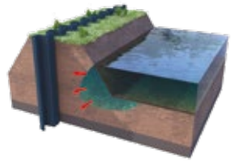
Retaining systems protecting slopes, landslides and various excavation sites



Protection of banks with variable water levels

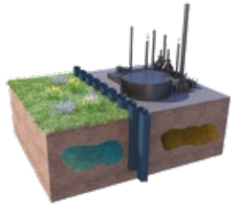


Construction of causeways on water reservoirs



Protection and reinforcement of flood-walls

Cut-off walls used to protect places with variable or raised groundwater level



Cut-off walls in ecologically threatened areas

PRUSZKÓW, POLAND: RAILROAD EMBANKMENT STABILIZATION.

Installation

Installation using a vibrohammer

The most commonly used method, in which sheet piles are mechanically driven into the soil along the pre-installed templates with the use of vibrohammers, i.e. light equipment with small impact energy. The type of the equipment used depends on the soil type, the depth of the cavity and the sheet pile profile type. In the case of hard, dense soil, or when long elements need to be hammered, steel mandrels are used i.e. special guide bars reflecting the shape and length of the profile installed.

Methods facilitating installation of vinyl sheet piles in difficult soil conditions, applied when the standard driving techniques are insufficient.

Pre-drilling

Pre-drilling makes it possible to efficiently drive vinyl sheet piles even in cohesive soild of very low plasticity. Pre-drilling consists in using a screw drill in the spot where the sheet pile would later be driven to mechanically loosen the soil. Importantly, this technique does not require removing the excavated material, which expedites the process of sheet pile installation.

Jetting

This method is used in cases of very compact or cohesive soil where the force of vibrohammers is not sufficient to embed the vinyl sheet piling to the required depth. Jetting consists in exerting pressure directly under the sheet piles which are being installed, which helps loosen and remove the soil or the obstacles. Special water or air ejectors are used in this technology.

The installation process developed by our company over the years is close to perfection. We have eliminated the notorious faults, such as sheet pile cracking during the driving process.

- **We offer installation assistance at the construction site by our technical team and training of the installation teams.**
- **Vinyl and hybrid sheet piles are compatible with traditional equipment – they can be driven and trimmed with conventional tools used for steel sheet piles.**
- **The installation works, as in the case of steel sheet piles, are performed using an excavator or a piling rig and a suitable vibrohammer.**

For each project that requires sheet piles longer than 3 m, we recommend using a face mandrel and additional accessories.

- Mandrel is a special steel profile in the shape of the vinyl sheet pile, which serves as a blade that cuts the soil and any obstacles that may be encountered in the soil, such as roots and small stones.
- Mandrels are manufactured by our company, according to the order and included in the product range.
- Mandrels help minimize the risk of damaging sheet piles during installation, accelerate the contracting works and reinforce the structure of the soil, for example in a flood bank, by additionally compacting the soil.

THE WROCŁAW WATER JUNCTION, POLAND: REINFORCEMENT OF A FLOOD BANK WITH VINYL SHEET PILES – INSTALLATION WORKS.

Installation carried out using a mandrel and a vibratory hammer makes it possible to successfully use vinyl and hybrid sheet piles in any project where steel sheet piles could be used. In case of low-bearing soils, difficult to access by heavy machines, vinyl and hybrid sheet piles are preferred due to their reduced weight and lighter transport and installation equipment (reduced costs of logistics, construction of temporary roads etc.).

Transport

The low weight of vinyl and hybrid sheet piles results from the material density of 1.44 g/cm^3. The density of steel used to manufacture steel sheet piles equals 7.86 g/cm^3, i.e. over five times more. This significant weight reduction of PVC sheet piles generates considerable financial savings on their logistics, because fewer transport units are required to carry a specific number of square metres of vinyl and hybrid sheet piles compared to steel sheet piles. In addition, the unloading process is much simpler since the profiles are comfortably loaded on a truck in specially prepared wood frames that contain a set of several sheet piles.

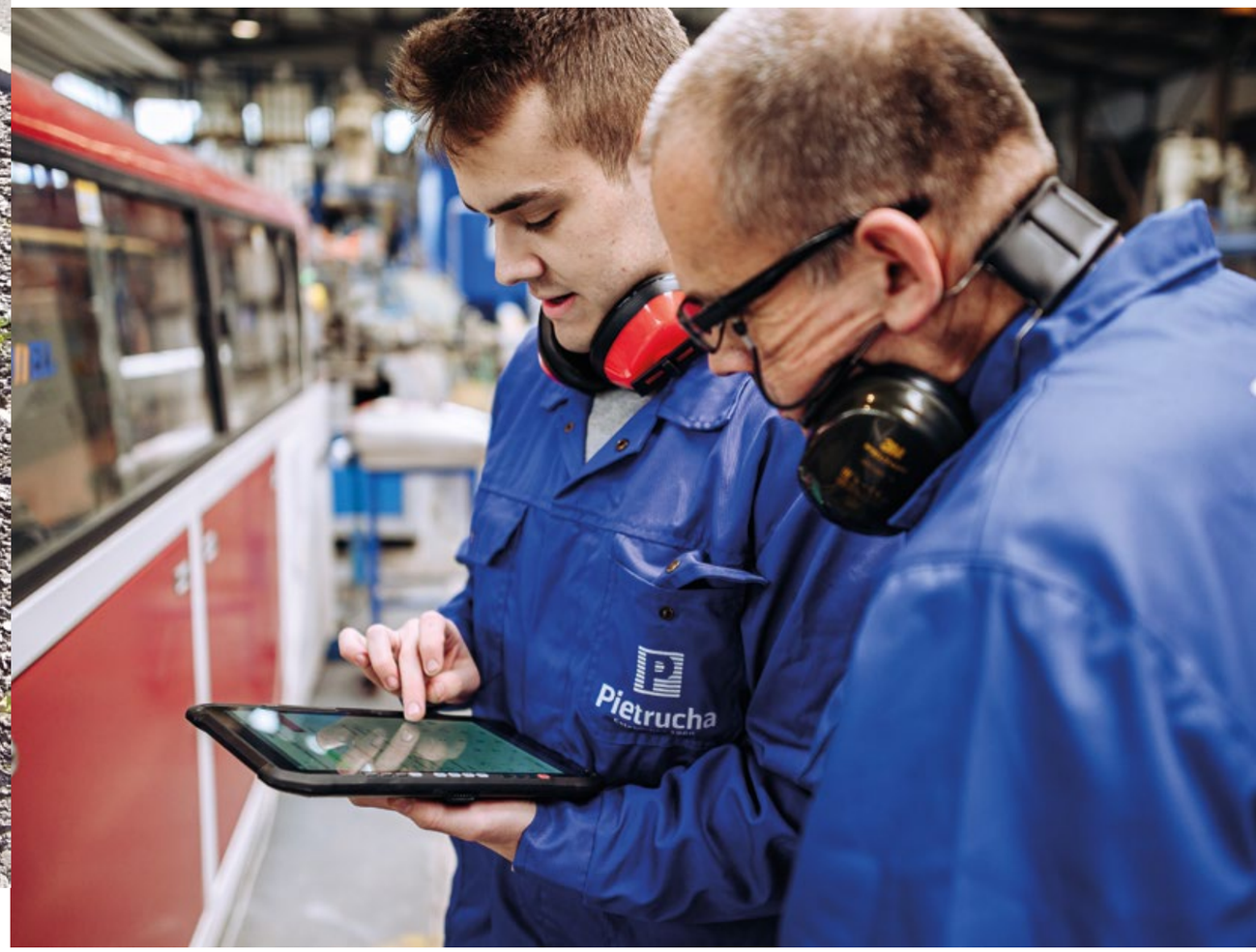
MARKLOWICE, POLAND; RETAINING WALL IN A ROAD CONSTRUCTION.

Technology

Our sheet piles are made from tough polyvinyl chloride, modified with refining agents (e.g. toughness modifiers, UV and thermal stabilizers and mineral filling components). The profiles are manufactured using the extrusion moulding method as monolithic profiles. Thanks to the use of the closed-cycle recycling, vinyl and hybrid sheet piles are an environmentally friendly solution.

Consistent quality and technical parameters

Thanks to the continuous monitoring and implementation of strict manufacturing procedures, we guarantee high and consistent quality of our products. The quality and the endurance parameters of our sheet piles are systematically validated by accredited laboratories, institutes and technical universities. Vinyl and hybrid sheet piles are fully certified construction materials compliant with the State Technical Assessment. Our profiles are certified by the National Institute of Hygiene, as well as the Institute of Construction Technology according to the state system 2+.



ISO 9001:2015

An advanced machine park coupled with over 20 years' experience in plastics processing guarantee the highest quality of our sheet piles. Manufacturing of PVC sheet piling is a process requiring utmost care. Our Factory Production Control protocol adheres to the highest standards and employs systematic procedures. This ensures consistent products that meet all declared parameters and maintain unwavering quality, as verified by the ISO 9001:2015 certification.

Technology Partners

The Łódź University of Technology	The Warsaw University of Technology	Orlen Laboratorium S.A.
The Road and Bridge Research Institute	The Institute of Technology and Life
The Łukasiewicz Research Network	The Institute of Polymer and Colouring Agents Engineering
The Textile Research Institute	The Construction Technology Institute
Fire Protection Research Center	National Institute of Public Health

Vinyl and Hybrid Sheet Piling Parameters and product range

The EcoLock vinyl sheet piles

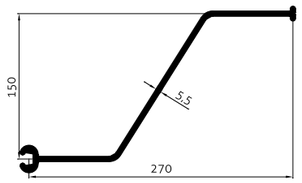
parameter	unit	norm	value
Density	g/cm^3	PN-EN ISO 1183-1	1,44 ± 10%
Charpy's impact test	kJ/m^2	PN-EN ISO 179-1	≥30
Shore durometer	Shore'a D	PN-EN ISO 868	≥65
Vicat's softening point	°C	PN-EN ISO 306	≥75
Tensile strength	MPa	PN-EN ISO 527-1	44 ± 5%
Tensile modulus of elasticy	MPa	PN-EN ISO 527-1	≥2300

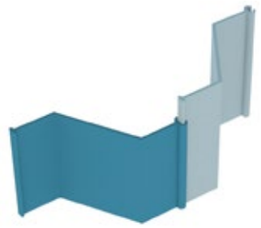
Parameters refer to all system elements save from accessory profiles.

DELFT, THE NETHERLANDS: REINFORCEMENT OF A CANAL EMBANKMENT.

GW-270/5.5 trapezoid profile	**unit**	**value**
Section width	mm	270
Section depth	mm	155.5
Thickness	mm	5.5
Section modulus	cm^3/m	369
Moment of inertia	cm^4/m	3266
Allowable moment*	kNm/m	8.1
Ultimate moment	kNm/m	16.3

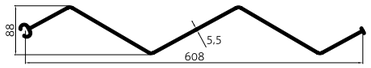
* Safety factor = 2

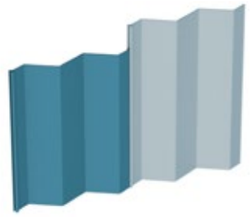




GW-537/5.5	**unit**	**value**
Section width	mm	608
Section depth	mm	88
Thickness	mm	5.5
Section modulus	cm^3/m	86.6
Moment of inertia	cm^4/m	382
Allowable moment*	kNm/m	1.9
Ultimate moment	kNm/m	3.8

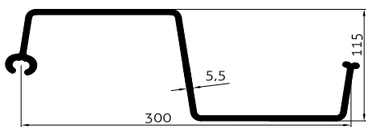
* Safety factor = 2





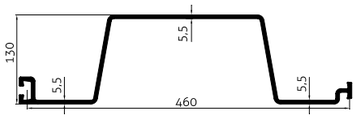
GW-300/5.5	**unit**	**value**
Section width	mm	300
Section depth	mm	115
Thickness	mm	5.5
Section modulus	cm^3/m	320
Moment of inertia	cm^4/m	1842
Allowable moment*	kNm/m	7.0
Ultimate moment	kNm/m	14.1

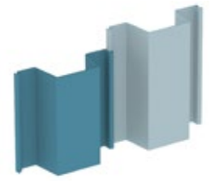
* Safety factor = 2



GW-460/5.5	**unit**	**value**
Section width	mm	460
Section depth	mm	130
Thickness	mm	5.5
Section modulus	cm^3/m	360
Moment of inertia	cm^4/m	2527
Allowable moment*	kNm/m	7.9
Ultimate moment	kNm/m	15.8

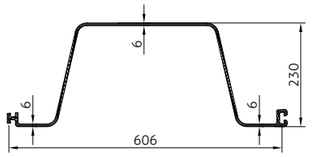
* Safety factor = 2

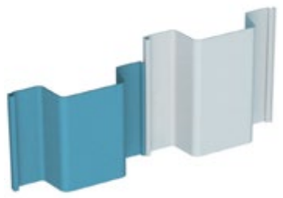




GW-610/6.0	**unit**	**value**
Section width	mm	606
Section depth	mm	230
Thickness	mm	6.0
Section modulus	cm^3/m	775
Moment of inertia	cm^4/m	8915
Allowable moment*	kNm/m	17.0
Ultimate moment	kNm/m	34.1

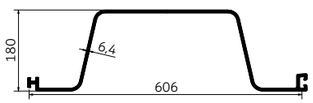
* Safety factor = 2

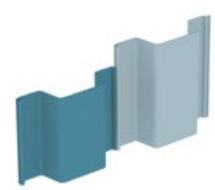




GW-610/6.4	**unit**	**value**
Section width	mm	606
Section depth	mm	180
Thickness	mm	6.4
Section modulus	cm^3/m	613
Moment of inertia	cm^4/m	5514
Allowable moment*	kNm/m	13.5
Ultimate moment	kNm/m	27

* Safety factor = 2

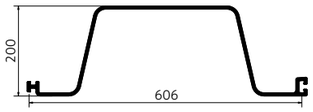


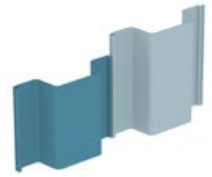


OLECKO, POLAND: VINYL SHEET PILES USED TO REINFORCE AN EMBANKMENT OF A PRIVATE POND.

GW-610/7.2	unit.	value
Section width	mm	606
Section depth	mm	200
Thickness	mm	7.2
Section modulus	cm^3/m	774
Moment of inertia	cm^4/m	7743
Allowable moment*	kNm/m	17.0
Ultimate moment	kNm/m	34.1

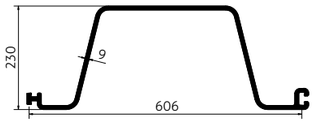
* Safety factor = 2

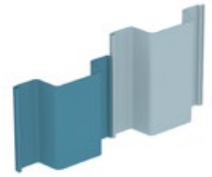




GW-610/9.0	unit	value
Section width	mm	606
Section depth	mm	230
Thickness	mm	9
Section modulus	cm^3/m	1109
Moment of inertia	cm^4/m	12758
Allowable moment*	kNm/m	24.4
Ultimate moment	kNm/m	48.8

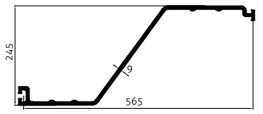
* Safety factor = 2

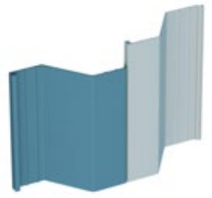




GW-565/9.0	unit	value
Section width	mm	565
Section depth	mm	245
Thickness	mm	9.0
Section modulus	cm^3/m	1042
Moment of inertia	cm^4/m	12768
Allowable moment*	kNm/m	22.9
Ultimate moment	kNm/m	45.8

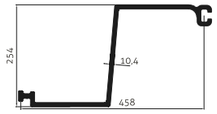
* Safety factor = 2

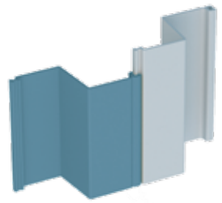




GW-458/10.4	unit	value
Section width	mm	458
Section depth	mm	254
Thickness	mm	10.4
Section modulus	cm^3/m	1542
Moment of inertia	cm^4/m	20718
Allowable moment*	kNm/m	33.9
Ultimate moment	kNm/m	67.8

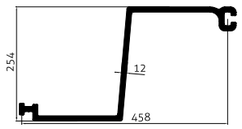
* Safety factor = 2

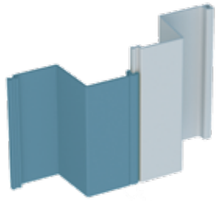




GW-458/12.0	unit	value
Section width	mm	458
Section depth	mm	254
Thickness	mm	12
Section modulus	cm^3/m	1717
Moment of inertia	cm^4/m	22937
Allowable moment*	kNm/m	37.8
Ultimate moment	kNm/m	75.5

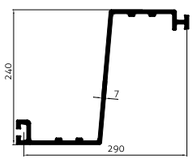
* Safety factor = 2

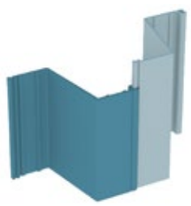




GW-580/7.0	unit	value
Section width	mm	290
Section depth	mm	240
Thickness	mm	7.0
Section modulus	cm^3/m	1228
Moment of inertia	cm^4/m	15429
Allowable moment*	kNm/m	27.0
Ultimate moment	kNm/m	54.0

* Safety factor = 2

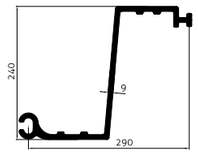


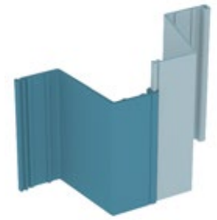


CRACOW, POLAND: VINYL SHEET PILES USED AS AN ELEMENT OF FLOOD PROTECTION INFRASTRUCTURE IN A DENSELY URBANIZED AREA.

GW-580/9.0	unit	value
Section width	mm	290
Section depth	mm	240
Thickness	mm	9.0
Section modulus	cm^3/m	1462
Moment of inertia	cm^4/m	18739
Allowable moment*	kNm/m	32.2
Ultimate moment	kNm/m	64.3

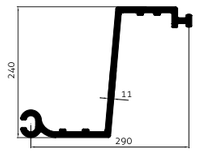
* Safety factor = 2

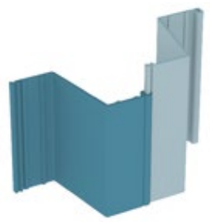




GW-580/11.0	unit	value
Section width	mm	290
Section depth	mm	240
Thickness	mm	11
Section modulus	cm^3/m	1711
Moment of inertia	cm^4/m	21851
Allowable moment*	kNm/m	37.6
Ultimate moment	kNm/m	75.3

* Safety factor = 2



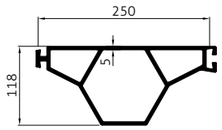


GIZAŁKI, POLAND: REINFORCEMENT OF FLOOD EMBANKMENT.

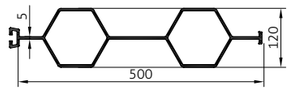
Hollow chamber profiles

Hollow chamber profiles may be combined with wooden posts or steel pipes for greater reinforcement to individually address the requirements of a given project.

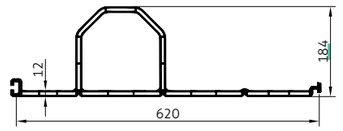
D-HEX	unit	value
Section width	mm	250
Section depth	mm	118
Thickness	mm	5
Pole distance	mm	250
Pole max. diameter	mm	100



M-HEX	unit	value
Section width	mm	500
Section depth	mm	120
Thickness	mm	5
Pole distance	mm	250/500
Pole max. diameter	mm	105



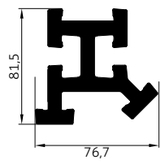
J-HEX	unit	value
Section width	mm	620
Section depth	mm	184
Thickness	mm	12
Pole distance	mm	620
Pole max. diameter	mm	160



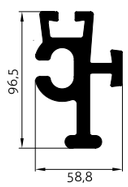
THE NETHERLANDS: M-HEX PROFILES WITH WOODEN POSTS USED TO REINFORCE AN EMBANKMENT OF A WATER RESERVOIR.

Accessory Profiles

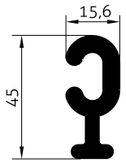
Corner 45	unit	value
Section width	mm	81,50
Section depth	mm	76,70



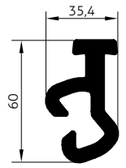
Corner 580/610	unit	value
Section width	mm	96,50
Section depth	mm	58,80



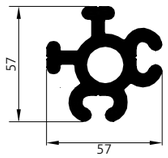
Corner 300	unit	value
Section width	mm	45,00
Section depth	mm	15,60



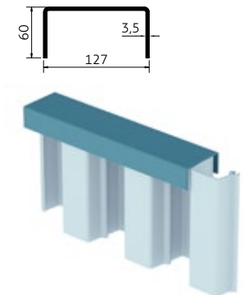
Corner 85-135	unit	value
Section width	mm	60,00
Section depth	mm	35,4



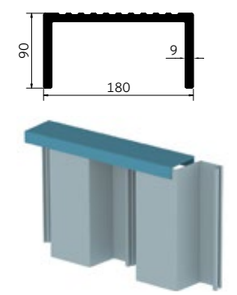
Corner – Quadruple	unit	value
Section width	mm	57
Section depth	mm	57



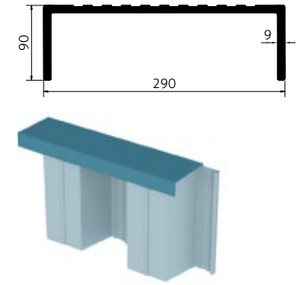
Cap 120	unit	value
Section width	mm	127
Section depth	mm	60
Thickness	mm	3,5



Cap 180	unit	value
Section width	mm	180
Section depth	mm	90
Thickness	mm	9



Cap 290/9.0	unit	value
Section width	mm	290
Section depth	mm	90
Thickness	mm	9



THE NETHERLANDS: SUPERLOCK HYBRID SHEET PILES USED TO REINFORCE EMBANKMENTS OF A CANAL.

The SuperLock hybrid sheet piles

The SuperLock sheet piles are made of hybrid material consisting of PVC reinforced with fiber-glass. This new generation of thermoplastic sheet piles was designed to be applied in more advanced constructions which require higher mechanical parameters than those achievable by vinyl sheet piles available on the market.

- All advantages of vinyl sheet piles combined with much higher technical parameters.
- Broader scope of application including cases where standard PVC sheet piles could not be used due to their inadequate stiffness.
- Hybrid sheet piles may be used in projects so far reserved for light steel sheet piles and reinforced concrete structures.

Comparison of different types of sheet piles

	Concrete	Steel	FRP	PVC	SuperLock
Total cost	medium	medium	high	low	medium
Weight	very high	high	medium	low	low
Corrosion resistance	N/D	low	high	very high	very high
Resistance to chemical and biological factores	medium	low	high	high	high
Environmental impact	high	medium	high	low	low
Aesthetics	medium	medium	high	high	high
Installation	onerous	easy	onerous	easy	easy
Maintenance cost	medium	high	medium	low	low

UPPSALA, SWEDEN: HYBRID SHEET PILES USED TO CONSTRUCT A BOAT RAMP.

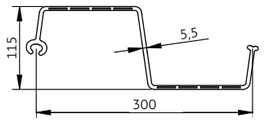
THE OLKUSZ AREA, POLAND: DRIVING OF THE SUPERLOCK HYBRID SHEET PILES IN ADVERSE SOIL CONDITIONS.

parameter	unit	norm	GW-300FR	GW-700FR
Density	g/cm³	PN-EN ISO 1183-1	1.44	1.44
Charpy's impact test	kJ/m²	PN-EN ISO 179-1	≥30	≥30
Shore durometer	Shore'a D	PN-EN ISO 868	≥65	≥65
Vicat's softening point	°C	PN-EN ISO 306	≥75	≥75
Tensile strength**	MPa	PN-EN ISO 527-1	44	44
Tensile modulus of elasticy	MPa	PN-EN ISO 527-1	≥2300	≥2300
Bending modulus of elasticity at 4-point bending test	MPa	ASTM D6109	≥3000	≥4300

* +/- 10%
** +/- 5%

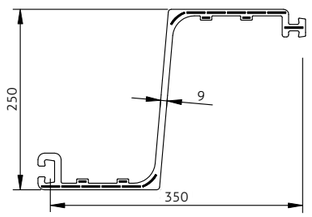
GW-300FR	unit	value
Section width	mm	300
Section depth	mm	115
Thickness	mm	5,5
Cross-section area	cm²	29,7
Section modulus	cm³/m	320
Moment of inertia	cm⁴/m	1842
Allowable stiffness*	kNm²/m	32,2
Ultimate stiffness	kNm²/m	64,5

* Safety factor = 2



GW-700FR	unit	value
Section width	mm	350
Section depth	mm	250
Thickness	mm	9
Cross-section area	cm²	71.4
Section modulus	cm³/m	1685
Moment of inertia	cm⁴/m	21203
Allowable stiffness*	kNm²/m	456
Ultimate stiffness	kNm²/m	913

* Safety factor = 2



Attention: Current technical parameters of our profiles are included in the technical specification documents available at the Designer 3.0 platform.

BUDEJOVICE, CHECH REPUBLIC: INSTALLATION OF VINYL SHEET PILES IN DIFFUCULT SOIL CONDITIONS.

THE POZNAŃ AREA, POLAND: REVITALIZATION OF A WATER RESERVOIR – EMBANKMENT STABILIZATION WITH A VINYL SHEET PILING PALISADE FINISHED WITH A CAP AND MODERNIZATION OF WATER DISCHARGE BY INSTALLATION OF MODULAR VINYL SLUICE IN THE EXISTING WEIR.

BANGKOK, THAILAND: VINYL SHEET PILES USED TO DEVELOP BLUE INFRASTRUCTURE AT THE US EMBASSY.

STALOWA WOLA, POLAND: STABILIZATION OF A RAILROAD EMBANKMENT.

THE CRACOW AREA, POLAND: STABILIZATON OF A STATE ROAD EMBANKMENT.

Sheet piles with gaskets

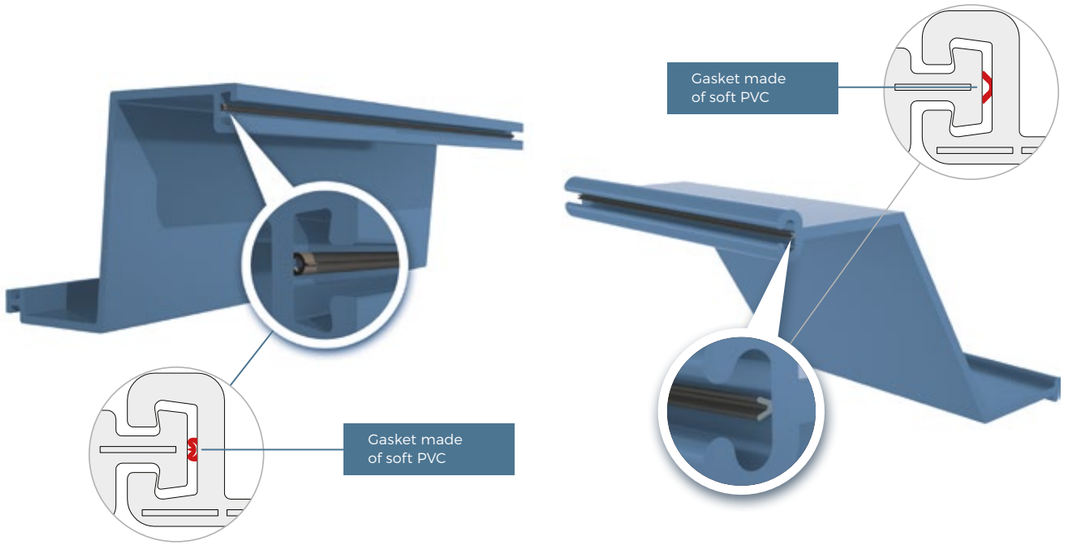
Some strategic investment projects require a guarantee of full water-tightness of the construction. In such cases, the EcoLock and SuperLock sheet piles may be additionally equipped with integrated gaskets.
The gaskets are made of soft PVC and manufactured in the process of post-coextrusion.

- The gaskets are not simply glued into the lock, but they are thermally-combined along the entire length of the profile to become an integral part of the sheet pile.
- The method of gasket bonding with the sheet pile coupled with special additives, ensure resistance to gasket damage.
- The gasket shape is adjusted to the profile type.
- Smooth surface and flexibility of the gasket ensure easy installation.

Profiles equipped with gaskets guarantee 100% lock tightness immediately upon installation. This is particularly important in environmentally threatened areas or dams, where blocking the water filtration is of utmost importance.

WILUNA, AUSTRALIA: BRINE RESERVOIR CONSTRUCTED USING VINYL SHEET PILES WITH INTEGRATED GASKETS MADE OF SOFT PVC.

Sheet piles for special purposes



In the case of constructions made of vinyl and hybrid sheet piles, the following factors impact the locks tightness:

- The shape of a lock, which may extend or reduce the water flow distance.
- The width of a single vinyl sheet pile. The wider the section, the lower the quantity of locks per unit of length of the wall, e.g. by replacing 300 mm wide profiles with sheet piles measuring 606 mm in width, the leakage factor of the wall will be reduced by two.
- The hydrostatic pressure affecting the wall. The higher the pressure, the lower the clogging of locks.
- The stress level at the locks' contact area. The higher the tightness and the pressure on the locks' wall surfaces, the smaller the gap between them, which results in better constraining of the flow of water through the lock.

The gaskets made of soft PVC are added in the locks simultaneously during the sheet pile extrusion. Their shape is determined by the profile type and the project requirements.

KUTNO, POLAND: PROTECTION OF A PETROL STATION AGAINST FLOODING FROM THE SURROUNDING FIELDS, ENHANCING THE RETENTION CAPACITY OF THE AGRICULTURAL AREA BY REDIRECTING THE WATER FILTRATION ROUTE, AS WELL AS PROTECTING THE ADJACENT FARMING LAND AGAINST POSSIBLE CONTAMINATION WITH CHEMICAL SUBSTANCES.

KOMORÓW, POLAND: VINYL SHEET PILES WITH GASKETS USED TO TEMPORARY REDIRECT THE RIVER BED.

PARNU, ESTONIA: INSTALLATION OF A CUT-OFF WALL AT A TANNING FACILITY CHEMICAL WASTEYARD.

Politechnika Łódzka
Instytut Maszyn Przepływowych

CERTYFIKAT

dotyczący

szczelności systemów zamków grodzic produkowanych przez firmę S. i A. Pietrucha Sp. z o. o.

Odcinki o długości 1 m grodzic typu GW 610/9 oraz GW 580/11 wyposażone w uszczelki odpowiednio typu V i C zostały poddane badaniom w zakresie weryfikacji poprawności metody badań szczelności oraz badaniom szczelności przez Instytut Maszyn Przepływowych Politechniki Łódzkiej w okresie od **17.12.2018 do 07.01.2019.**

Analizie i badaniom poddano następujące dokumenty i parametry:

1.	**Opis metody badań**	Opis metody dostarczony przez firmę S. i A. Pietrucha Sp. z o. o. zgodny ze sztuką inżynierską, która uwzględnia oddziaływanie ciśnienia hydrostatycznego na system zamka grodzicy dla jednostkowej długości tego zamka.
2.	**Stanowisko badawcze**	Analiza stanowiska przeprowadzona w oparciu o dokumentację oraz rzeczywiste stanowisko zaprojektowane i zbudowane w firmie S. i A. Pietrucha Sp. z o. o. zgodnie z przyjętą metodą badania szczelności.
3.	**Strumień objętości przecieku Q_h**	Wyznaczony strumień objętości wody, która stanowi przeciek przez system zamka grodzicy na podstawie zmierzonej masy tej wody, czasu, w którym przeciek wystąpił przy zadanych warunkach ciśnienia i rodzaju systemu zamka grodzicy.
4.	**Parametr szczelności ρ_s**	Parametr zgodny z normą wyznaczony na podstawie zależności: $\rho_s = \frac{2Q_h}{h^2}$

Potwierdza się, że przyjęta metoda badań jest zgodna ze sztuką inżynierską i pozwala obiektywnie określić szczelność systemu zamka grodzicy w dowolnej konfiguracji.

Potwierdza się, że zbudowane stanowisko badawcze pozwala zrealizować przyjętą metodę badania szczelności systemu zamka grodzicy w dowolnej konfiguracji.

Potwierdza się na podstawie wyników badań, że systemy zamków grodzic GW 610/9 i GW 580/11 wyposażone w uszczelki, odpowiednio typów V i C są w 100% szczelne i wyznaczony dla nich parametr szczelności ρ_s równy jest 0.

Łódź, 9 stycznia 2019 r.

DYREKTOR Instytutu Maszyn Przepływowych
(podpis i pieczątka imienna)
prof. dr hab. inż. Krzysztof Jóźwik

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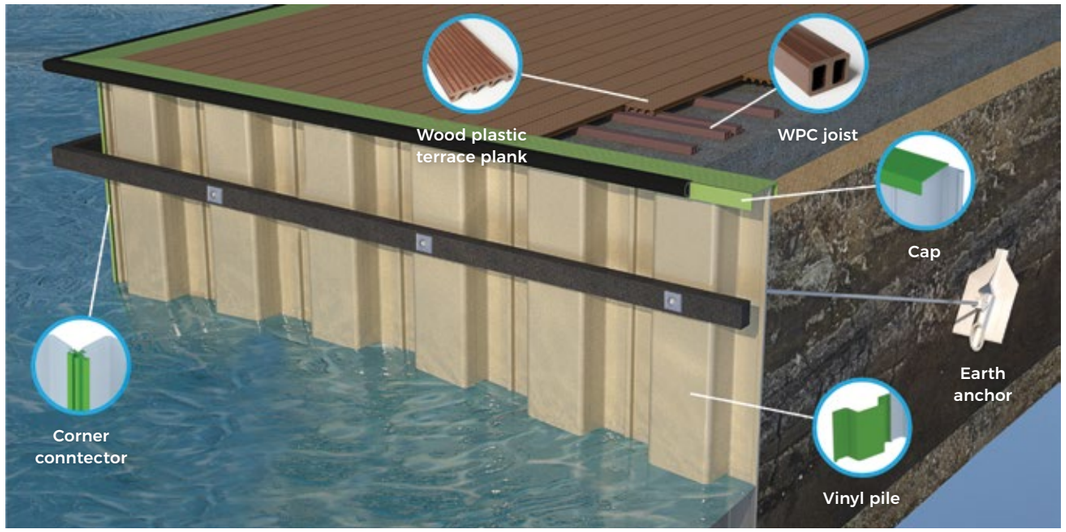
NIP: 727-002-18-95, REGON: 000001583

BĘDZIN, POLAND: DEVELOPMENT OF THE BOULEVARDS OF THE CZARNA PRZEMSZA RIVER ALLOWING FOR THE CONSTRUCTION OF A MARINA.

Vinyl and hybrid sheet piles
Accessory profiles and complementing systems

The EcoLock and the SuperLock sheet pile systems comprise a full range of accessory elements which allow for designing bespoke constructions that would comply with the highest quality parameters. The fully compatible system elements include:

- Corner connectors which enable joining the walls at 45, 90 and 135 degree angles, which ensures full integration of the joined profiles while preserving the tightness of locks.
- Caps mounted at the top of the walls, which protect the profiles against curling and give the sheet pile constructions an aesthetic finish.
- The TerraDeck composite planks used to construct tourist embankments, utility wharves, piers and yacht marinas.
- Earth anchors used when transferring the tensile forces onto the bearing layer of the soil is required.



WIDE RANGE OF ACCESSORY PRODUCTS COMPATIBLE WITH THE ECOLOCK AND THE SUPERLOCK SYSTEMS.

According to the project requirements, an individually designed steel, reinforced concrete or wood structure can also be used as a cap.

The EcoLock vinyl sheet piles SuperLock hybrid sheet piles are compatible with all commonly used anchor and tie systems.

Details of structural connections are available at:
www.pietrucha.pl/oferta/inzyniera-ladowa-i-wodna/kotwy/produkty

VINYL SHEET PILING AND TERRADECK COMPOSITE PLANKS USED TO CONSTRUCT THE INFRASTRUCTURE OF EXPERIMENTAL FISHING PONDS IN ŻABIENIEC, POLAND.

VLISSINGEN, THE NETHERLANDS: VINYL SHEET PILING WALL REINFORCED WITH EARTH ANCHORS IN A HARBOUR DEVELOPMENT PROJECT.

NYSA, POLAND: VINYL SHEET PILING USED TO CONSTRUCT A MUNICIPAL WATER PARK.

IN THIS PROJECT, APART FROM THE ECOLOCK VINYL SHEET PILING, THE TERRADECK COMPOSITE PLANKS WERE USED.

Vinyl and hybrid sheet piling Summary

When selecting the appropriate solution, not only the cost of purchase of the sheet piles should be taken into account, but also the costs of transport, installation and auxiliary works, maintenance or replacement.

The advantages of vinyl and hybrid sheet piles include the following:

- **Aesthetic look,**
- **Lower investment costs,**
- **Easy handling and installation,**
- **Minimized maintenance costs,**
- **Long-term safety,**
- **50 years' guarantee,**
- **Low environmental impact.**

CARNIKAVA. LATVIA: EMBANKMENT REINFORCEMENT OF A WATER RESERVOIR.

WATER RETENTION SOLUTIONS

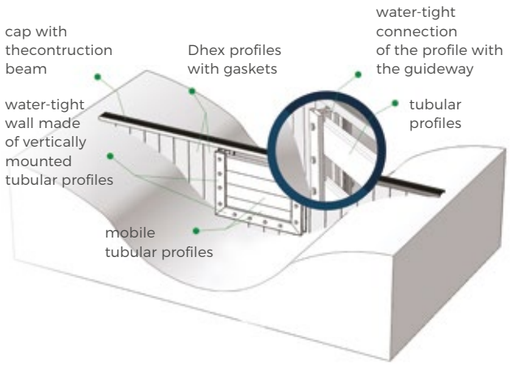
GRABÓW, POLAND: AN ELEMENT OF A COMPREHENSIVE WATER RETENTION SYSTEM IN THE PILICA RIVER BASIN.

Small retention gates

Durable and environmentally friendly stream retention solution used to increase water retention capabilities of ecosystems, and to mitigate the risk of flood and draught. Small retention sluices help raise the ground water level, slow down water runoff and retain the water-flow balance during dry seasons for better micro-climate and biodiversity.

The small retention sluice gate system is made of tubular profiles in the shape of a honeycomb – D-Hex, where the profile design guarantees high strength and at the same time lightweight transport and easy assembly in hard access spots. The profiles are equipped with gaskets ensuring 100% water-tightness of the construction.

As the water level rises, the PVC tubular profiles assembled diagonally fill in with water. The weight of the water inside the profiles tightens the locks to create water-resistant sluice.



THE POZNAŃ VOIVODESHIP, POLAND: INSTALLATION OF A VINYL SMALL RETENTION SLUICE TO PROTECT A FOREST ECOSYSTEM AGAINST DROUGHTS.

GRABÓW, POLAND: ANOTHER TYPE OF A SMALL RETENTION SLUICE INSTALLED WITHIN ONE DRAINAGE AREA IN THE PILICA RIVER BASIN.

THE JAROCIN AREA, POLAND: SMALL RETENTION SLUICES INSTALLED IN A DEVELOPMENT PROJECT OF A MUNICIPAL PARK.

- **User-friendly solution with lightweight mobile system elements.**
- **Maintenance-free.**
- **Resistant to mechanical, atmospheric and biological damage.**
- **Natural, aesthetic look in harmony with the surroundings.**
- **Water-tightness compliant with DIN 19569-4 standard.**

SWEDEN: FIRST VINYL SMALL RETENTION SLUICE INSTALLED OUTSIDE POLAND.

THE PODANIN FOREST DISTRICT, POLAND: VINYL SMALL RETENTION SLUICES ARE DURABLE AND RESISTANT TO ATMOSPHERIC CONDITIONS.

Open Top Road Culverts

- Maintenance-free, impregnation and cleaning.
- Durable and resistant to mechanical pressure.
- Resistant to biological and atmospheric factors.

A lightweight, economical and maintenance free drainage solution preventing water run-off from road surface.

Vinyl open-top road culverts are a durable and maintenance-free alternative to the traditional road drainage solutions. The vinyl open-road culvert is installed 15 cm deep in the road structure. In case of roads reinforced with geogrids or geocells, vinyl open-road culverts do not infringe the load-bearing layer of the road. In case of wooden solutions, geogrid or geocell must be cut at the edge of the culvert. In case of vinyl open-top culverts, the reinforcement runs beneath the vinyl profile.

Fish passes and fish ladders

Hydrotechnical constructions such as dams, water bars and barrages which run across water streams, obstruct the water flow and are an obstacle to free upstream and downstream migration of fish and other species.

ŻAGAŃ. POLAND: FISH PASS MADE OF VINYL SHEET PILING FINISHED WITH A CAP.

- **Durable solution ensuring free migration of the river fauna.**
- **Aesthetic look which blends in with the natural surroundings.**
- **Synergy with other hydrotechnical constructions intended to raise the water level.**

Water bars and barrages

Durable and resistant to environmental factors, complete solutions made of vinyl sheet piles. Our water barrages are maintenance-free and do not require any maintenance work. They are resistant to corrosion and UV radiation.

SZCZECIN, POLAND: WATER BARRAGES MADE OF VINYL SHEET PILES FINISHED WITH A CAP.

SZCZECIN, POLAND: SYSTEM OF WATER BARS INSTALLED AT A STREAM TO SLOW DOWN WATER RUN-OFF.

BIESTRZYNNIK, POLAND: ECOLOCK VINYL SHEET PILES USED TO CONSTRUCT A WATER BAR ON THE LIBAWA RIVER IN THE ODER BASIN.

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