

**M Increased Escape Prevention:**  
The mechanical woven connection between the PET monofilaments of KikkoNet gives the mesh great strength. Even if the mesh is damaged it will hardly unravel or unzip, maintaining the integrity of the net pen and your fish stocks within it.

**M Maximised water flow:**  
The PET monofilaments are very strong for their diameter and weight. Couple this with KikkoNet's anti-fouling properties and you have a mesh that has a high aperture : mesh ratio. This enables greater water flow and better oxygenation.

**M Easy to handle:**  
KikkoNet can remain in the water for years without removal for cleaning or anti-fouling treatment. It practically does not absorb water and become saturated, making it easier and safer to handle, even when wet.

**M Environmentally Friendly:**  
The PET used in KikkoNet is recyclable, and no chemical anti-fouling paints are required.

“ COMPARE THE WHOLE-LIFE-COSTS OF KIKKONET TO YOUR CURRENT NET PEN NOW, AND SEE HOW YOU CAN REDUCE OPERATIONAL COSTS WHILST INCREASING YOUR YIELDS TODAY! ”

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## Engineering a Better Solution

Maccaferri's motto is 'Engineering a Better Solution' We don't merely supply products, but work in partnership with our clients, offering technical expertise to deliver versatile, cost effective and environmentally sound solutions. We aim to build mutually beneficial relationships through the quality of our service and solutions.

### OFFICINE MACCAFERRI GROUP PROFILE

Founded in 1879, Officine Maccaferri has evolved into a global provider of a wide range of civil and environmental engineering applications from beach nourishment to reinforced soil structures and from rockfall mitigation to tunnelling systems.

We are a global company, with more than 70 subsidiaries operating in 5 continents, with an on-site presence in more than 100 countries, and over 3000 employees: we are highly specialized professionals trained in designing and developing complex solutions in the civil engineering, geotechnical and environmental construction markets. Our worldwide network grows through innovation and diversification of its sectors of activity and through an increasing range of high quality and environmentally friendly products and applications.

Through technological innovation, geographical expansion and focussed diversification, evolution has continued with advanced solutions for the Aquaculture market.

We work in partnership with our clients, offering technical expertise to deliver versatile, cost effective and environmentally sound solutions. Whether you want to simply purchase our quality materials, or receive a turnkey package, we would be delighted to be of service!

Our purpose is to become a leading international provider of advanced solutions to the aquaculture industry. Implementing a strategy of vertical integration, we research, design, supply and provide cage aquaculture netting solutions within our target markets.

### MACCAFERRI APPLICATIONS

RETAINING WALLS & SOIL REINFORCEMENT

SOIL STABILIZATION & PAVEMENTS

AQUACULTURE NETS/ CAGES

LANDSCAPE & ARCHITECTURE

HYDRAULIC WORKS

BASAL REINFORCEMENT

TUNNELLING

EROSION CONTROL

FENCING & WIRE

DRAINAGE OF STRUCTURES

SAFETY & NOISE BARRIERS

INDUSTRIAL MANUFACTURING

ROCKFALL PROTECTION & SNOW BARRIERS

COASTAL PROTECTION, MARINE STRUCTURES & PIPELINE PROTECTION

ENVIRONMENT, DEWATERING & LANDFILLS

CONCRETE FLOORING, PRECAST & OTHER USES

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MACCAFERRI



KIKKONET

M

INTRODUCING MACCAFERRI KIKKONET: FOR FIN-FISH AQUACULTURE OF THE FUTURE



= GREATER PROFITS

Maccaferri KikkoNet is the net for technology-driven fish farming. When used within aquaculture net pen, farm operators benefit from its built-in innovation and technology.

**M Long-Lasting Design Life:**  
KikkoNet is made from PET (Polyethylene Terephthalate) monofilaments woven together to form a tough, high tensile strength, structurally stable hexagonal mesh. KikkoNet has been exposed to mechanical damage and extreme weather and it has been used in over 4000 projects.

**M Reduced Cleaning:**  
Reduced downtime for cleaning, means greater profits. The smooth PET monofilaments of KikkoNet dramatically reduce biofouling. Antifouling paint is not necessary, and the net pen does not necessarily have to be removed from the water for cleaning.

**M High Resistance to Predators Attacks:**  
The stiff, yet lightweight, KikkoNet net pen is very resistant to predator bites, entanglement or chafing damage. Only a single layer of KikkoNet is required to keep your fish stocks safe, reducing costs and risk.

**M Structural Stability:**  
The woven hexagonal mesh of KikkoNet is far stiffer than traditional polymer meshes. The net pen shape is more stable and resistant to currents and waves, enabling the net pen to be used further offshore than previously possible.

MACCAFERRI | KIKKONET



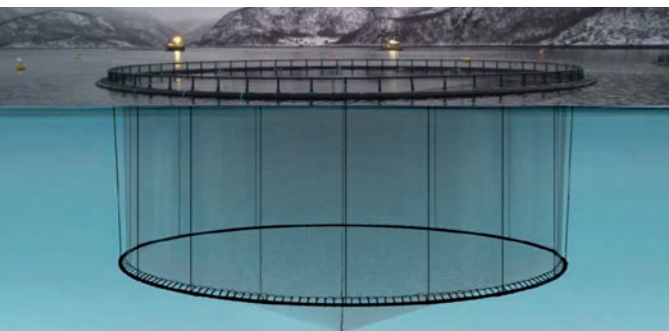


## KIKKONET- ADVANTAGES



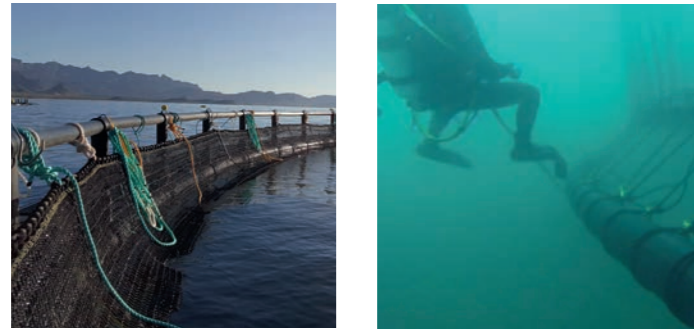
Maccaferri KikkoNet brings significant advances to today's fish farms.

This innovative net is made of UV stabilised PET monofilaments, woven into a double twisted hexagonal mesh, with specific and unique characteristics. Net pens fabricated from KikkoNet provide optimum conditions for the growth of many fish species, in addition to reducing the whole life costs of the net enclosure.



### Key features:

1. Highly resistant to predators attacks - only a single net is required.
2. Provides enhanced escape prevention - even if damaged.
3. Significantly reduces biofouling.
4. Requires up to 3x less cleaning than traditional polymer net pens.
5. It hardly unravel or unzip - even if damaged.
6. Semi-rigid barely deformable structure - withstands ocean forces.



The "waterline" around the uppermost edge of the net pen is fabricated to enable simple and rapid assembly with various models of floating cage collars. Jump net can be supplied pre-assembled if required.

The "Bottom Line" around the lowermost edge of the net pen also enables efficient anchoring with sinker tube. Deformation is reduced and the risk of tearing is minimised due to the inherent semi-rigid structure and high tensile strength of the net.



Standard net pens can be delivered fully assembled thereby reducing on-site operations whether on or off-shore.

KikkoNet net pens are lightweight, robust, strong and highly resistant to mechanical damage during installation, relocation, cleaning and fish harvesting.

The surface of the PET monofilaments is very smooth, enabling the mesh to resist damage, predators and biofouling far better than traditional polymer nets.

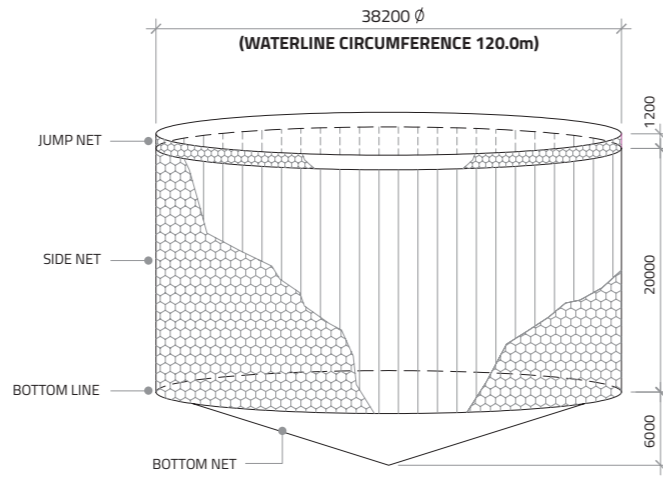


Thanks to these properties, KikkoNet can be left into water for several years, without the use of antifouling paints.

The PET monofilaments are chemically stable and inert. Moreover, KikkoNet practically does not absorb water and the weight of the net remains constant throughout its service life.



## KIKKONET - NET PEN TECHNICAL DETAILS



ELEVATIONS - CYLINDRICAL NET & BOTTOM CONICAL NET

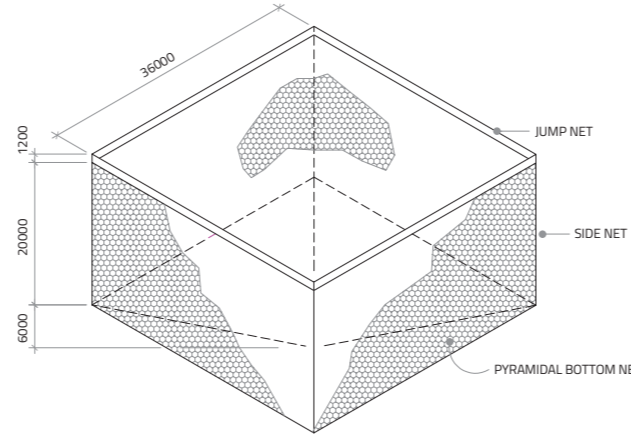
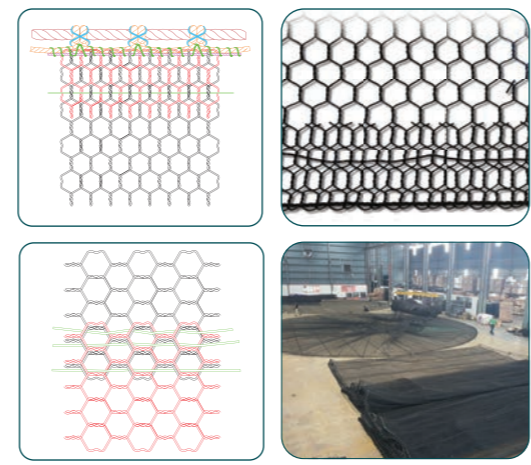
A variety of standard net pens are available, but they can be customised to suit your site, species and dimensional requirements.

The dimensions may change, but the quality is always high!

The net pen can include:

- M Customised shapes
- M Customised dimensions
- M Jump net
- M Bird net
- M Delivered pre-assembled

NET TYPE	Unit	Square	Cylindrical	Truncated Cone	Truncated Pyramid
<b>DIMENSION</b>					
Side / Diameter	m	Upon request	Upon request	Upon request	Upon request
Top Perimeter / Circumference	m	Upon request	Upon request	Upon request	Upon request
Tapering Rate	%	-	-	Approx. 5%	Approx. 5%
Side wall depth	m	Upon request	Upon request	Upon request	Upon request
<b>BOTTOM TYPE</b>					
Flat (Bottom depth - 0m)		✓	✓	✓	✓
Conical (Bottom depth - 3-6m)		N.A	✓	✓	N.A
Pyramidal (Bottom depth - 3-6m)		✓	N.A	N.A	✓



SQUARE LATERAL NET & PYRAMIDAL BOTTOM NET

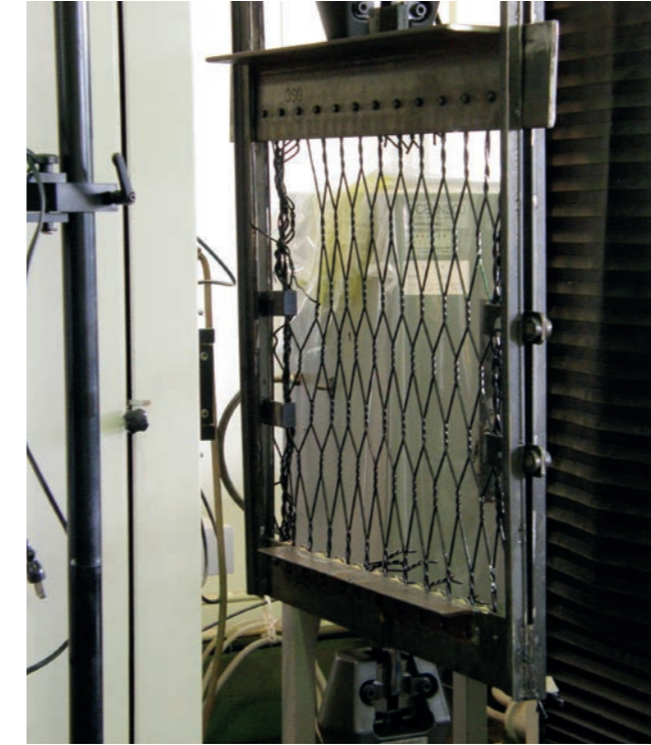
The "Waterline" of the net pen is designed for simple assembly with a floating cage collar.

The "Bottom Line" is designed for simple attachment of sinker tube.

Accurate finishing, attention to construction details, stringent QA&QC, safe, strong and robust construction.



## KIKKONET - MESH TECHNICAL DETAILS



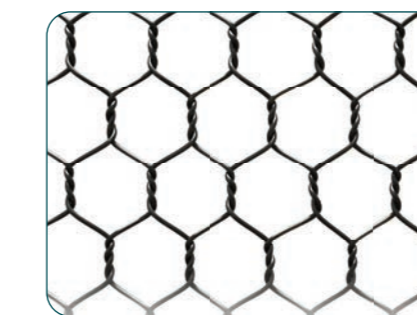
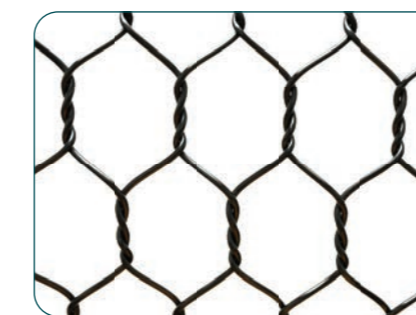
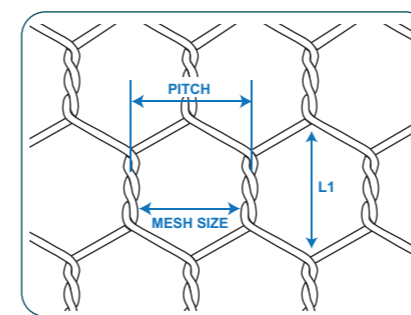
Maccaferri has over 130 years' experience in the manufacture of industrial materials. This heritage is combined with a commitment to quality and on-going research and development into raw materials and manufacturing processes.

KikkoNet was developed in response to market demands for a more robust net, which required less maintenance, offered greater life and could withstand rough conditions. Maccaferri KikkoNet meets the strictest National and International standards and regulations.

"QUALITY AND MANUFACTURING PROCESS CONTROL MEANS THE PRODUCT YOU PURCHASE HAS CONSISTENT QUALITY AND PERFORMANCE PROPERTIES."

NOMINAL NET CHARACTERISTICS	Mesh Type*	
	Large Mesh	Small Mesh
Wire Diameter (mm)	3.0	2.5
Mesh size (mm)	45	35
Pitch (mm)	50	40
Length - L1 (mm)	70	43
Mass per unit area (g/m <sup>2</sup> )	590	570
Tensile Strength (kN/m)	≥45	≥40

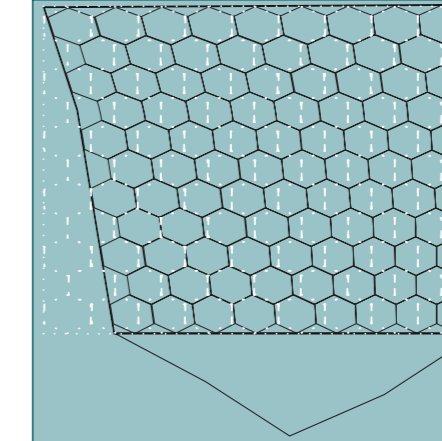
\* Also available Large Mesh with monofilament 2.5mm and Small Mesh with monofilament 3.0mm and Super Large Mesh with monofilament 3.0mm. Data and information available upon request.



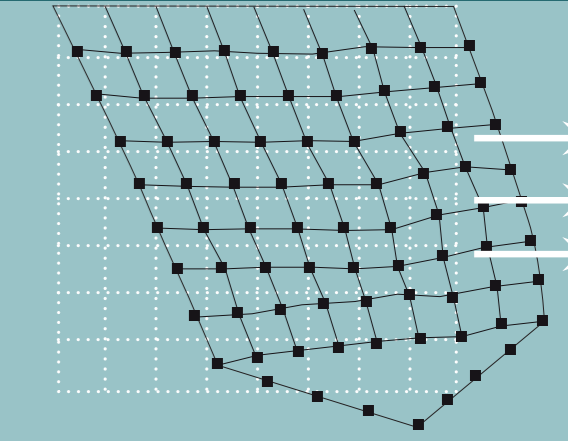
Large Mesh

Small Mesh

## EXAMPLE OF KIKKONET IN MARINE CURRENT



## CONVENTIONAL NET PENS IN THE SAME MARINE CURRENT



## MONOFILAMENT PROPERTIES

PHYSICAL PROPERTIES	Test Method	Units	MF 3.0	MF 2.5
Material			PET	PET
Colour			BLACK	BLACK
Nominal Diameter		mm	± 3.0	± 2.5
Tolerance before production of mesh		mm	0.2	0.18

MECHANICAL PROPERTIES	Test Method	Units	MF 3.0	MF 2.5
Tensile Strength	EN ISO527	Mpa	≥230	≥230
Elongation at break	EN ISO527	%	≥30	≥30
Tensile Modulus	ASTM D638	Mpa	≥6000	≥6000
UV resistance (2000hrs exposure)	EN ISO4892-3	Mpa	≥200	≥200
Heavy Metal Free	RoHS Directive		Conformity	Conformity