

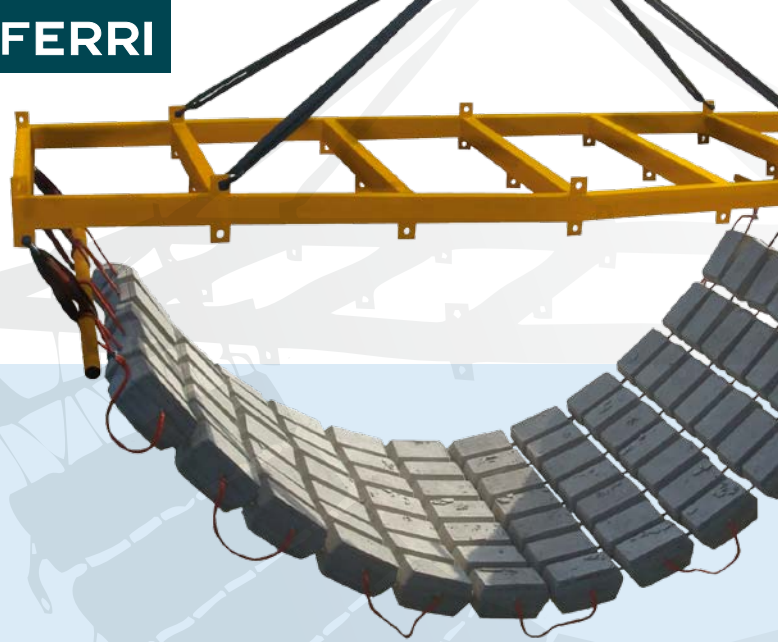


Articulated Concrete Block Mattresses **ACBM**



MACCAFERRI

For over 30 years, Maccaferri has provided engineered solutions for the protection, anchoring, ballasting and stabilisation of marine subsea pipelines.



ACBM

The Maccaferri **Articulated Concrete Block Mattress (ACBM)** provides the owners and operators of underwater infrastructure, efficient and cost effective protection to their cables and pipelines.

Simple in concept, yet focused in detail, Maccaferri ACBM is increasingly popular for contractors requiring a rapid-to-deploy protection system that minimises on-site time.

The Maccaferri ACBM system features a transportable and patented system, enabling production to be taken direct to the launch site. This removes one of the most expensive components of equivalent systems: freight costs.

The individual blocks, connected together by polymer cables, are a distinctive shape, specifically developed to provide enhanced protection to underwater infrastructure.



Concrete mattresses produced with the Maccaferri ACBM system are compliant with strict QA/QC procedures in order to accord with the requirements of International Standards.

Qualified supervisors and skilled manpower check each production run for compliance, ensuring the quality of the final mattress.

Maccaferri ACBM provides a new combination of benefits, offering cost effective “on-site” manufacturing, simple deployment and proven reliability.

Finally, the Maccaferri ACBM production enables customisation of the mattress dimensions to suit the project requirements, not to suit the transportation from factory to dockside.

Technical Features

An important consideration during the design of underwater pipelines is their stability once laid upon the sea bed. The combination of forces from waves and currents can destabilise the pipeline, causing movement. If the self-weight of the pipeline is insufficient to restrain this movement, the pipeline will require anchoring; Maccaferri Articulated Concrete Block Mattresses (ACBM) provide a proven solution.

Maccaferri ACBM is a rectangular array of concrete blocks, intimately connected together with polymer cables to form a single mattress. The cables are looped on each side of the mattress to facilitate lifting and deployment of the ACBM. The blocks are specifically formed to grant the mattress a high degree of flexibility in 3 dimensions. Specific marine-grade concrete is used to deliver consistent technical performance of the mattress. Materials used are chemically inert and non-degradable in sea water, offering a performance life of over 25 years.



ACBM - Dimensions [m] and Total Mattress Weight in Air [Tons]

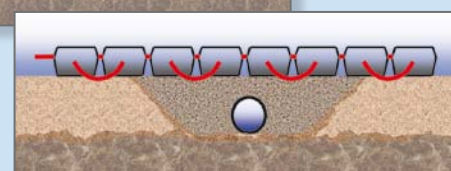
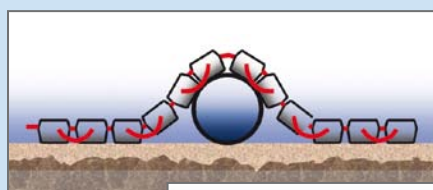
Width	1.93				2.26				2.59				2.92			
Thickness	0.15	0.20	0.25	0.30	0.15	0.20	0.25	0.30	0.15	0.20	0.25	0.30	0.15	0.20	0.25	0.30
Length																
3.14	1.5	1.9	2.4	2.7	1.7	2.3	2.8	3.2	2.0	2.6	3.2	3.6	2.2	2.9	3.6	4.1
3.67	1.7	2.3	2.8	3.2	2.0	2.7	3.3	3.7	2.3	3.0	3.7	4.3	2.6	3.4	4.2	4.8
4.20	2.0	2.6	3.2	3.6	2.3	3.0	3.7	4.3	2.6	3.5	4.3	4.9	3.0	3.9	4.8	5.5
4.73	2.2	2.9	3.6	4.1	2.6	3.4	4.2	4.8	3.0	3.9	4.8	5.5	3.3	4.4	5.4	6.2
5.26	2.5	3.3	4.0	4.6	2.9	3.8	4.7	5.3	3.3	4.4	5.4	6.1	3.7	4.9	6.0	6.9
5.79	2.7	3.6	4.4	5.0	3.2	4.2	5.2	5.9	3.6	4.8	5.9	6.7	4.1	5.4	6.7	7.6
6.32	3.0	3.9	4.8	5.5	3.5	4.6	5.6	6.4	4.0	5.2	6.4	7.3	4.5	5.9	7.3	8.3

ACBM - Dimensions [m] and Total Submerged Mattress Weight [Tons]

Width	1.93				2.26				2.59				2.92			
Thickness	0.15	0.20	0.25	0.30	0.15	0.20	0.25	0.30	0.15	0.20	0.25	0.30	0.15	0.20	0.25	0.30
Length																
3.14	0.8	1.1	1.4	1.6	1.0	1.3	1.6	1.8	1.1	1.5	1.8	2.1	1.3	1.7	2.1	2.4
3.67	1.0	1.3	1.6	1.8	1.1	1.5	1.9	2.2	1.3	1.8	2.2	2.5	1.5	2.0	2.4	2.8
4.20	1.1	1.5	1.8	2.1	1.3	1.8	2.2	2.5	1.5	2.0	2.5	2.8	1.7	2.3	2.8	3.2
4.73	1.3	1.7	2.1	2.4	1.5	2.0	2.4	2.8	1.7	2.3	2.8	3.2	1.9	2.6	3.1	3.6
5.26	1.4	1.9	2.3	2.6	1.7	2.2	2.7	3.1	1.9	2.5	3.1	3.5	2.1	2.8	3.5	4.0
5.79	1.6	2.1	2.6	2.9	1.8	2.4	3.0	3.4	2.1	2.8	3.4	3.9	2.4	3.1	3.9	4.4
6.32	1.7	2.3	2.8	3.2	2.0	2.7	3.3	3.7	2.3	3.0	3.7	4.3	2.6	3.4	4.2	4.8

ACBM - Mattress Specific Weight in Air VS Submerged [Tons/m²]

Mattress Thickness	Specific Weight in Air	Specific Submerged Weight
0.15 m	0.24	0.14
0.20 m	0.32	0.18
0.25 m	0.39	0.23
0.30 m	0.45	0.26



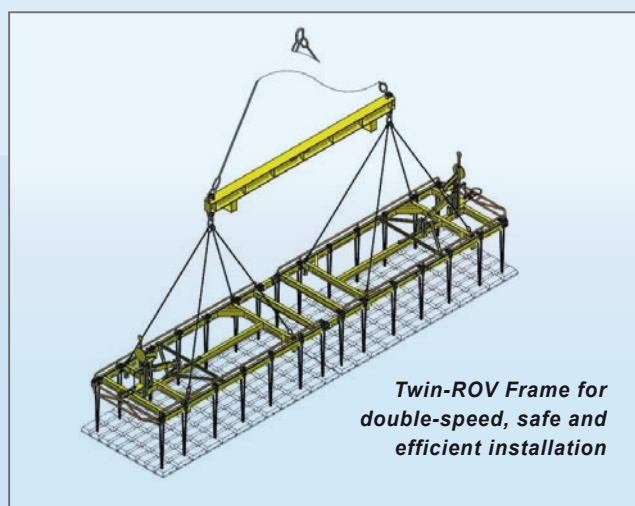
Why Maccaferri ACBM?

The Maccaferri ACBM System not only redefines the manufacture of concrete mattresses, but is a complete solution including consultancy support and specific lifting-frames for faster, safer and cost effective installations.

Consultancy Support

Maccaferri offers:

- **Mattress concept design** - Customised mattress dimensions and concrete mix, specifically for the project.
- **Mattress stability analyses** - Analysis based upon local project parameters including hydrological data, pipe or cable features and wave and current forces.
- **Mattress lifting arrangement** - The parabolic deformation of a mattress during lifting can be configured to establish safe conditions for mattress handling.



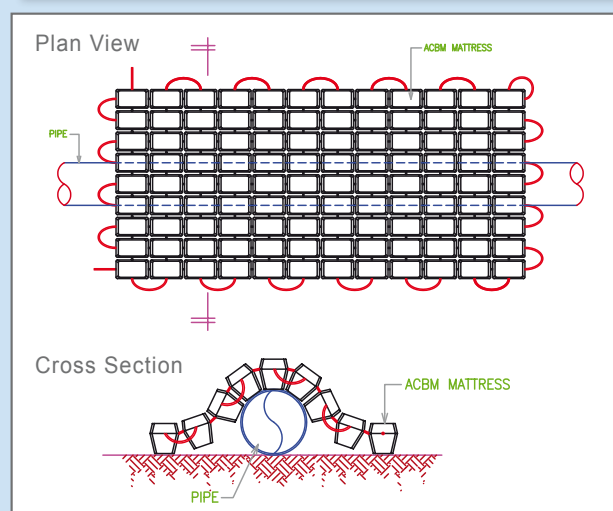
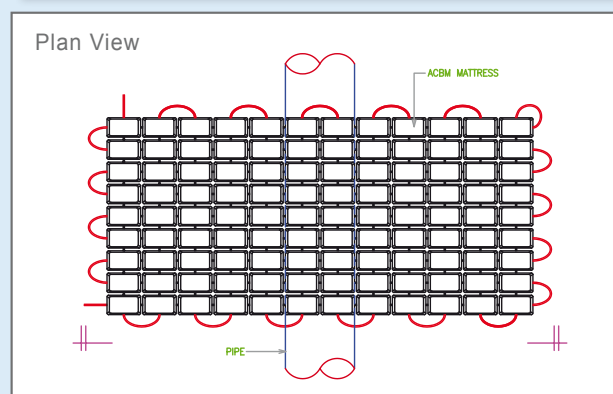
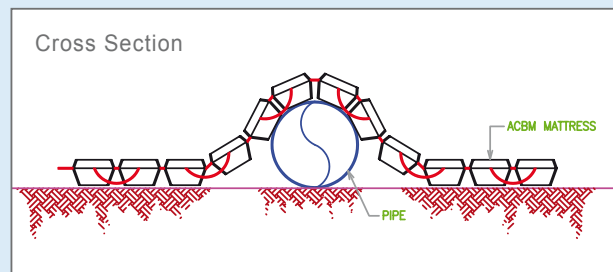
Installation Frames

When working offshore, contractors need reliable and effective equipment, enabling them to focus on the job in hand. Maccaferri offers ACBM installation frames that satisfy this demand;

- **Manual** - For onshore mattress handling and diver-assisted installation
- **Automatic** - ROV friendly for deep-water installation

Automatic frames feature mechanical release systems that can be activated by Remotely Operated Vehicles (ROVs). Both automatic and manual release frames are designed, manufactured and certified to provide reliable, rapid and safe mattress handling on and off-shore.

Customised frames for the deployment of multiple, or special arrangements of mattresses, are available upon request.



Maccaferri Articulated Concrete Block Mattresses (ACBM) provide the ultimate protection for underwater infrastructure including oil and gas pipelines, communications and electrical cables, aqueducts and sewage outfalls.

Features

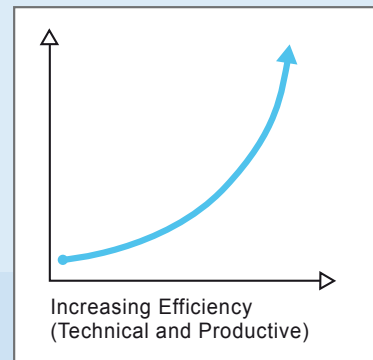
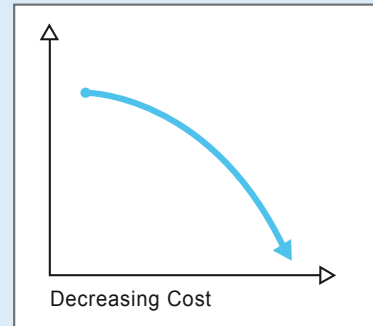
- “On-location” manufacturing using Patented formwork
- Rapid production and installation
- Technically proven and cost effective
- Customisable mattress design
- Strict QA/QC procedures and controls

Advantages

- Lifetime unit flexibility
- Minimal transportation costs
- Modular units simplify construction

Benefits

- Effective stabilisation and/or support of pipelines, cables or other services
- Long-term protection from anchor impact or other collisions
- Prevents scouring and resultant free-span problems
- Mattress dimensions are optimised for the project requirements, not for the efficiency of transportation.



Monaco - Monte Carlo



Messina - Italy



Officine Maccaferri Group Profile

Founded in 1879, **Officine Maccaferri** soon became a technical reference in the design and development of solutions for erosion control and retaining structures.

Since then, through technological innovation, geographical expansion and focussed diversification, Maccaferri now offers solutions at a global level for a wide range of **civil and environmental engineering** applications.

Consultancy and Partnership

Maccaferri's motto is 'Engineering a Better Solution'; We do not 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 with clients through the **quality of our service and solutions**.

Organisational Structure

Officine Maccaferri is at the heart of the Maccaferri Industrial Group. Its continued growth is based upon long-held values of innovation, integrity, excellent service and respect for the environment.

Maccaferri's vision is to become a leading international provider of advanced solutions to the civil engineering and construction market. Implementing a strategy of vertical integration, Maccaferri researches, manufactures, designs, supplies and constructs solutions within its target markets.

The capability of the business continues to expand due to a strategic plan to open new markets and grow existing ones; Maccaferri now offers advanced engineered solutions from **solutions from coastal protection to reinforced soil structures** and from **rockfall mitigation to tunnelling systems**.

With over 2000 employees, 26 manufacturing facilities and local operations in 100 countries around the world, Maccaferri can truly claim to have a global presence with local focus.

Maccaferri: Engineering a Better Solution



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Bureau Veritas Certified Quality System Company with
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