

# IN-TA-CT<sup>®</sup>

Single-Stage System TAPIS<sup>®</sup>



Intake Systems

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## TAPIS® - TAPROGGE Air Powered Intake System

TAPIS® is an important milestone in the progress of effective and environmentally compatible pre-screening systems. Except for its primary task, the protection of pumps in cooling water circuits from macro fouling, it has nothing in common with the traditional pre-screening systems as far as design, operation and maintenance are concerned.

TAPIS® combines the functions of the classic multi-stage pre-screening systems in a single stage. This saves building expenditure. TAPIS® is a system for the mechanical treatment of water at the place of extraction by making use of hydrophysical principles. This is achieved without the need to separate the debris from the water. This saves the constantly increasing cost for the environmentally friendly disposal of debris. TAPIS® operates at low flow velocities. It is fish-friendly and protects aquatic life. TAPIS® does not require movable parts in the water and works fully automatically. This reduces maintenance cost and guarantees system availability. TAPIS® has a modular structure. In this way, it is easily adjustable to output and local topology.

All this has been accomplished by two very effective developments of TAPROGGE which are combined in TAPIS®: a special polyhedron geometry for the TAPIS® screens which in turn allows an extremely effective backwash of the screens. And, additionally, special Cling-Free® elements which have been optimized to respond to the fouling typology in surface water.



TAPIS® single-stage pre-screening system

## Field of Application

- Application in sea, brackish and river water and other types of surface water for the protection from macro fouling of pumps connected downstream
- Pre-screening stage in main and auxiliary cooling water circuits of power stations, chemical and petrochemical plants, steel works, and other industrial applications
- Pre-screening stage for drinking water plants
- Pre-screening stage for the pre-treatment of water for micro, ultra, nano filtration and reverse osmosis systems

## System Design

TAPIS® is a single-stage pre-screening system. It comprises one or several TAPIS® polyhedra and a central backwash unit.

### System Component 1: The TAPIS® Polyhedron

Polyhedrally shaped screens form the core of TAPIS®. The polyhedron consists of a stainless steel supporting structure which contains the screen surfaces. Whereas the polyhedron sides that are directed to the water surface are equipped with special screens, those sides directed to the ground remain closed to avoid the ingress of debris sediment from the bed of the sea, river or lake.

Inside of the TAPIS® polyhedron there is a spray nozzle system which, due to its special arrangement, and in combination with the geometry of the polyhedron, enables a particularly effective screen backwash by pressurized air pulses. The lower, closed sides of the polyhedron are used as rebounding plates for the expanding pressurized air.

As screen surfaces TAPROGGE uses its special, corrosion-resistant Cling-Free® elements. These screen elements are designed as thick-walled panels and are easy to handle and to exchange. They are fabricated of modified polyamide and provided with holes in the shape of canals. These canals are normally 10 mm in diameter but can also be adjusted to other sizes governed by the requirement of pump protection.

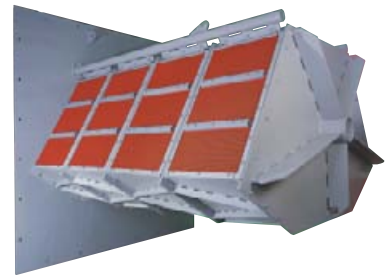
For the discharge of the cleaned water, the polyhedra are connected with the pump well via a pipe or a closed canal.

### System Component 2: The Air Backwash Unit

The backwash unit serves for providing the pressurized air pulse required for the air backwash and is connected to the spray nozzle system inside of the TAPIS® polyhedra via a connecting pipeline. The pressurized air pulse is generated in the air receiver by means of a compressor. The total system is controlled by a programmable controller.



TAPIS® modules



TAPIS® polyhedra



TAPIS® backwash unit



TAPIS® control unit

## Function

### Filtration Phase:

The driving force for the filtration process through the TAPIS® polyhedra is the static differential pressure between the water level in the pre-screening inlet and that of the pump well. Caused by this level differential the feed water passes through the screen surfaces of the TAPIS® polyhedra. All fouling particles larger in size than the selected perforation of the screen are retained on the exterior sides of the screen surfaces; cleaned water which has passed through the screen surfaces is forced to flow into the pump receiver via a pipe or a closed canal that form the connection between the TAPIS® polyhedra and the pump well.

### Air Backwash Phase:

In the course of time fouling accumulates on the screen surfaces. To remove such fouling a backwash cycle is initiated. Controlled by a timer, a signal is given to release the air compressed in the air receiver. Once released, the pressurized air enters from the air receiver via feed pipes directly into the interior of the TAPIS® polyhedra where it abruptly expands via a specially arranged spray nozzle system. The special polyhedron geometry causes a harmonized and thus particularly effective utilization of the pressurized air.

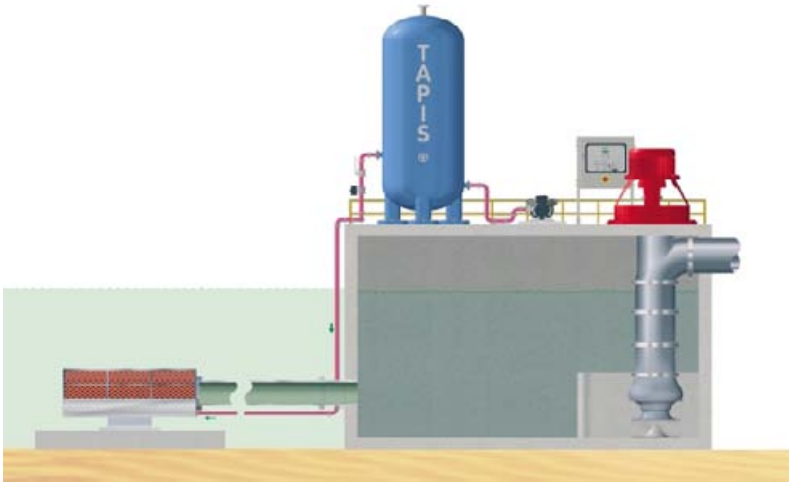
The abrupt expansion displaces the water volume contained in the polyhedron within seconds (air backwash), with the fouling accumulated on the screen surfaces first being vigorously lifted off by the displaced water and then transported away with the expanded air cloud. The canal-shaped holes of the special Cling-Free® filter elements generate a jet effect when being passed by water and air which intensifies the cleaning effectiveness.

The entire air backwash process takes only a few seconds. Filtration continues immediately afterwards, without further interference by the operator, in a natural way (pressure differential between water intake and pump well).

As soon as the release of pressurized air has caused a drop of the static pressure in the air receiver to below a pre-set value, the control emits a signal to close the pressurized air pipe and start the compressor for recharging the air receiver with fresh pressurized air. Once the desired initial pressure has been reached, a new pressurized air charge has been generated, and the compressor switches off. The backwash unit is then ready for another backwash process.



TAPIS® backwash phase



## Installation

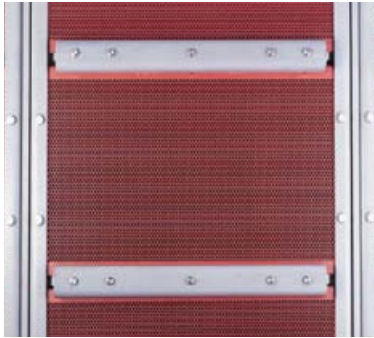
TAPIS® polyhedra are installed at the place of water extraction on the bed of the sea, lake or river, or immediately at the wall of the pump well. Important is the permanent submerging of the polyhedra at minimum water level.

Number and size of the polyhedra are governed by the specific project, that means by the required water quantity and the available water depth.

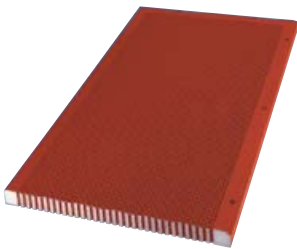
The backwash unit is preferably mounted on the pump well cover. To protect it from atmospheric influences an indoor erection is recommended.

### Technical Data:

Series:	TAPIS®
Principal design:	single-stage system for pre-screening
Volume flow/polyhedron:	100 – 6,000 m <sup>3</sup> /h
Filter element:	Cling-Free®
Degree of filtration:	10 mm (standard); further perforations upon request
Material polyhedron housing:	stainless steel
Material filter element:	modified polyamide
Design pressure polyhedron housing:	0.15 bar
Design pressure filter element:	0.15 bar
Design pressure air receiver:	10 bar
Control:	PLC, type of enclosure IP 65, OperatorPanel
Options:	Remote Monitoring Service



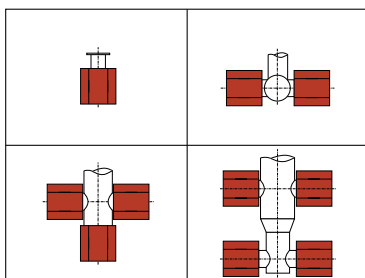
Cling-Free<sup>®</sup> elements fixed to the TAPIS<sup>®</sup> polyhedron



Cling-Free<sup>®</sup> elements



Canal shaped holes of the Cling-Free<sup>®</sup> elements



Flexible installation through multitude of variants

## Technical Features and Benefits

### Economy through innovative Design of Polyhedra

- TAPIS<sup>®</sup> polyhedra combine the multi-stage arrangement of traditional systems in a single stage. The necessary capital investment for concrete canals of traditional systems through which the extracted water is fed to a multi-stage pre-screening system is saved.
- TAPIS<sup>®</sup> polyhedra operate without the need to dispose of debris cleaned off. This saves current cost for environmentally friendly disposal and avoids uncontrollably rising expenditure.
- TAPIS<sup>®</sup> polyhedra allow a much better backwash effectiveness than any other type of design. By utilizing the closed bottoms of the polyhedra as defined rebounding plates for the injected pressurized air during backwash and the optimization of the spray nozzle geometry, a completely new cleaning behaviour has been created that has been equalized with regard to time and space. This has beneficial effects on the operating cost and the availability.
- TAPIS<sup>®</sup> polyhedra require a lower water level compared to cylindrical types. This is favourable for the construction cost.
- TAPIS<sup>®</sup> polyhedra have no moving parts, a fact that places them well ahead of traditional travelling band screens and drum screens, as far as maintenance efforts are concerned.

### Safety through Cling-Free<sup>®</sup> Elements

The earlier solution to use wedge wire screen baskets (passive screens) as screening surfaces did not stand the test. The narrow gap widths were very quickly blocked by aquatic creatures. At the same time they offered ideal entangling possibilities to critical types of fouling, such as fibres, grass or algae. Cling-Free<sup>®</sup> filter elements are optimized in view of the critical types of fouling contained in surface water. According to the Cling-Free<sup>®</sup> technology developed by TAPROGGE, fibres are guided and aligned in the canals without getting entangled or matted. The ability to master fouling, particularly such wide-spread species as algae and seagrass, and other fibrous types, is of major importance.

### Flexible Installation by Modular Structure

The number and size of the polyhedra are adjustable to the required flow rate and the available water level. In this way, a lower water depth can be responded to by a greater number of smaller polyhedra, and a deeper water depth allows bigger polyhedron types. A complete series of polyhedron types with flow rates from 100 to 6,000 m<sup>3</sup>/h enable a smooth optimization.

## TAPROGGE Care & Comfort Package

### Quality right from the Start

- Performance by TAPROGGE as per DIN EN ISO 9001
- Safety of design by fulfilling the requirements of the European Pressure Equipment Directive 97/23/EC
- Application of a management system for safety, health and environmental protection (SCC)
- Hydrostatic and functional tests in the TAPROGGE workshop
- Standard documentation; documentation upon customer's request, respectively
- The use of extremely corrosion-resistant materials with long lifetimes safeguards the preservation of the value of investment.

### Compatibility by IN-TA-CT® Modules

- TAPIS® is a modular element of IN-TA-CT®, our integral principle for the optimization of cooling water circuits.
- By combination with a TAPROGGE debris filter of our PR-BW series installed downstream, and a TAPROGGE tube cleaning system, an effective overall solution presents itself for the protection from micro and macro fouling, of pumps and heat exchangers or condensers. A complete solution - without interfaces - and inclusive of the TAPROGGE System Guarantee.

### Competence and Experience out of one Hand

- Application consultancy, project management, fabrication, installation and commissioning of TAPIS® is available from TAPROGGE out of one source.
- With more than 12,000 successful applications, TAPROGGE can make use of its application-technological experience in its special field that stands unparalleled the world over. This plus of competence is indispensable for difficult media and unknown cleaning behaviour.
- In addition to that, the cooling water test circuits of TAPROGGE's Technological Centre allow a particularly reliable and cost-effective simulation of site conditions.

### Comprehensive Operator Support by IN-TA-S®

- By the installation and commissioning of TAPIS®, operators have immediate access to IN-TA-S®.
- By IN-TA-S®, TAPROGGE takes care of the operator in all questions of operation and maintenance. Scope, duration and frequency of the care can be determined by the operator.
- Particularly quick support is available to the users of our Remote Monitoring Service.



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