



EFFICIENT SOLUTIONS FOR WATER AND AIR TREATMENT

ENGINEERING.
DESIGN.
VISION.

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**WATER AND
AIR TREATMENT**
COMPONENTS AND SOLUTIONS

ENDEVION

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ENDEVION S.r.l. deals with **the design and production** of skids, packages and industrial components. Leader in the supply of solutions for **revamping of evaporative towers**, for **water treatment and purification**, industrial cooling and mass exchange. ENDEVION's products are ideal for the enhancement or revamping of sedimentation, clear-flocculation, oil removal, biological purification, process water cooling, revamping of cooling towers and air condensers, removal of pollutants from gaseous or liquid flows.

ENDEVION STRENGTHS ARE:

- Internal production of materials in **polypropylene (PP)** or in polyvinyl chloride (PVC) according to customers' needs
- Evaluation, together with the customers, of strategies for **energy efficiency**
- Products designed to achieve ever greater **sustainability**
- Flexible configurations** adaptable to any situation

ENDEVION RANGE OF PRODUCTS AND SERVICES INCLUDES:

- Inspection of plants and equipment with following reporting
- Planning and co-design
- Performance evaluation
- Supply of lamella modules and structured fills for biological treatment, coalescing media for oil removal
- Revamping
- Replacement of components and mechanical parts
- Increase of existing plant capacity
- New treatment skids
- Scrubbing towers or mass transfer
- Air humidifying walls



LAMELLA MODULES

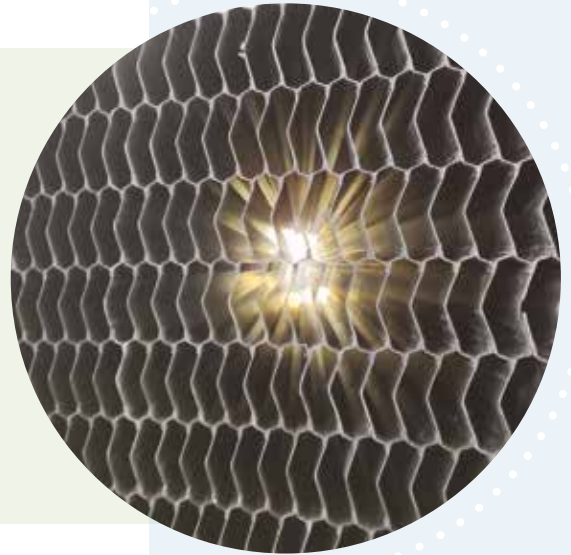


ENDEVION lamella modules represent the pivotal element adaptable to any application in the field of sedimentation. Module inclination, module height and distance between the lamella can be adapted to any specific need. Different operating conditions require adapted specific solutions, paying particular attention to the relationship between process capacity and available surface.

ENDEVION lamella modules can be used in all conditions for the different parts of the treatment process; they can be made of polypropylene or stainless steel.

ADVANTAGES OF ENDEVION LAMELLA:

- ↻ Equidistant sedimentation surfaces, total applicability of Hazen law
- ↻ "V" shape for a better collection and discharge of the settled sludge
- ↻ Male-female interlocking system for robust modules
- ↻ Customizable dimensions, different inclination angles
- ↻ The self-supporting modules do not require an external frame and allow the complete use of the tank area; no need for additional structures or containment frames.



The equidistant profiles of ENDEVION lamellas precisely define the length of the sedimentation path and allow **maximum solids separation efficiency**.

Any other non-parallel channel shape (e.g. hexagonal) with the same area makes the sedimentation path significantly longer than parallel channels and therefore fails to properly separate the desired particles. The availability of different channel spacing between the flat surfaces allows to choose the most suitable lamella module for each application and for each specific need.

ENDEVION lamella show their reliability even in overloaded circular tanks, allowing further expansion of the systems even when there is no additional space in existing plants. These solutions increase the sedimentation surface and thus improve the capacity of the system.

There are several possibilities for installing the lamella modules in circular tanks:

TANGENTIAL CONFIGURATION

In this case the lamella separators are installed in a ring tangential to the outer edge of the tank. This method is most frequent on large tanks with limited available space on the outer end.

RADIAL CONFIGURATION

When a larger part of the tank must be covered, it is recommended to install ENDEVION lamella with a radial installation of modules. In this case larger rings can be assembled.

PARALLEL CONFIGURATION

For small tanks, an installation with parallel lines of modules is more convenient. Only the modules in contact with the circular perimeter are shaped according to the round configuration. A central opening can also be provided to let the mud scraper shaft pass through.



ENDEVION parallel lamella clarifiers are often used **for civil wastewater treatment**:

PRIMARY SEDIMENTATION TANKS

The installation of ENDEVION lamella ensures the efficient retention of solids; automated washing systems can be designed to prevent sludge from accumulating in the lamella.

SEPARATION OF ACTIVATED SLUDGE

In secondary sedimentation, the driving parameter is the volume of the separated sludge. In this case, ENDEVION carries out in-depth evaluation and product selection, making use of the vast experience accumulated through the years.

SECONDARY SEDIMENTATION AFTER FIXED BED BIOLOGICAL SYSTEMS

In compact systems that use rotating elements, large trickling filters or fixed bed systems, limited volumes of sludge are produced, which can be efficiently separated with ENDEVION lamella. The use of these modules contributes significantly to the reduction of the construction costs and maintenance costs of these systems.

THIRD AND FOURTH STEPS OF PURIFICATION

Third and fourth purification phases are being set up with increasing frequency to remove micro pollutants (traces of substances, pharmaceutical residues, microplastics) and residual phosphates from wastewater by means of precipitation and / or phases with activated carbon. The ENDEVION parallel lamella effectively separate the precipitate and the sludge treated together with the coal.

NEW TREATMENT SKIDS: QLD PRE-ASSEMBLED MODULAR SEPARATORS

(Quick Lamella Decanter)

The solutions offered by ENDEVION combine the advantages of parallel plate separators with those of compact turnkey units, with tanks made of painted carbon steel or stainless steel, they are stable and resistant, they ensure high performance, they just need simple installation and require reduced maintenance. All QLD models consist of rectangular tanks with a hopper on the bottom for collecting and thickening the sludge. QLD tanks are equipped with lamella modules for sedimentation and clarified collection channels to allow the clarified water, free from suspended solids, to be collected.

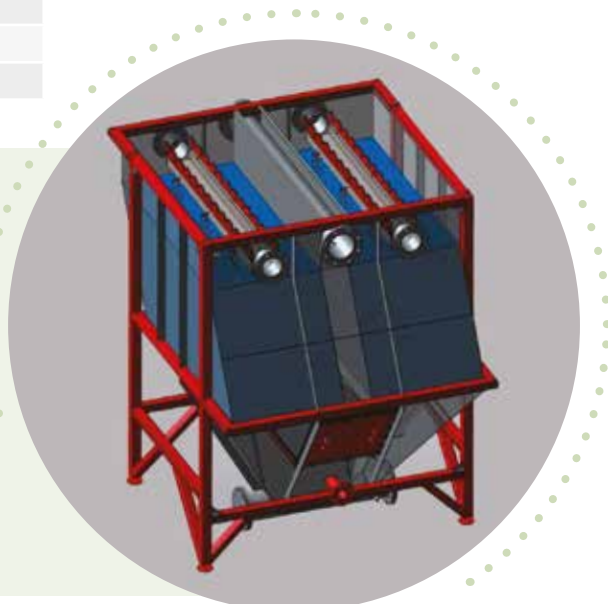
The big advantage of the new QLD series consists in being able to connect up to 3 tanks in series in order to manage even greater flow rates, thanks to the perforated inlet channel, specially designed to distribute the wastewater even over multiple tanks.

QLD sedimentation tanks are built in **3 sizes**:

Type	Material	Nominal plan view size (LxWxH)
QLD1	Fe/AlSi 304/PP	1.6 x 1.4 x 2.2 m
QLD2	Fe/AlSi 304/PP	2.3 x 1.4 x 2.2 m
QLD3	Fe/AlSi 304/PP	2.6 x 2.2 x 2.8 m

ADVANTAGES OF ENDEVION QLD:

- **Better sedimentation efficiency** with ENDEVION lamella compared to conventional parallel plate packs
- **Volume and projected surface perfectly adapted** to the type of wastewater to be treated
- **Low installation costs**
- Sludge removal by **simple hydrostatic pressure** - no energy dispersion
- It does **not require oversized transport**



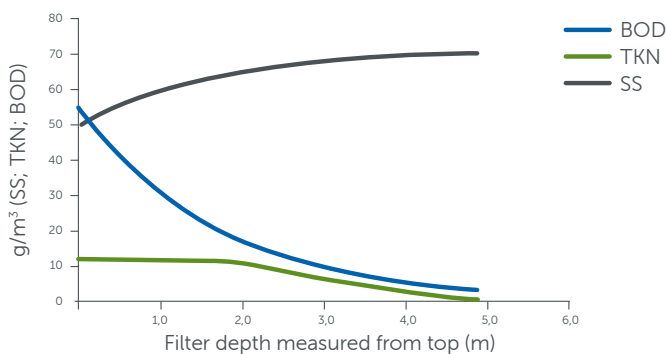
SOLUTIONS WITH TRICKLING FILTERS

Trickling filters have always been a valid solution for wastewater treatment: simple to operate, reliable and energy efficient, they can meet the treatment levels currently required with short payback times.

Percolating filters are considered a modern and highly interesting process today thanks to the development of different types of structured plastics, specialized for various applications:

- Roughing applications for high concentration inlet
- Carbon removal
- Nitrification down to very low concentrations

CONCENTRATION PROFILES



Although many equations and design rules have been published for the trickling filter operation process, a great deal of expertise and experience is required to find the most suitable configuration for each project. ENDEVION know-how is at customer's disposal to obtain:

- Reliability of reaching the discharge limits
- Considerable economic benefits
- High operational reliability
- Accurate hydraulic parameters for rotating distributor arms and nozzles



PROCESS ENGINEERING - DIFFERENT REQUIREMENTS

- **HIGH PERFORMANCE TRICKLING FILTERS** designed to **reduce BOD loads between 50% and 70%**. The vertical structure of ENDEVION fills has the optimal design to quickly and easily expel the excess sludge, especially when wastewater generates a strong growth of biomass.
- **SECONDARY TREATMENT TRICKLING FILTERS** to **reduce BOD and ammonia** in wastewater to levels that allow it to be discharged into waterways without compromising its conditions. ENDEVION filters can **work by gravity** without any additional energy.
- **TERTIARY NITRIFICATION TRICKLING FILTERS** to **improve an existing treatment process for ammonia discharge**. ENDEVION fills with a **cross-fluted structure** are particularly effective for this application thanks to high retention times and a high specific surface value.

UPGRADE OF EXISTING FILTERS

A cost-effective solution to increase the treatment capacity of a trickling filter plant is **to replace an existing mineral rock or random media with ENDEVION structured polypropylene fill**: the purification of waste water requires an active biofilm, a good supply of oxygen and nutrients and proper irrigation so that the sludge can be removed avoiding the clogging of the system. The correct choice of the fills (according to the application) ensures the required purification level while maintaining a good level of cleanliness (channels with adequate free passage) and guaranteeing energy savings for aeration.



ADVANTAGES OF ENDEVION STRUCTURED FILLS:

- Reduced risk of unpleasant odors thanks to the free and low resistance ventilation path
- Effective surface totally available for sludge growth, no overlap losses
- Variable sheet thicknesses to reach even very high load capacities
- No memory effect, no crushing during use
- Simple basic support structure, top layer can be walked on
- Respectful of the environment, resistant to shocks at room temperature and stable to aging thanks to the use of PP (PVC on request)

CUSTOMIZED SOLUTIONS FOR MANY APPLICATIONS



MUNICIPAL PLANTS

The trickling filters equipped with ENDEVION structured fillings can be designed to achieve stringent discharge limits. Therefore they are the ideal process for a complete secondary treatment. They are also used as an addition to the existing plant to decrease the pre-treatment load, at a low cost, where the capacity of the existing plant must be increased, or as a special treatment to meet the new standards imposed by the legislation. **The versatility of our product range allows existing plants and treatment systems to be upgraded to meet future needs** with reduced costs and minimal interruptions to treatment capacity.

INDUSTRIAL SECTOR

Industrial wastewater has special characteristics such as higher salinity and temperature, changing organic loads and various pH levels. **The ENDEVION trickling filters are able to treat such waste by generating limited excess sludge and operating at high efficiency, with small footprint and little supervision.** The adhered biofilm process has a high resistance to toxic or inhibitory compounds and other process variables, which provides better treatment stability than other methods such as activated sludge. The wastewater temperature stabilization through the filter is often seen as an additional positive effect. ENDEVION filters are particularly efficient in applications that require partial treatment to meet the requirements for discharge into municipal sewage systems.



COMPONENTS AND SOLUTIONS FOR SEDIMENTATION AND OIL SEPARATION

ENDEVION is able to supply spare parts for the mechanical equipment with the most advanced efficiency classes, of every size and construction type in order to satisfy every need:

STRUCTURED FILLINGS with crossed or parallel channels, with variable wave height from 8 to 38 mm, the sheets can be produced with different thicknesses according to the project loads.

LAMELLAR MODULES: totally made of PP, customizable in three dimensions (channels spacing of 50, 72 and 94 mm), they can adapt to each tank and are robust and efficient.

"IFAS" SYSTEM which combines the advantages of fixed bed technology with the conventional activated sludge process and can increase the performance of up to 40% without adding new aeration tanks.

SCRUBBER TOWERS: horizontal or vertical, depending on the selected process, they allow the removal of gas from liquid flows or the precipitation of substances thanks to chemical reactions, facilitating the contact between the two counter-current flows.

SUPPORT STRUCTURES with contact surfaces which are stable, inclined and insensitive to sludge deposits.

ROTATING DISTRIBUTOR ARMS : equipped with non-clogging nozzles, they can operate on reaction or peripheral traction; each distributor is specifically designed according to the project needs.

SPRAY NOZZLES: available for a wide range of flow rates, non-clogging type and for long durability.

AIR DIFFUSERS: disc or tubular type, in various materials of construction, compatible with different wastewater characteristics, for a wide range of flow rates.

OVERFLOW COLLECTION CHANNELS: they can be made of stainless steel, galvanized or painted steel, fiberglass, with an optimized design and configuration to collect the clarified water uniformly.

PACKAGE TANKS: stable and durable, they ensure high performance with plug and play installation and reduced maintenance, ENDEVION QLD series combine the advantages of ENDEVION lamella modules with the flexibility of skids.

AIR HUMIDIFYING WALLS: used in chicken or pig farms, they allow the air entering the sheds to be cooled, also increasing the moisture content for greater comfort of the animals and increased production.

STORMWATER TREATMENT: ENDEVION lamella allow the reduction of the costs and of the dimensions associated with the management of large volumes of water resulting from heavy rainfall, compared to the expensive and large traditional sedimentation tanks.

SERVICE: ENDEVION can do maintenance on any component or system of customer's plant providing spare parts or revamping service.



STRUCTURED FILLINGS



IFAS



SCRUBBER



SUPPORT STRUCTURES



ROTATING DISTRIBUTOR ARMS



SPRAY NOZZLES

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The Company is certified according to
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