

# Heat treatment system of biocontaminated effluents (Biowaste)

COMMERCIAL DESCRIPTION



## SYSTEM OVERVIEW

Manufactured in Spain, the Matachana treatment systems of biocontaminated waters include the latest advances in safety and efficiency in their technical design, ensuring full control of the entire sterilization process.

They are manufactured following the guidelines of quality standards UNE EN ISO 9001, certificate awarded by the inspection body Lloyd's Register Ltd.

The treatment system has been designed and built to perform the sterilization of potentially biocontaminated effluents (e.g. those produced in P3 areas, in blood and tissue banks, etc.) under safe conditions, both for the personnel responsible and for the environment. Subsequently, once treated, they will be discharged into the sewer under sterile conditions. Moreover, all circuits involved in the treatment system will be automatically sterilized every time a process is performed, with the aim of carrying out the maintenance tasks in complete safety.

## SYSTEM SCOPE

This system has been designed to control the following functions:

- Treatment of potentially biocontaminated fluids.
- Treatment control information signals.
- Control of the accumulator.
- Digesters control.
- Program for steam sterilization of the digester circuits for performing maintenance tasks.

## SYSTEM COMPONENTS

In this section the various components of the system and their functionality are listed.

The set comprises the accumulator unit where fluids from working areas with contaminated material are stored, and the digester unit, where they are sterilized prior to being discharged to the sump.



## ACCUMULATOR UNIT



Place for storing fluid that must be treated, from the different areas. It is a robust pressure vessel, built in AISI 316L (1.4404) stainless steel, 3 mm thick, with a manhole on the side, and fitted with all the sensors and controls required for its operation.

The effluents fall into this tank by gravity and are then sent, using pressurized compressed air, to the digester unit for treatment.

## ACCUMULATOR UNIT COMPONENTS AND CIRCUITS

The accumulator module is equipped with the following circuits and main components:

- **Input circuit:** This is the point where the effluents are received.
- **Input filter:** Before the liquid is poured into the accumulator it passes through a sieve which is capable of retaining the oversized and potentially hazardous solids so that the digester operates smoothly. Located at the top of the accumulator.
- **Output circuit:** This is the part of the circuit which communicates with the digester and through which the fluid transfer is performed.

The accumulator is ready to collect the water that seeps through its walls once it is empty, and send the contaminated water to the digester for treatment.

- **Back pressure circuit:** Injects air into the accumulator to allow transfer between the accumulator and the digester by overpressure, for which reason the accumulator tank is pressurized to 500 mbar gauge pressure. Once the air has been transferred it is discharged through the digester and the accumulator depressurization circuit.
- **Equalization circuit:** Serves to maintain the accumulator at atmospheric pressure during the filling phase preventing it from pressurizing. The air that enters and exits the accumulator does so through an absolute HEPA filter located in a stainless steel casing in the technical area.
- **Anti-foam circuit (optional):** The effluent treatment system has the option to include an additional anti-foam system.
- **Maximum and minimum level sensors:** Indicate the available capacity in the accumulator at all times, showing the values on the touch screen. The levels are on the side of the accumulator.
- **Safety Valve:** This is a mandatory requirement of the Pressure Vessel Regulations. Its function is to trigger if a pressure is reached that is dangerous to the integrity of the pressure vessel. Additionally, the system has pressure sensors which stop the treatment system before allowing excess pressure which could trip the valve.



## DIGESTER UNIT

Vessel in which the fluids are sterilized before being discharged into the sewer. It consists of one or more containers fitted with a chamber used to heat (up to sterilization temperature) and subsequently cool the liquid after processing. Built in AISI 316L stainless steel.



## DIGESTER COMPONENTS AND CIRCUITS

The digester is equipped with the following main circuits and components:

- **Input circuit:** This circuit is connected to the accumulator, and therefore receives the contaminated effluent. This circuit is located on top of the digesters. The inlet valve is directly mounted on the latter to avoid water stagnation that may be difficult to sterilize.
- **Drain circuit:** This is the circuit in the lower part of the digesters through which the contents are discharged into the sewer following treatment.
- **Back pressure circuit:** Facilitates draining of the digesters after pressurizing them, as they

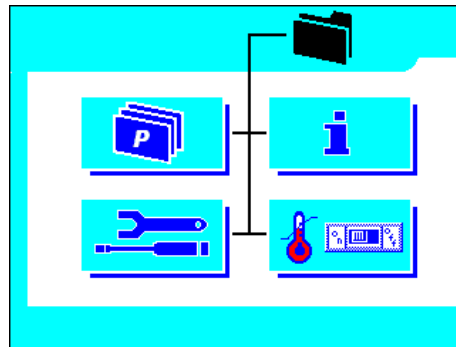
are emptied in less time while ensuring that there is no water retained in the output circuits.

- **Equalization circuit:** Serves to maintain the digesters at atmospheric pressure while they are not in service, preventing them from pressurizing and facilitating the exhaust of compressed air used during the transfer from the accumulator. The air that enters and exits the digesters via this circuit does so through an absolute HEPA filter mounted in a steel casing at the top of the digesters.
- **Level:** Used to indicate when the digesters have reached their working level and based on which the cycle begins.
- **Ante-chamber:** Digesters have an ante-chamber or jacket which is used to heat and cool the contaminated water contained inside the digester chamber. This means we prevent elements from entering the chamber in contact with the product, which would make it dirty and be difficult to clean.
- **Heating circuit:** The steam is introduced into the heating circuit for heating the digesters and then the condensates generated by this operation are removed. Steam is introduced through the top of the ante-chamber and the condensates (uncontaminated) are drained through the bottom. Through this procedure, the digesters are heated without increasing the amount of fluid within the chamber thereof, allowing them to work with a constant volume. They also have a built-in pump that recirculates the fluid thereby achieving greater uniformity of temperature.
- **Cooling circuit:** Distilled cold water is introduced into the ante-chamber to cool the contents of the digesters' chamber. Cold water is introduced through the bottom and exits through the top, thereby ensuring that the whole ante-chamber is flooded with water with the result that the heat exchange is maximum and the cooling time is minimal. Similarly, and in parallel, there is a heat exchanger that cools and neutralizes all the condensates from the heating circuits before discharging them into the sewer.
- **General control box:** This is the main box that controls all elements of the system as well as the supply of water, steam and air. This box contains the controller (PLC) which acts on the pneumatic pilot lights and electrical regulation and control devices.
- **Emergency stop:** The emergency stop action causes all the digester valves to close, as well as those in the equipment in the technical area, and generates an alarm that is displayed on the control screen. In this situation the buzzer sounds to alert the user to the presence of the anomaly. Mushroom emergency stop button on the general control box.
- **Recorder:** Displays at all times the absolute pressure and temperature values of the digesters and records their sterilization cycles on paper. The recording operation switches on automatically as soon as the sterilization process of the digesters is initiated, and stops on its completion. The recorder is mounted on the front of the general control box.
- **Main switch:** This is the switch that supplies electrical power to the accumulator and digesters. It protects itself against overloads as it has a thermal and magnetothermic function. It is mounted on the front of the general control box and prevents it from opening when the switch is on, preventing anyone from operating the panel when it is live.

## CONTROL SYSTEM

- **Man/machine interface.** This is a touch screen, where the accumulator/digester treatment system process is selected, started up and displayed. The screen has a general part and subsequent to the execution of the processes, the user decides when they must be executed. Once the treatment system has been started up, the operating system displays the four main icons which provide the options described below:

### Main touch screen control panel



Icon for entering the configuration and setting. Access is password restricted for technical staff.



Icon giving access to the information screens displaying date, time, program version and contact details for Matachana technical service.

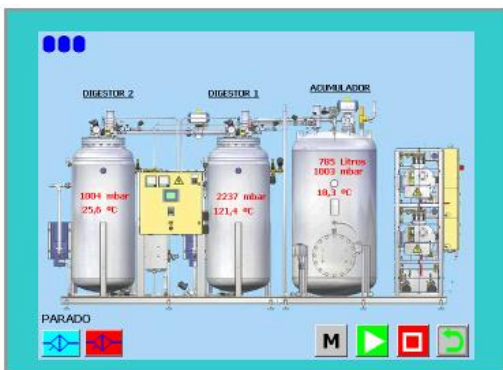


This icon gives access to the activation of various analogue channels of the accumulator and digesters so that if one of them fails it can be cancelled and the process continued.



This icon lets you select from the available programs

### Processing screen



On selecting one of these programs, the graphic image will appear showing a block diagram of the entire equipment. The various circuits from the diagram will appear or disappear depending on whether they are active or not, and the pumps will be in blue when they are operating, black when they are stopped and red when faulty. Inside the accumulator and digesters the value of the most significant parameters of both is indicated.