



Municipal Wastewater Treatment Plant in Palencia

1/2



Location	Palencia
Customer	Ministry of the Environment Duero Hydrographic Confederation
Construction period	36 months
Capacity	45,000 m³/day
Population	23,500 e.i.

The municipal wastewater treatment plant for Palencia is located on a 45,218 m² plot in Palencia city limits, on the left bank of the Carrión River, 2,500 meters downstream from the old wastewater treatment plant. It is sized for a flow of 45,000 m³/day and a population of 32,500 equivalent inhabitants and has the capacity to handle a flow of 144,000 m³/day.

Water line

The water line begins at the inlet with an overflow weir to evacuate excess flow and by-pass the plant in case of floods.

It continues to the preliminary treatment building with the solids pit where heavy materials are eliminated by gravity and five submersible 1500 m³/h pumps convey the raw water. One of these pumps is on standby.

The grit/grease removal unit has three rectangular tanks 19 meters long by 4 meters wide. Air is supplied by 2+1 blowers of 684 Nm³/h to separate the sand and demulsify the grease. There is also a sand extraction pump. The grease concentrator is of continuous chain type and has surface scrapers and takes place in a metal tank while the grit classifier is screw type with a stainless steel tank that is amply sized for the pump flows. The grit classifier and grease concentrator have evacuation valves.

The water flow in the primary treatment is measured with a Parshall type gauge with ultrasound that has been resized for the new flows. Primary decantation is done with three circular gravity type units with 28 meter diameter and there is sufficient space for a fourth. Foam and floating elements are skimmed from the surface to a collection pit and pumped from there. Sludge is pumped to the thickening by three submersible centrifuge pumps.

Municipal Wastewater Treatment Plant in Palencia

2/2



The biological treatment is done in three 46.5 x 73.3 meter lines with a total volume of 15,116 m³. This treatment involves a nitrification-denitrification process. The mixed liquor is released on the side opposite from the inlet through a 14.5 meter long overflow weir leading to a channel used by all the biological reactors.

The air is distributed throughout the tub by means of 9" diameter membrane diffusers. Secondary sedimentation occurs by gravity in three 38 meter diameter round tanks. Sludge is removed by suction from the bottom of the clarifiers.

The treated water collected in the peripheral channel of the distribution to the secondary sedimentation unit, is conveyed to a treated water storage tank prior to releasing it into the Carrión River.

The pumping to the thickening unit is done by three (2+1) submersible centrifuge pumps with a 35 m³/h each, sized for the daily volume of primary sludge to be pumped in less than 13 hours. They are controlled automatically by a programmable system in 48 hour cycles and with level sensors.

The water characteristics are as follows:

	Inlet	Outlet
BOD ₅	310 mg/l	≤ 25 mg/l
BOD ₅ daily average	13,950 mg/l	
TSS	270 mg/l	≤ 35 mg/l
TSS daily average	12,150 kg/day	
N-NTK	42 mgN/l	≤ 8 mg/l
N-NO ₃	3 mgN/l	≤ 15 mg/l

Sludge line

The sludge line is formed of a 13 meter diameter gravity thickener. To thicken the biological sludge even more two Rotamat type rotating presses were built with 50 m³/h flow each.

In the General Services Building are located the complementary installations required for the biological sludge thickening and mixing process.

The digestion designed is done in one stage only, in cylindrical digesters, with a high load operating system, a 21 day retention period and exterior heating. In order to adjust the sludge production to the discontinuous operation of the dehydration process, a tank with a 14 meter diameter was designed. The top of the tank is covered with GFRP with an extraction system and air deodorization.

The biogas produced is stored for use in the sludge heating and energy recovery process, also foreseeing a by-pass circuit to burn surplus gas. The biogas is stored at half pressure in two membrane gasometers with 789 m³ capacity, which is sufficient to store 30% of the daily production.

The sludge dewatering facility is spin type, the daily drying load being 12,878 kg. The sludge is supplied by three (one on standby) horizontally mounted pumps with positive displacement. There are two centrifuge pumps. Each with a capacity of 25 m³/h in one of the rooms of the general services building. Polyelectrolyte is used to chemical conditioning the sludge for drying, for which there are two dosing units working constantly.

The final product is conveyed by screw pumps to two 50 m³ sludge storage hoppers with a motorized exit gate for loading trucks.

The different stages of the product are controlled by modular extractable MCC's and PLC's. These are also connected to a main one located in the control room for managing the process.

The sludge has the following characteristics:

Dryness (% in weight of dry solids)	≥ 25 %
Reduction of volatile solids in the digestion process	≥ 40 %