



Drinking Water Purification Plant in Majadahonda – Madrid

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Location	Majadahonda (Madrid)
Customer	Canal de Isabel II
Date	28th of September of 2005
Construction period	18 months
Capacity	940 l/s
Budget	7.730.792 €

The works in this project include the following actuations:

Water line

The water line includes all the physical-chemical treatment and sedimentation processes required in this action for a maximum plant capacity of 4 m³/s; four lines were designed, each for 1 m³/s.

The following installations and processes were observed:

- Measurement of total water flow reaching the drinking water treatment station.
- A possible future pre-ozonisation chamber probably will be added after the existing mixing chamber.
- The flocculation process is added in four lines with 1 m³/s per line. The total retention time is over 30 minutes.

- Lamella settling, four units for a total of 1 m³/s, enlarged in their specific conditions of areas and velocities, ensuring the output for the different types of water and with sludge concentration system and special scraping for light sludge.
- Collection of decanted water and its return to the starting point of the filter bank, matching the real capacities of the filter distribution channel.
- Replacement of filter washing pumps and connection to the general water and air collectors for washing the filter bank. The system of collectors and valves upstream of the filters was renewed recently.
- Installation of flow measuring equipment for water and air in filter washing and automatic regulation system to maintain the flows of washing water in all filters.
- Chlorine dioxide was added for dosing in pre-oxidation and final disinfection. There are product detectors in the room, which complies with the relevant ventilation and safety standards. Water for dilution and to operate the injectors in the machines comes from the enlarged existing services water system.
- The hydrochloric acid dosing capacity was increased with the installation of a new dosing pump.
- The coagulant was replaced with ferric chloride and the existing installations are adapted to this reagent. The existing tanks were renovated and adapted to this reagent and new dosing pumps were installed.
- The plant was equipped with a new automatic polyelectrolyte preparation and dosing system for flocculation in the water line.



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- Powdered active carbon dosing was also installed with a storage silo matching the existing building and with a system to transport the suspension of the product to the point of application without problems, complying with the safety standards for this product.
- Lime dosing was significantly improved with the installation of a system for extracting the solid with fine regulation and a crushing system.
- Pumping of treated water to tank number 15 at 2 m³/s. Three units, each with a capacity of half of this flow, of the dry chamber horizontal centrifugal type. Regulation is by controlling the constant water level in the well with an additional safety sensor controlled by frequency shifter to ensure optimal operation conditions with the optimization of the well's dimensions and properties.

Sludge Line

A sludge line was included with two mud production points - decanter purging and filter washing water.

In the case of the Majadahonda drinking water treatment station, the work covered the products of water treatment, that is, the treatment of the water from the filter washing and sludge purging from the decanters, are currently dumped into a canyon with the resulting environmental impact.

The works involved in this project are:

- Removal of filter washing water, sludge purging from the new decanters in the water line and centrifuge water to new installations.

- Sand removal from the filter washing water to remove sand from the filter bed that could affect the following processes, piping it to the storage tank and pumping it to the inlet of the flocculation chambers.
- Building a lamination tank for sludge purging and water from the centrifuges.
- Pumping of sludge to sludge thickening, with a double regulation system that affects the frequency shifters to adjust the flow correctly: ultrasound level gauge - with safety pressure gauge - in the tank and flow meter in the pumping.
- Sludge thickening by high capacity floatation in rectangular thickeners in a metal tank with an automatic system for pressurising and removing the sludge with polyelectrolyte dosing, two lines.
- Degassing of thickened sludge, regulation and feeding to drying.
- Sludge dehydration by centrifuges with chemical conditioning of sludge using polyelectrolyte, two lines.
- Removal of dehydrated sludge and movement to storage using special helical screw pumps for these solids.
- Storage of dried sludge in vertical silo with truck loading with a special system for this type of mud that prevents clogging and compacting during loading.
- The sludge building has a gantry crane covering all the equipment in it with a street level unloading platform.
- The sludge building has two compressors, one supplying compressed air to the floatation equipment and one general one that serves all the pneumatic valves in the building.