

The disinfection system OxiperM Pro

Disinfection system for drinking water fueling of aircrafts



Drinking Water Fueling of a Lufthansa Airbus A319-100 by a fresh water vehicle

Düsseldorf Airport

Düsseldorf International Airport (DUS) was opened on April 19th, 1927. Nowadays, it is the most important international junction of North Rhine Westphalia. Düsseldorf Airport is the third largest airport in Germany regarding passenger volume. In total, more than 18.1 million people travel from Düsseldorf to 180 destinations in 50 different countries per year worldwide using 77 airlines (figures from 2008). On average, 49,000 passengers are transported daily on 625 flight movements.

Ground handling

At Düsseldorf Airport, there are two ground handling companies responsible for maintenance and supply of the aircrafts: AVIA-Partner and FDGHG (Flughafen Düsseldorf Ground Handling GmbH). In addition to cleaning the aircrafts, refueling of kerosine and baggage handling, the aircrafts are refueled with drinking water as well. The drinking water is used for making coffee, for food steamers and for the wash hand basins on board. AVIA owns two fresh water vehicles with 500 l and 1,500 l tank capacity, FDGHG has three with 3,000 l tank capacity each. The fresh water vehicles are fueled with drinking water at a central point and then driven to the corresponding aircrafts. In the central fueling room there are two hose bobbins with a 1 1/4" drinking water hose and a standardized connection adapter. This adapter is connected to the fresh water vehicle and fueled after clearance. Fueling the 3,000 l fresh water vehicle takes approximately 11 minutes.

Fueling of aircrafts



Drinking water shutter on the rear bottom side of the aircraft

After the drinking water has been filled in, the fresh water vehicles are driven to the corresponding aircrafts. Using the integrated hoisting platform, an employee can reach the drinking water shutter, which most of the time is located on the rear bottom side of the aircraft. The capacity of the aircrafts' water tanks is between 400 and 800 liters. The filling hose corresponds to the DVGW - W 270 and VP 549 and therefore, microbial contamination and formation of biofilm are minimized. The vehicle is also equipped with a special frost protection system.

Why use Chlorine dioxide?

Düsseldorf Airport opted for the OxiperM chlorine dioxide system, because chlorine dioxide can fulfill its disinfection task even in low concentrations. In addition, it has a high depot effect, i.e., the disinfection effect lasts for a long period of time. Chlorine dioxide also diffuses into the biofilm and hereby removes it from the water pipes. Therefore, we do not have a short-lived, superficial disinfection only, but a long-term one as by removing the biofilm the germs are deprived of their habitat.

Another decision criterion was the low risk of corrosion of the Oxiperm Pro, because both initial components, diluted hydrochloric acid 9% and diluted sodium chlorite solution 7.5%, react in a volumetric 1:1 relation to chlorine dioxide. Other chlorine dioxide systems work with a 1:3 relation, i.e., 2 liters of diluted hydrochloric acid don't react to chlorine dioxide and can therefore corrode pipe material.

The technology

A DN 65 stainless steel pipe leads from the central drinking water supply to the fresh water vehicles' tank room. Both, AVIA and FDGHG have their own disinfection and tank systems. Therefore, the feeder line is splitted in two DN 50 stainless steel pipes. The drinking water flows through a water filter and a system separator to an electromagnetic measuring water meter, which measures the flow and passes a 4-20mA signal on to the Oxiperm Pro system. During the filling of the fresh water vehicle, the Oxiperm Pro doses chlorine dioxide into the drinking water in proportion to quantity. According to the Drinking Water Ordinance, the critical value of chlorine dioxide in drinking water mustn't exceed 0.2 mg/l. A stepper-motor driven dosing pump, which is installed in the Oxiperm Pro system, takes care of dosing the exactly needed quantity of chlorine dioxide.



2 x Oxiperm Pro 5 g ClO₂ / h with a digital dosing pump DDI209

Grundfos products used:

- 2 x Oxiperm Pro 5 g ClO₂ / h with a digital dosing pump DDI209
- 2 chlorine dioxide measuring cells Aquacell
- Chlorine dioxide gas warning device DIS-G
- 2-channel writing implement
- Grundfos service and start of operation

Next to the injection unit, there's a chlorine dioxide measuring cell which measures the concentration of the dosed chlorine dioxide and forwards the measured value to a 2-channel recorder. You do not need an additional external analyzing device, because the Oxiperm Pro has an integrated measuring amplifier. So you have already attended to your measuring duty as required by the Drinking Water Ordinance in a quick and cost-efficient way. In the Oxiperm Pro control you can also define a limit value for chlorine dioxide so that there is no danger of unintentional over-dosing.

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The legal aspect

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The DIN 2001/part 2 (Drinking water supply from small and non-stationary systems) deals with drinking water systems on ships, surface vehicles and aircrafts.

Drinking water systems are also defined in the German Drinking Water Ordinance, § 3 (definitions): "Systems, from which a maximum of 1,000 m³ water is extracted or dispensed for human usage (small systems), as well as other non stationary systems". In addition, there are European Regulations of the aviation industry (JAR 25x799) and local sanitary instructions for filling stations on airports.

There also is an IATA guideline (IATA AHM 440 - Potable Water) for drinking water fueling. Thus, aircrafts must only be fueled with drinking water 30 minutes before take-off. Besides, a disinfection of drinking water is envisaged.

The Public Health Department takes a water sample from the fresh water room every 3 months and one sample per month from the tank vehicles to ensure an impeccable drinking water hygiene.

Advantages:

- Impeccable disinfection even in low concentrations
- No formation of sensorily discernible by-products (chlorine smell)
- Low potential of corrosion and reduction of the operating costs due to the 1:1 mixture of both initial components
- Integrated measuring amplifier to fulfill the requirements according to the Drinking Water Ordinance
- Exact dosing due to a digital dosing pump (DDI 209) with stepper motor
- No over-dosing due to a limit value of chlorine dioxide