

DANIEL-LM s.r.o. | AquaTech North Bohemia

# ACDeC Whirlpool

Breakthrough control of microbial contamination  
and combined chlorine in whirlpools,  
wellness tubs, and children's pools.

# Why Standard Chlorination Is Not Enough

Microbial contamination in warm-water pool environments — whirlpools, hot tubs, wellness tubs, and children's pools — is difficult to control even with correctly dosed chlorine disinfectants. Rising microbial resistance to disinfectants leads to periodic or persistent bacterial counts exceeding legal hygiene limits, particularly in warmer water bodies.

Increasing the chlorine dose is not a sustainable answer. It creates health concerns of its own and generates higher levels of combined chlorine and disinfection by-products (chloroform, bromodichloromethane, dichloroacetonitrile).

Operators need a safe, chemical-free method to control microbial growth and reduce combined chlorine at the same time.



# The ACDeC Whirlpool Solution

ACDeC Whirlpool is a passive, chemical-free water treatment technology built around the ART CARBON® adsorbent, developed and patented in the Czech Republic in cooperation with the Technical University of Liberec.

## The technology delivers two effects in a single pass:

- **Microbial control** — bacteria are captured on the surface of the adsorbent, where their cell membranes are disrupted and the cells die. No biofilm forms on the adsorbent surface.
- **Combined chlorine reduction** — up to 90 % per single pass, through catalytic decomposition into harmless nitrogen and salts.

Low capital cost. Low operating cost. Fully passive operation — no chemicals, no by-products, no electricity beyond a small booster pump.

# How It Works

Compact bypass installation. One or two polypropylene reactor columns filled with ART CARBON® adsorbent, reinforced with stainless-steel supports and stacked vertically to minimise plant-room footprint.

The unit is connected to the bypass of the main circulation loop, downstream of the sand filter:

1. Booster pump — ensures constant flow through the unit
2. Mechanical pre-filter — captures fines escaping the sand filter
3. Float-type flow meter
4. ART CARBON® reactor columns — microbial capture + combined chlorine decomposition
5. Return to the main circulation loop or the balance tank

Equipped with pressure gauges (PI-1 to PI-5) for continuous monitoring.



# Reference: Municipal Whirlpool, Jablonec nad Nisou

**Bacterial count reduced from 3,000 to 0 CFU/100 ml in 14 days — and held for months.**

A municipal swimming pool in Jablonec nad Nisou (Czech Republic) had persistently exceeded the legal limit for cultivable bacteria at 36 °C (100 CFU/100 ml under Czech Decree 238/2011 Coll.) in its whirlpool despite standard chlorine dosing.

- **Installation:** 11 March 2024
- **Whirlpool volume:** 7 m<sup>3</sup>
- **Bypass flow:** 1 m<sup>3</sup>/h (constant)
- **Result:** Within 14 days, cultivable bacteria dropped below the legal limit. The reduction has held for over three months of continued operation — demonstrably sustained microbial control.

## CFU 36 °C — Before and After ACDeC Whirlpool Installation

|                                           |       |
|-------------------------------------------|-------|
| 2 Jan 2024:                               | 3,000 |
| 16 Jan 2024:                              | 65    |
| 6 Feb 2024:                               | 590   |
| 20 Feb 2024:                              | 9     |
| 5 Mar 2024:                               | 280   |
| 11 Mar 2024 — ACDeC Whirlpool installed — | —     |
| 19 Mar 2024:                              | 0     |
| 2 Apr 2024:                               | 4     |
| 16 Apr 2024:                              | 0     |
| 7 May 2024:                               | 0     |

Reference line: legal limit 100 CFU/100 ml  
(Decree 238/2011 Coll.).

A close-up, low-angle shot of industrial machinery, featuring a large, polished metal pipe with a flange and a valve handle. The scene is dimly lit with a strong blue light source from the left, creating a dramatic, high-contrast effect. The background is dark and textured.

# Technical Specification

Compact. Passive. Maintenance-light.

| Parameter                      | Value                                                  |
|--------------------------------|--------------------------------------------------------|
| • Footprint (H × W × D):       | 1.5 × 1.0 × 1.0 m (for two columns)                    |
| • Connection:                  | Bypass of main circulation loop, after sand filtration |
| • Flow control:                | Booster pump, adjustable to current pool occupancy     |
| • Combined chlorine reduction: | Up to 90 % per single pass                             |
| • Disinfection by-products:    | None                                                   |
| • Electricity consumption:     | Booster pump only (low)                                |
| • Servicing:                   | Once a year — adsorbent replacement                    |
| • Operation:                   | Fully passive, chemical-free, unattended               |

Height applies to a two-column configuration;  
total height varies with pool size and number of columns.

# ACDeC Whirlpool vs. Medium-Pressure UV Lamps

|                               | ACDeC Whirlpool              | UV Lamps                                               |
|-------------------------------|------------------------------|--------------------------------------------------------|
| • Combined chlorine reduction | ✓                            | ✓                                                      |
| • Free chlorine removal       | ✓                            | ×                                                      |
| • Disinfection properties     | Passive — chemical-free      | Active — only water passing through the lamp           |
| • Disinfection by-products    | None                         | Chloroform, bromodichloromethane, dichloroacetonitrile |
| • Electricity consumption     | Booster pump only            | High (continuous lamp operation)                       |
| • Environmental burden        | None                         | Mercury from UV bulbs — specialist disposal            |
| • Increases chlorine demand   | No                           | Yes (processes only part of the flow)                  |
| • Servicing                   | Annual adsorbent replacement | Annual UV bulb replacement                             |

# Economics

## Lower total cost of ownership than UV.

Model calculation for a 35 m<sup>3</sup> children's pool with a 1 kWh UV lamp,  
250 operating days per year:

|                  | ACDeC Whirlpool                     | UV Lamps                        |
|------------------|-------------------------------------|---------------------------------|
| • Electricity    | 240 kWh/year ≈ €45/year             | 6.0 MWh/year ≈ €1,140/year      |
| • Annual service | Adsorbent replacement ≈ €1,030/year | UV bulb replacement ≈ €620/year |
| • Total          | ≈ €1,075/year                       | ≈ €1,760/year                   |
| • Annual saving: | ≈ €685/year                         |                                 |

Higher-power UV lamps increase the saving proportionally.

Prices indicative; CZK → EUR conversion at ~24.3 CZK/EUR, Q3 2025.

# Contact

Interested in ACDeC Whirlpool? We will prepare a tailored proposal for your facility.

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Based on ART CARBON® technology — patented in the Czech Republic (WO2022/152338A1), developed with the Technical University of Liberec.