

What Is a Car Wash Water Reclamation System?

A car wash water reclamation system collects leftover water, treats it to remove contaminants and pollutants, and reuses it for subsequent washes and fresh water rinses.

Here's how a typical car wash water reclamation system works:

1. **Water collection:** The system collects the water used in various stages of the car wash. This includes the initial supply of fresh water and the water that comes into contact with the vehicle and picks up dirt, oils, detergents and contaminants.
2. **Separation and filtration:** The collected water then goes through a series of filtration stages to remove contaminants. This process varies depending on the type of reclamation system.
3. **Treatment:** After filtration, the water may undergo further treatment processes such as chemical coagulation, flocculation, and disinfection to remove remaining impurities and ensure it meets quality standards for reuse.
4. **Storage:** The treated water is stored in tanks or reservoirs until it's ready for reuse.
5. **Recycling:** The recycled water for your car wash is used for pre-soaking, washing, rinsing, and more.

The effectiveness of a water reclamation system depends on its type, design, maintenance and the specific conditions of the car wash operation.

10 Types of Reclamation Systems

Whether you own an automated loop car wash, a self-serve coin car wash, or both, these systems can help reduce water waste and meet your car wash water recycling needs. Here's a look at 10 types of water reclamation systems.

Gravity Settling Tanks

Gravity settling utilizes a car wash water tank that separates solid particles from liquid in a process called sedimentation. These water tanks for car washes use the force of gravity to allow heavier solids to settle at the bottom of the tank while the clarified liquid is allowed to overflow from the top.

Gravity settling tanks are great for removing larger particles, such as sand and gravel, before further treatment stages. This initial purification step enhances the efficiency and effectiveness of other downstream water reclamation processes.

Hydrocyclone Systems

Hydrocyclone systems leverage centrifugal force to separate solid particles from liquids or gasses by directing the water into a spinning chamber. Heavier particles are flung to the outer wall while cleaner water moves toward the center. This separation effect creates two distinct streams: clarified water that spirals upward and concentrated particles that spiral downward into a collection chamber.

By exploiting the differences in particle density and utilizing the magic of physics, hydrocyclone systems excel in removing fine particles that may have escaped initial treatment stages.

Sand Filtration Systems

Sand filtration systems use layers of sand to trap both large and small contaminants as water passes through. When wastewater enters the sand filter, larger particles are caught on the surface, while smaller particles are trapped within the sand bed. Over time, a layer of captured particles forms on the sand's surface, creating a natural filter. The filter is backwashed periodically to dislodge the accumulated particles.

Sand filtration systems are adept at removing debris that collects on car surfaces over time but are less effective for filtering fine particles. But they're cost-effective and pair well with filtration systems that focus on removing fine particles from wastewater.

Activated Carbon Filtration Systems

Also known as carbon filters or charcoal filters, carbon filtration systems utilize activated carbon – a porous material with a large surface area – to remove contaminants from dirty water. It's highly effective at absorbing organic compounds, chemicals, odors, and even some gasses.

Here's how it works:

1. Water passes through an activated carbon filter. Contaminants in the water are attracted to the surface of the carbon particles and are held there by chemical forces.
2. Organic compounds and certain chemicals in the water adhere to the carbon through chemical bonding, effectively trapping contaminants within the carbon structure.
3. Water that exits the activated carbon comes out cleaner with reduced levels of organic compounds and chemicals.
4. Spent carbon is either regenerated through heating or replaced.

Membrane Filtration Systems

Membrane filtration systems use semipermeable membranes to separate impurities from water. They produce high-quality treated water by allowing certain substances to pass through while blocking others.

There are several types of membrane filtration systems:

- **Microfiltration** employs porous membranes to filter out larger particles, suspended solids, and bacteria from water.
- **Ultrafiltration** uses more fine-tuned membranes to remove even smaller particles, colloids, bacteria, and some viruses.
- **Nanofiltration** has smaller pores and can remove divalent ions, organic matter, and contaminants while allowing smaller ions and molecules to pass through.
- **Reverse osmosis** is a highly advanced filtration process employing a semipermeable membrane to remove ions, molecules, and even dissolved salts. It produces highly purified water for a great fresh water rinse.

Chemical Coagulation and Flocculation Systems

Chemical coagulation and flocculation involve adding chemicals to destabilize particles and encourage them to come together and form larger aggregates called flocs.

Coagulants like metal salts are added to the water. These coagulants neutralize the surface charges of particles and destabilize them, causing them to clump together. Then, flocculants — polymers that bind the particles together — are added to create larger flocs of reclaimed wax and other substances and make them easier to filter.

The coagulated and flocculated water is gently mixed or agitated to thoroughly mix the chemicals and evenly distribute the flocs. The flocs are allowed to settle under the force of gravity and are removed as water passes through a filter medium.

UV (Ultraviolet) Disinfection Systems

UV disinfection systems are utilized in everything from reusable water bottles to McDonald's restrooms in Japan. Though UV filtration doesn't filter out particulate matter, it does deactivate or kill microorganisms, such as bacteria and viruses. It's a great final treatment in your water reclamation process.

UV disinfection addresses potential microbial concerns by subjecting the water to intense UV-C light before refilling your car wash tank. The genetic material of any microorganisms is disrupted, rendering them incapable of replicating or causing harm. UV disinfection systems provide consistent water quality and promote a chemical-free and more environmentally conscious car wash operation.

Ozone Systems

Ozone is the naturally occurring molecule in the earth's stratosphere that protects it from the sun's harmful UV rays. It's also highly effective at destroying microorganisms and improving water quality.

Like ultraviolet disinfection systems, ozone filtration systems primarily focus on disinfecting water by utilizing ozone gas's powerful oxidizing properties to neutralize microorganisms and contaminants. It doesn't function like a traditional filtration system designed to physically remove particulate matter or suspended solids from water. But like UV disinfection systems, it's another great option for the final stage of your car wash water reclamation system.

As water enters the ozone system, ozone is introduced into the water stream. It reacts rapidly with organic and inorganic contaminants, disinfecting the water. Ozone systems are particularly beneficial in car washes, as they enhance water quality without adding chemicals, ensuring a safe and thorough wash while minimizing the environmental impact.

Combined Systems

Combination systems offer a comprehensive approach to water filtration in car washes by combining several reclaimed water systems. For instance, a combination system might integrate sedimentation tanks to remove larger particles, followed by activated carbon filtration to adsorb chemicals and UV disinfection to neutralize microbes. By strategically layering these treatments, combination systems create a comprehensive car wash water reclamation system that helps you save money on water and sewage costs, minimize your environmental impact, and meet water recycling regulations.

Benefits of Water Reclamation Systems

On average, a traditional car wash system uses up to 80 gallons of water per wash. However, a car wash water reclamation system, when optimized properly, can reduce average freshwater gallons per wash to about 30-35 GPW. But that's not all water recycling systems offer.

Reduces Water Usage and Sewer Costs

Rather than continuously drawing from external water sources for every wash cycle, the treated water is recycled and repurposed, substantially diminishing your demand for fresh water and significantly reducing overall water consumption. This leads to lower overhead water costs and less pressure on the municipal water supply.

The reduced wastewater flow corresponds to lower sewer charges, especially if your charges are based on the volume of water you discharge. Some regions may even incentivize businesses to demonstrate responsible water usage and environmental commitment, saving you more money.

Ensures Compliance With Environmental Regulations

Environmental regulators often impose strict limits on the quality of water that can be discharged into the environment or sewer systems. Depending on the cleaning products your car wash utilizes, your wastewater may contain chemicals, detergents, or other contaminants that your local, state, or federal government has deemed harmful to the environment. Before the wastewater can be discharged, it must be treated.

By treating and purifying your wastewater, water reclamation systems prevent harmful substances from entering the environment or sewer systems and guarantee that discharged water meets or exceeds the standards outlined by applicable environmental regulations.

Extends the Life of the Car Wash Equipment

Water reclamation systems offer significant benefits that extend the lifespan of your car wash equipment:

- **Contaminant removal:** Reclamation systems filter out particles, safeguarding equipment from abrasion and damage caused by contaminants.
- **Chemical management:** Clean, treated water from reclamation prevents chemical buildup, preserving equipment surfaces and longevity.
- **Corrosion prevention:** High-quality water minimizes corrosion risk, preserving metal components and prolonging equipment life.
- **Optimized Performance:** Clean water helps components work efficiently, reducing wear and tear and ensuring longer equipment life span.
- **Maintenance frequency:** Cleaner water reduces clogs and other problems, decreasing maintenance needs and extending equipment life.

Contributes to a Smaller Ecological Footprint and Reduces Pollution

Car wash water reclamation systems significantly reduce the ecological footprint and pollution associated with car wash operations. By embracing a circular approach and reusing water, these systems lower the demand from local sources and reduce strain on city water resources.

Moreover, these systems actively combat pollution by treating and removing contaminants and detergents from wastewater before reuse or discharge. This prevents harmful substances in dirty water from entering nature preserves, aquatic habitats, and sensitive local ecosystems.

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