WATER SAVER

Water Saver: state of the art water purifying.

ceccato
live bright

It is best to purify.

The purifying of waters is not only a legal obligation, but a precise duty towards the environment, towards ourselves and our future. Respect the environment starting from the awareness that water is life and to waste it is a real crime: this must be the mutual objective.

Purifying, recycling and treatment of the waters - to reduce the necessary amount and improve its quality, at inlet and outlet - are integrating phases of the work cycle of a modern washing system: both because imposed by increasingly restrictive laws, and because an efficient purifying system significantly contributes to improving the detergent and energy performances.

Purifying is worthwhile.

Purifying **essentially means improving the quality of waste water** coming from car washing before draining into the sewer system or in superficial waters, with the possibility of **recycling or reusing as much as possible in the washing system**; it also means decreasing the polluting load before introducing the waste water inside city sewer systems.The correct treatment of the primary waters improves the same quality of the washin: **in fact, a less hard water with reduced percentages of mineral salts and metals, enables decreasing the amount of necessary surfactants;** assures greater homogeneity of the final result; drastically reduces the environmental impact.

The drain waters compliant to law. And conscience.

The drain waters of a car washing system contain, as well as the substances washed from the vehicles, a consistent amount of shampoo, hydrocarbons, waxes, iron, zinc and lead.

The modern designing technologies of the systems improve their efficiency, reducing the chemical substances used to a minimum. However, the polluting load remains above the legal limits, for draining in superficial water or sewer system and, in particular, above to what the environment can support.
This is why purifying is also a matter of ethics.

The water recycling: the honest truth.

"Recycle" or "recirculation of washing water are expressions that must be clarified. With the different technologies available today, it is not possible to recycle 100% of the water: it is a promise that Ceccato does not make for now.
We are very clear about it, based on a consolidated experience.

A water recycle system is adapted to high pressure washing systems, that can use over 400 litres of water per car.

In fact, the recycled water can only be used in the initial part of the pre-washing. Dematerialised or fresh water is used for rinsing..

In the best case, a recycling of 80% can be reached. If wanting to obtain optimal results with regard to washing and full efficiency duration of the system. Naturally.

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Parameter		Medium drain				Examples of legal limit - Italy		
		Brush gantry	Touchless gantry	Self service bay	Lorry wash	Superf. waters	Sewage	soil
pH		6.3 - 7.6	6.3 - 7.6	6 - 7	6.3 - 7.6	5.5 - 9.5	5.5 - 9.5	6 - 8
Tot. susp. Solids	mg/l	160	160	120	170	80	200	25
BODS	mg/l	140	145	180	135	40	250	20
COD	mg/l	280	280	300	270	160	500	100
Tot. hydrocarbons	mg/l	10	10	15	18	5	10	-
Tot. surfactants	mg/l	18	20	25	25	2	4	0.5
Iron (Fe)	mg/l	5	5	5	5.2	2	4	2
Zinc (Zn)	mg/l	0.6	0.6	0.6	0.7	0.5	1	0.5
Lead (pb)	mg/l	0.1	0.1	0.1	0.1	0.2	0.3	0.1

Water Saver: the value of experience.

We have been manufacturing purifying systems for more than fifteen years.

We design them together with our gantries, tunnels and washing bays, which are, to all effects, integrating part. Our Water Savers enable complying with the most severe environmental Standards and assure important competitive advantages in terms of working costs and energy saving.

The Water Savers are the result of the continuous research activity and represent the synthesis of our way of being a solid and responsible company. On all fronts.

A complete range of solutions.

Our Water Savers cover all market needs, from the small car washing to the areas equipped for the cleaning of large transport means, even simultaneously:

- **systems for treating primary waters and improving the water at washing system inlet;**

- **systems that treat the outlet water depending on parameters complying with legal limits and enable the recycling of drain water in the washing system;**

- **systems that separate sand and oils from the first rain waters, meaning that which falls within the first 15 minutes, homogeneously, on the draining surface.**

The importance of choosing Ceccato.

To choose Ceccato Water Savers means assuring **10 great advantages.**

1 integration
The purifying system is designed made-to-measure for the gantry, the tunnel or the Ceccato bay: so that all performances are naturally optimised.

2 more efficiency
An optimal purification makes the system work better and enables increasing the washing quality.

3 reduced maintenance
It is a natural consequent of full integration with the washing system: the system requires reduced and easily manageable maintenance interventions.

4 system duration
A Water Saver purifying system extends duration of the system, thus reducing the amortisation and working costs.

5 qualified and full service
All the experience of Ceccato at your service: for preliminary study, the designing of the tanks, the organisation of the washing bays, the installation, the start-up, the formation and the adjustment. Also for the formulation chemical products most suitable for your system.

6 energy saving
Reduced water and detergent consumption also entails a decrease in the system energy need: an immediately verifiable convenience.

7 tax saving
To respect the environment is also worthwhile economically: who installs the Water Saver purifying systems complies with the most severe international Standards and benefits from tax incentives established in the country of installation.

8 competitiveness (on costs with other washing areas)
The optimisation of the working costs, the energy and tax saving make the washing systems purified with Water Saver perfectly competitive.

9 profitability
A washing area equipped with Ceccato Water Savers and systems enable higher profit margins, for a wider range of time: basically, the squaring of the circle.

10 single correspondent
Ceccato is able to deal with all aspects linked to washing, of primary and waste waters, placement and maintenance of the buried tanks: for a simpler full management, from designing to maintenance.

Choosing to associate a Water Saver to ones own Ceccato washing system means preferring a concrete and visionary partner: able to undertake global responsibility of the system functioning and to accompany the customer into the future, made of efficient and sustainable solutions.

Recommended purifiers.

PURIFIER CODE	DESCRIPTION	SYSTEMS								
		PHOENIX TECH	HYDRUS TECH	PEGASUS TECH	HYPERION TECH	HERCULES	BALTIC	EASY	LABRADOR MAX 3 P.	LABARDOR MAX. 6 P.
Drain in sewage collector										
B/3a	Physical treatment 4.5 mc/h with carbons and quartzite column	•	•	•	•		•	•	•	•
B/6a	Physical treatment 7 mc/h with carbons and quartzite column					•				
Bio 3 B	WS Bio 3B buried biological	•	•	•				•	•	
Bio 5 B	WS Bio 5B buried biological				•		•			•
Bio 10 B	WS Bio 10B buried biological					•				
Drain in recycle and sewage collector										
B/3b	Physical treatment 4.5 mc/h with carbons and quartzite column + oxygenation kit	•	•	•	•		•	•	•	•
B/6b	Physical treatment 7 mc/h with carbons and quartzite column + oxygenation kit					•				
Bio 3 B/Q	WS Bio 3B/Q buried biological kit with 0.6 kW pump	•	•	•				•	•	
Bio 5 B/Q	WS Bio 5B/Q buried biological kit with 0.6 kW pump				•		•			•
Bio 10 B/Q	WS Bio 10B/Q buried biological kit with 1.5 kW pump					•				
Drain in superficial waters without recycle										
Bio 3 B/C	WS Bio 3B/Q buried biological kit with 0.6 kW pump	•	•	•				•	•	
Bio 5 B/C	WS Bio 5B/Q buried biological kit with 0.6 kW pump				•		•			•
Bio 10 B/C	WS Bio 10B/Q buried biological kit with 1.5 kW pump					•				
Drain in superficial waters with recycle										
Bio 3 B/QC	WS Bio 3B/QC buried biological kit + WS Bio 3 kit with 0.6 kW pump	•	•	•				•	•	
Bio 5 B/QC	WS Bio 5B/QC buried biological kit with 0.6 kW pump				•		•			•
Bio 10 B/QC	WS Bio 10B/QC buried biological kit with 1.5 kW pump					•				
Drain with particularly restricting limits with or without recirculation										
Bio 3 B/QCC	WS Bio 3B/QCC buried biological kit + WS Bio 3 kit with 0.6 kW pump	•	•	•				•	•	
Bio 5 B/QCC	WS Bio 5B/QCC buried biological kit with 0.6 kW pump				•		•			•
Bio 10 B/QCC	WS Bio 10B/QCC buried biological kit with 1.5 kW pump					•				
Purifiers for Northern Europe										
Special	Standard kiesfilter	•	•	•	•			•	•	•
Special	Kiesfilter with pH and conductivity regulator	•	•	•	•			•	•	•
Special	Kiesfilter with pH regulator	•	•	•	•			•	•	•
Special	Kiesfilter with conductivity regulator	•	•	•	•			•	•	•

• **To be checked case by case**
• **Advised against feeding add-osmosis sys. with recycled water**

The secret is in the water.

The primary waters: know, analyse, treat.

The washing efficiency, the optimal functioning and the system duration depend from the inlet water.Too many mineral sales contrast the action of the washing and drying chemical products. They also cause stains and streaks on the vehicles bodywork. **This is why it is essential to analyse the waters from the main system, well or other source.** Depending on the results, to compensate the lacking in water quality, it is possible to define the necessary treatment and install the most suitable system.
The water supply must have the features summarised in the table:

Parameter		Tunnel – Gantry Industrial systems	Bays
pH		6 - 8	6 - 8
Hardness	°F	< 30	
TDS (tot. salinity)	mg/l	< 3000	< 1500
Tot. suspended solids	mg/l	< 15	< 10
COD	mg/l	< 200	< 160
Tot. hydrocarbons	mg/l	< 5	
Tot. surfactants	mg/l	< 2	
Tot. chlorine	mg/l	-	< 0.1
Iron	mg/l	< 2	< 0.05

Notes relating to the table:

Hardness: expresses in French degrees (F°) the content of salts - calcium bicarbonate, magnesium bicarbonate and calcium sulphate - and measures the amount of ion Ca++ and Mg++. At environmental temperature, the calcium and magnesium bicarbonates dissolve in water but, at high temperatures, they drop forming limescale.

Totally dissolved solids (TDS): it is the measure of all minerals contained in the water: not only calcium and magnesium (hardness factors), but also zinc, copper, chromium, selenium, etc. Usually, if the hardness degree is high, so is the TDS. High concentration of dissolved salts can stain the vehicle.

Total suspended solids: the data usually associated to water turbidity measures, indicates the solids present that must be filtered through energetic mechanical processes. In large amounts, the suspended solids precipitate, blocking piping and reducing washing efficiency. With an osmosis system, attention must be paid: solids larger than 5 micron would risk irreparably damaging the membranes.

COD = "chemical oxygen demand": the value expressed in milligrams per litre, represents the amount of oxygen necessary for oxidation of the organic and non-organic composites, present in a sample of water. It measures the degree of water pollution by the oxidisable, mainly organic, substances.

Hydrocarbons: these organic composites contain only carbon and hydrogen atoms.

Silica and chlorine: high silica and chlorine values can jeopardise the membranes used in the osmosis process.

Iron: The iron present in the water deposits in the piping and gradually blocks them. It also favours corrosion of the systems.

The primary waters treatments.

PRE-FILTERING Excess of suspended solids.
The cartridge **enables different filtering degrees**, from 50 micron to 5 micron, and it is usually made of polystyrene or similar, also resistance to aggressive composites. It must be washed and restored at regular intervals, until normal replacement.

DE-IRONING Excess iron.
Iron is one of the most difficult contaminants to remove, as it can change valency and switch from soluble state (Fe++) to insoluble state (Fe+++). If oxygen or oxidising agents are placed in the water, the iron oxidises and precipitates. The colour can vary from straw yellow to red-brown, depending on the concentration. Iron can clog piping, trigger or accelerate corrosion, dirty or pollute ion exchange resins in the softening systems, drastically reducing the life cycle.
The de-ironing systems **eliminate the iron in solution** using the specific catalysts resins (Birm) sensitive to the oxygen contained in the water to be treated. **The dissolved oxygen oxidises the iron, whereas the birm improves the reaction between dissolved oxygen, iron and manganese**. Birm is produced through activation, until saturation, of the manganese salts on an aluminium silicate sand. Chlorination reduces its efficiency and lowers its catalysts properties.
A routine washing - which frequency is linked to the amount of iron present and the consumed water - eliminates the iron withheld by the equipment.

SOFTENER Excess hardness.
The removal of the dissolved solids requires specific treatments that eliminate only particular ion (Softeners), or treatments that eliminate all ion with the same mark or all in general (osmosis).
The softener uses the calcium and magnesium ion exchange with sodium ion, making the water to be softened flow on to a ion exchange resin bed. The resin is often a styrene and divinylbenzene polymer placing groups of SO3 sulfonate - on its own structure. The sulfonate groups are linked to Na+ sodium ion, exchanged with calcium and magnesium ion present in the water. The resins are then re-generated through treated with concentrated brine (salty water with sodium chloride), that restores the sodium ion on the surface.

OSMOSIS Excess of Dissolved salts.
The osmosis is a natural process with which dissolved or lighter solutions change into more concentrated solutions, through semi-porous membranes; soft water tends to permeate through an osmotic membrane, to mix with a marine or brackish water solution. The flow through the membrane stops when the two liquids reach a balancing point; the pressure difference between the two liquids is called "system osmotic pressure".
The reverse osmosis inverts the direction of the flow. By applying a sufficiently high pressure to the concentrated solution (greater than its osmotic pressure), a reverse flow is obtained into the semi-permeable membrane and, therefore, the salts and dissolved solids are separated.
Usually, **the membranes used in the osmosis are in polyamide**, permeable and almost impermeable to dissolved impurities, including salt ion and other molecules that cannot be filtered.
Certain substances in the washing systems can prematurely damage the membranes: for example, free chlorine, oily substances, micro-organisms and suspended solids.

CARTRIDGE FILTERS
The membranes are protected from the suspended solids with 5 micron "wire" filters, installed upstream. Other concentrations (>10 mg/l) of suspended solids at inlet, also require **pre-filtering**.

The drain waters: recycle, reduce, purify.

As well as substances washed from the vehicles, the water drained from a car washing system contains shampoo, hydrocarbons and waxes. The modern designing technologies e**nable optimising the systems efficiency** and reduce the amount of chemical substances used to a minimum, but the polluting potential remains above the legal limits for the draining in superficial waters (channels, rivers or lakes) or in public sewage systems. .

If the **purifying of water** before draining remains essential, it is just as important **to reduce the amount, recycling as much as possible and reserving fresh water for the final phases only**, fundamental for the quality of the washing.

The table summarises the minimum parameters to check before draining.

Analytical test		Method	Analytical values	Limits Dlgs. n° 152 Tab. 3 All.5	
				Drains in superficial waters	Drains in public sewage
pH		APAT IRSA-CNR 04		5.5 - 9.5	
Materials in suspension	mg/l			80	200
COD	mg/l			160	500
Total surfactants	mg/l			2	4
Total hydrocarbons	mg/l			5	10
Iron	mg/l			2	4
Zinc	mg/l			0.5	1
Lead	mg/l			0.2	0.3

Notes relating to the table:

PH.Measures the concentrations of ion H+ and OH- of a solution, defining the acidity or basicity.
The term pH (Potential of Hydrogen) is defined as: pH = -log10 [H+] in neutral solution at 25°C (meaning the logarithm of the ion concentration H+). The pH scale oscillated from 0 to 14. With values below 7 the solutions are acid; with values above they are basic; if pH is equal to 7, they are neutral (e.g. distilled water).

Suspended sediment (total suspended solids: Indicates the amount (in milligrams/litre) of suspended solids. The suspended solids, therefore not dissolved in water, can be settleable or suspended.
The suspended solids tend to voluntarily separate from water for gravity. The sedimentation time depends on specific weight of the particles and their dimensions (sand, iron oxide). The suspended solids can only voluntarily separate from water after long periods of time, or not at all (fine clay, fine impurities, organic solids in general like soaps, rubbers, glue, etc.). It is the case of the colloidal solids.

COD = "chemical oxygen demand":t he value expressed in milligrams per litre, represents the amount of oxygen necessary for oxidation of the organic and non-organic composites, present in a sample of water. It measures the degree of water pollution by the oxidisable, mainly organic, substances.

Hydrocarbons: These organic composites contain only carbon and hydrogen atoms.

Iron: The iron present in the water deposits in the piping and gradually blocks them. It also favours corrosion of the systems.

The drain waters treatments.

SAND TRAP

It removes sand and inert solid materials, normally heavier and larger than organic materials, which could cause wear of mechanical parts or accumulation of aggregates for the subsequent sections of the unit. **The process exploits the force of gravity for separation. Therefore the liquid to be treated needs to flow at low speed**. Once the solids are separated, they will be removed from time to time.

DEGREASER

It removes sand and inert solid materials, normally heavier and larger than organic materials, which could cause wear of mechanical parts or accumulation of aggregates for the subsequent sections of the unit. The process exploits the force of gravity for separation. Therefore the liquid to be treated needs to flow at low speed. Once the solids are separated, they will be removed from time to time.

BIOLOGICAL

The process is based on **the natural purifying action of micro-organisms**, capable of destroying organic substances (the main constituents of surfactants) and of assimilating inorganic substances (nitrogen, phosphorus, iron, copper) present in the polluted water. With a sufficient amount of dissolved hydrogen blown through blowers enhances the development of aerobic bacteria; anaerobic bacteria, at the base of fermentation processes, would create bad smells..
Differently from the traditional biological "active sludge" process, **in this case a biological "adherent film" process is applied; namely, the formation and growth of a biofilm (of bacteria) is enhanced on bodies filled with high specific surface plastic material**.
Thus **obtaining greater purifying efficiency per volume unit and greater resistance to significant hydraulic load variations**. The process does not require a sedimentation basin: simplifying the unit. The biofilm, detached from the support in order to exchange the young micro-organisms, is filtered or sorted in the first sand trap tank, where is settles at the bottom.

QUARTZ FILTER

Composed of a pressurised column filled with a bed of quartzite (silicon dioxide) of various sizes. It retains the suspended solids up to 90 microns. Bit by bit that the solids are retained, the filtering degree increases, as well as the internal pressure (measured with the pressure gauge installed on each filter). **The almost daily counter-wash of quartzite with clean water is used to cleanse the filtering material and bring the pressure back to optimal values.**
The water flow is from the top to the bottom during work, whereas the flow of the counter-wash is from the bottom upwards. At the end, an equal-flow phase enables emptying of the filter. The counter-wash water plus the draining water are sent back to the sand trap tank.

ACTIVE CARBON FILTER

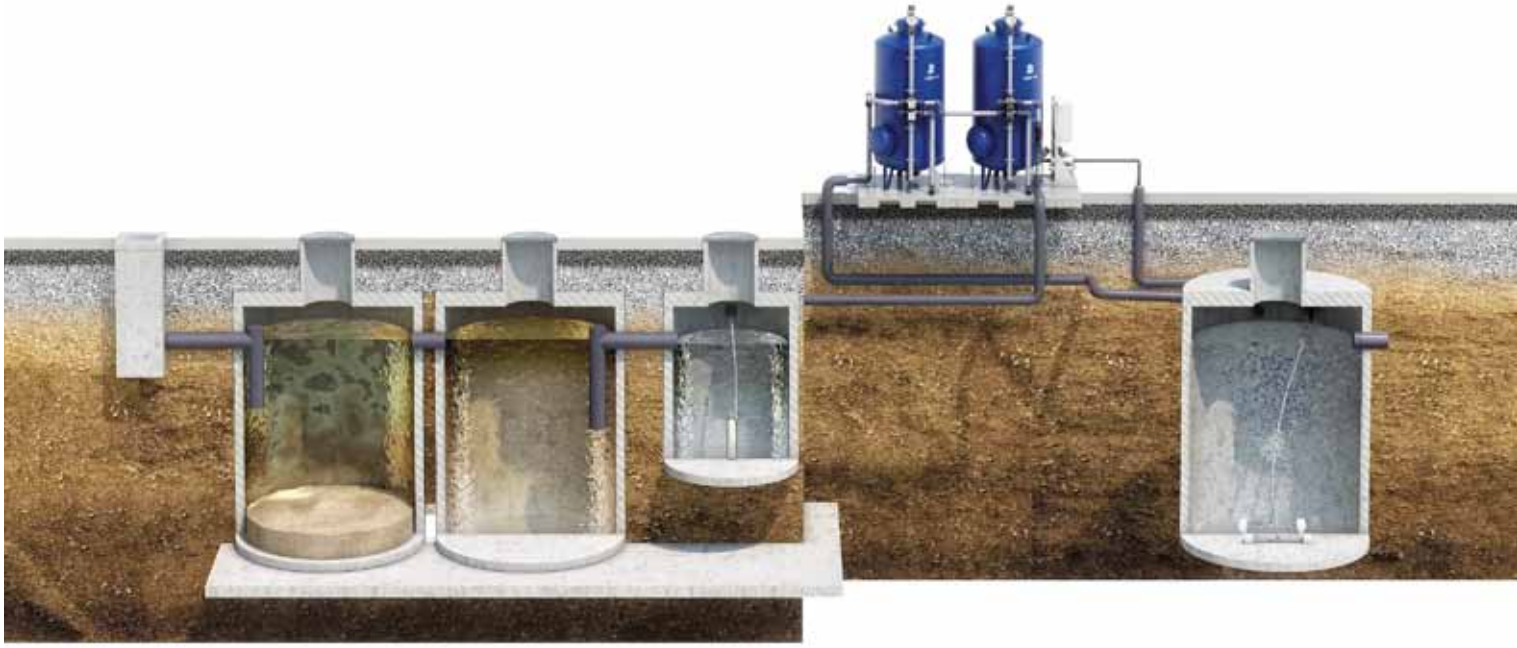
Adsorbs traces of chlorine, hydrocarbons, surfactants not previously retained. The filter layer is made up of a mineral-type granular carbon with high dechlorination and adsorbent capacity. The lower bed is made up of quartz sand of an adequate grain size. Chemical adsorption is irreversible. Therefore the carbons must be replaced from time to time. **The daily counter-washing eliminates the held solids and bring the internal pressure back to regime**.

CHEMICAL TREATMENT

The water is purified using chemical products that help aggregation and precipitation of the fine particles in heavy and settleable flakes.
The flocculant coagulates and makes the polluting agents heavier, the polyelectrolyte aggregates the flakes to facilitate sedimentation, the soda corrects the pH to basic ambient to optimise the efficiency of flocculation. **This is how suspended solids not sediment, surfactants, hydrocarbons, iron, lead, zinc are treated**. **The resulting chemical sludge must be disposed of as special waste**.

A close-up of the treatments.

Physical treatments.



THE PROCESS

The pressure filtering on quartzite and active carbon enables eliminating solid residues with greater or equal dimension to 90 micron and most of the surfactants, waxes and heavy metals.
The drain water is firstly pressure pumped through quartzite filtering beds with variable granulometry, then through active carbon beds with high absorbing power, that irreversibly withhold organic polluting agents and heavy metals.
The active carbons must be periodically replaced and disposed of, whereas the supply tanks and drain of the filters must be aired using a blower to avoid bad smells.

These treatments are ideal for medium-small washing systems that drain into public sewage systems, or when the re-use of water is requested during initial washing phases.

THE ADVANTAGES

Reduced clearance and easy management are the two main advantages.
These purifying systems are less sensitive to external temperatures than biological ones.
They do not suffer the presence of eventual aggressive polluting agents that might kill the bacteria colony.

Biological - Physical treatments.

THE PROCESS

An aerobic and fungi bacteria biomass forms on the filling bodies surface, usually of plastic and shaped so as to present maximum surface volume ratio. Air must be introduced through blower for the sustainability of the aerobic bacteria and for full oxidation and mineralisation of the biodegradable substances, which ion and wax surfactants. The inert sludge detaching from the filling bodies is thickened inside the sand trap tank and drained at regular intervals.

The purifying "motor" is made of bacteria, meaning living organisms, that must be accurately managed.
In particular, minimum draining must be guaranteed to feed the floral bacteria; the water temperatures must not be too low; **do not introduce substances too aggressive** (bacterial acid, products for chemical washing, paraffin strippers, hypochlorite sterilisers).
To bring the system to regime - create biomass - a week's starting is required. The operation can be accelerated with suitable enzymes, but only in the first few days, to avoid growing of unwanted competitive bacteria. To prevent bad smells caused by anaerobic fermentation of the sewage, suitable and constant airing is required.

THE ADVANTAGES

These adherent biomass purifying systems exploit the bio-degradability of the chemical substances used in washing; they are installed in concrete or resin glass buried tanks and have average working costs.

Chemical - Physical Treatments.

THE PROCESS

Thanks to the addition of particular chemical products, the sedimentation process breaks down the polluting agents and transforms them in stable sludge. T**hese systems are used for medium-large systems, with draining in public sewage or superficial waters**. They can be supported by safety filtering on carbon. The drain water is added with aluminium and anionic and cationic polyelectrolyte based precipitating products, liquid or powder, mixed using a low revs static mixer and introduced in a contact tank where the sludge matures. These precipitate for gravity, to then be drained at regular intervals in appropriate draining bags. The high management costs due to disposal of the chemical sludge and management of the chemical products almost always today advise against use.

THE ADVANTAGES

The purifying systems based on a chemical process are versatile and adjustable in real time on the drain requirements of the washing system.

Chemical - Physical Treatment for Northern-Europe .

THE PROCESS

The treatment allows the separation of the organic substances (surfactants) from waste; the action is facilitated by the introduction of air through blower, that also prevents the forming of bad smells. The water flows through a quartzite filter that eliminates the bad smells greater or equal to 90 micron. Subsequently, it is re-used in the washing system. **Automatic pH check and correction and conductivity of recycle water are available upon request**.

THE ADVANTAGES

This purifying system is conceived for Northern Europe where low mains water consumptions are requested, the drain limits are less restrictive and where biological purifiers are advised against, unless adequately insulated.
The system is DIBt certified (German Institute for Construction Technique).

BURIED TANKS SYSTEM

A buried tanks system, usually in reinforced concrete, is combined to every purifying system.

These tanks have three objectives:

- **guarantee a drained water storage bag for the flexible management of the capacity peaks;**
- **allow the elimination of sand and soil coming from the washing;**
- **allow the elimination of the hydrocarbons**.

The correct dimensioning of the tanks requires a water retention test for each of at least one hour.

First rain waters treatment.

THE PROCESS

Filling stations, workshops, bodywork, and all installations that are part of category "C" must, according to Standard of reference, separate the first rain waters from those of second rain; an adequate treatment system must also be arranged for first rain waters.

The first rain waters are those that evenly fall in the first fifteen minutes on the draining surface; they correspond to a precipitation of about 5 mm.

The treatment system is made of a drain well to separate the first and second rain waters, of a sedimentation tank **for the separation of sands, and of an oil** and grease removal tank with coalescence filter, for the separation of oils.

THE ADVANTAGES

Ceccato is able to supply treatment systems adequate for the different operational realities and requirements of every type of customer, independent or combined with eventual purifying systems of waste coming from the washing systems.

More than cleaning.
The Ceccato path.

The process has been started and can no longer be stopped as everyone is involved for years, at every level, making us all protagonists of a mutual set-up, leading us to a progressive transformation - aesthetical and functional - of our products.

To manufacture the most efficient and effective systems is important, but no longer enough.

Today vehicles cleaning is a determining but partial aspect of a system integrating actions between them, that aim at a delicate, but ever more strategic, balance: that of sustainability.
For example, sustainability of the materials used to manufacture the systems, with the progressive abandoning of plastics; design sustainability: to make the systems better looking and re-qualify urban spaces; sustainability of an increasingly more rational production cycle: to also reduce the transporting of raw materials and CO_2 emissions.

Environmental sustainability and corporate sustainability in a world that is quickly changing the game rules, must go side by side: one can no longer exist without the other.

The concept of efficiency is also drastically changed: which is more efficient between a system giving brilliant results with regard to cleaning of the vehicles but that consumes a lot of water and energy and produces highly polluting waste, or a system that on equal detergent performance, saves electric energy, enables recycling most of the water and reduces or even eliminates the polluting percentage of drain waters?

Us of Ceccato have no doubts. And you?

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