

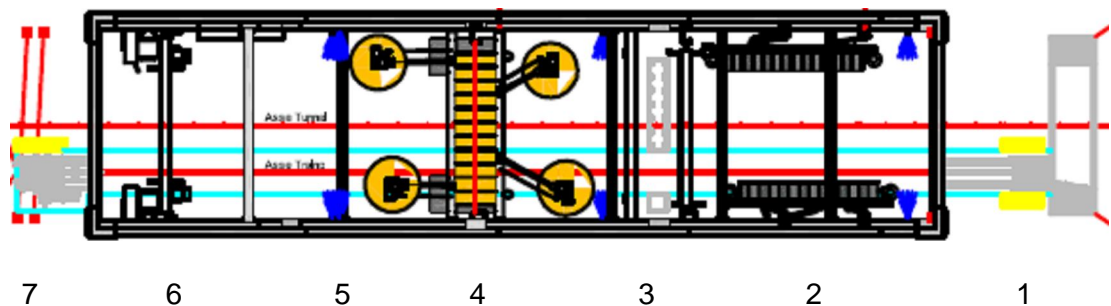
# HERCULES



**Hercules** is a tunnel washing system suitable to perform up to 60 cars/hour (Turbo Evolution Model) or up to 90 cars/hour (Translating Model).

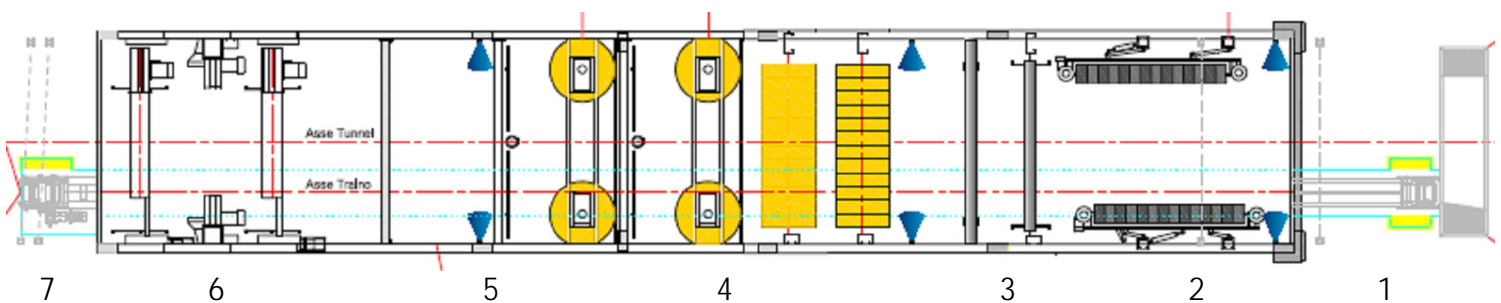
The system allows the configuration of a very wide range of different washing tunnels. Hercules tunnels could be subdivided into the sections as shown in the figure herein below:

### *Hercules Turbo Evolution (up to 60 cars/h)*



1. - Entry Pre-wash - 2. Wheel-wash - 3. High Pressure - 4. Brushes (Turbo) - 5. Wax - 6. Drying - 7. Exit

### *Hercules Translating (up to 90 cars/h)*



1. Entry Pre-wash - 2. Wheel-wash - 3. High Pressure - 4. Brushes - 5. Wax - 6. Drying - 7. Exit

## DESCRIPTION OF THE MACHINE

### ENTRY SECTION

- Compulsory equipment:
  - Push button panel with card reader
  - Wheel correlator
  - Traffic lights
- Options
  - Magnetic card reader
  - Roller type wheel correlator
  - Wheel correlator with sliding plate
  - Front cladding with traffic lights
  - Illuminated front cladding with traffic lights
  - Entry barrier

### PRE TREATMENT SECTION

- Options
  - Stationary pre wash cleaner arch
  - Contour following pre wash cleaner arch
  - Contour following high pressure arch
  - Fast wheel wash
  - Underchassis wash
  - Rocker panel brushes

### BRUSH STATION

- 5 - Brush group:
  - 2 Pair of translating side brushes + Stationary top brush
  - 1 Pair of translating side brushes + 1 translating side brush conveyor side + 1 translating side brush opposite side + Stationary top brush
  - Brush station "Turbo Evoluzione 2006".
- Options:
  - Additional stationary top brush
  - Additional translating top brush

### PRE - DRYING SECTION (OPTION)

- Super wax arch
- Wax illuminated arch
- Felt separation curtain

### DRYING SECTION

- Drying group
  - High capacity dryer 2x11 Kw+7.5 Kw
- Option
  - Additional high capacity top dryer 7.5kW
  - Drying group type "Turbo Evoluzione 2006":
    - 2x4 kW + 2x7,5 kW or 2x4 kW + 2x11,5 kW

### EXIT SECTION

- Compulsory equipment
  - exit traffic lights
- Options:
  - Front cladding
  - Illuminated front cladding

### CONVEYOR

- Conveyor modules
  - 3 meter
  - 1.5 meter
  - 0.75 meter
- Motorgear and motor:
  - Motor gear with orthogonal axis and inverter kW
- Options:
  - Chain washing device
  - Chain lubrication device
  - Pre-conveyor

### CLADDINGS AND ROOF

- Tunnel gates or roller shutters
- Fibreglass side enclosures 'Deco'
- Glass and aluminium side panels
- Fibreglass roof (not suitable to walk on)
- Polycarbonate roof (not suitable to walk on)
- "Hercules" claddings

### FEEDING PUMPS

- Under chassis wash pump, 3 kW for clean water
- Electropump to feed the tunnel system, 1.5 kW for recycled water
- Electropump for contour following high pressure wash, 18.5 kW

## General features

### Structure and frame

- Self-supporting structure, fixed to the floor with expanding dowels.
- Frames of quality steel, hot dip galvanized or of galvanized steel sheet, with all visible screws and self-locking nuts of “inox” steel.
- Painted with polyurethane powders, deposited electro statically and polymerized into an oven at high temperature.

### Electrical equipment and main switchboard

- the electrical system is manufactured according to the European norms in force
- all components used are of high quality, supplied by leading manufacturer.
- the system is controlled through a programmable logic control (PLC)
- the cycle counter is protected by password
- each electric motor is individually protected against overload and short circuit.

### Hydro-pneumatic equipment

- pneumatic circuit equipped with pressure switch
- double water connection, prepared for feeding the washing tunnel with recycled water and with fresh water
- manual flow regulator fitted on every of distribution arch
- automatic discharge of the condensate from the inlet air filter.

### Chemical products dosing system

Pneumatic dosing Pumps, with adjustable capacity for the delivery of:

- Shampoo, wax and Snow-shampoo as standard equipment.
- Super wax, Pre-wash chemical (emollient) as an option.

### Frost protection

The washing unit is equipped with suitable electro-valves for the discharge of the water circuit, against possible freezing in winter.

# Main components

## Conveyor System

The conveyor system is embedded at floor level. Starting and stopping of the conveyor are carried out automatically.

The push rollers are equipped with toe protection devices to prevent the introduction of the foot under the roller.

The conveyor frame is without wheel guides and is equipped with a new type of "covered" towing chain which improves the dragging of the vehicles with low-profile tires.

A wheel correlator system and a roller positioning device are installed on the conveyor entry side to facilitate the introduction of the vehicle.

The conveyor chain is driven by:

Gearbox with inverter, with a capacity regulation range of 60 to 120 vehicles per hour.

## Translating brushes

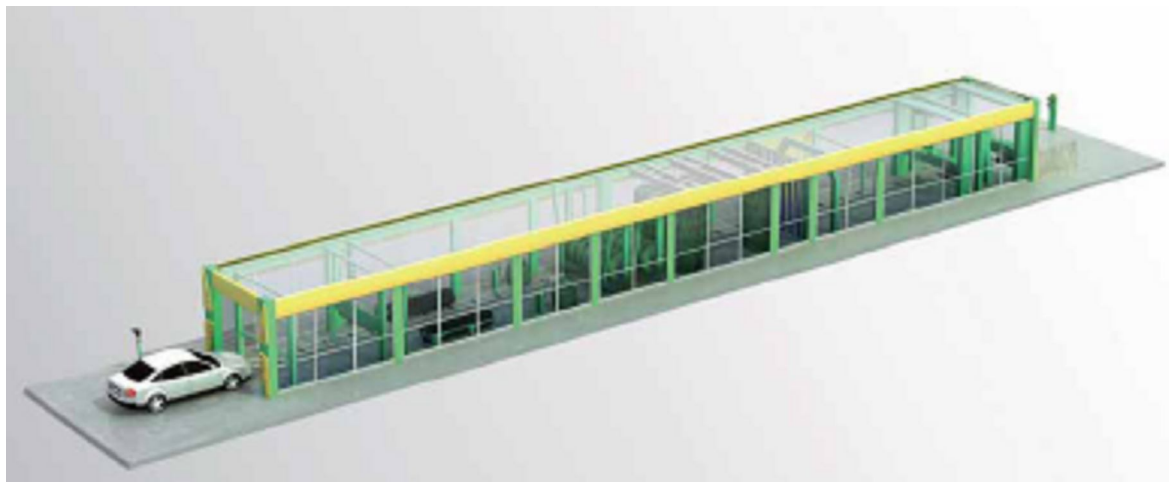
It is the main group of the washing tunnel.

The translating system allows to increase the throughput capacity and to achieve an high wash quality.

It is equipped with one or two pairs of vertical brushes and one top brush. The vertical brushes are mounted on trolleys, driven by electric motor and transmission chain, and can move crosswise in relation to the direction of the vehicles.

The crossbeams supporting the trolleys of the vertical brushes can slide longitudinally on suitable guides and carry out a "translating" movement, following the vehicles.

This system improves the washing action on the whole surface of the vehicle, as it increases the brushes contact time with the vehicle surfaces. The most important advantage of the system is an accurate brush washing of the front and rear ends of the vehicles, without stopping the conveyor.



## Description of the brush washing cycle

### Side brushes

When the vehicle reaches the brush station, the first pair of vertical brushes will wash the vehicle front, then open to wash the sides and finally close to wash the rear end.

At the same time the group "translates" i.e. it follows the vehicle.

The second pair of vertical brushes carries out the same movements washing front, sides and rear of the vehicle. At the end of the cycle both groups move back to the starting position and wait for the next vehicle.

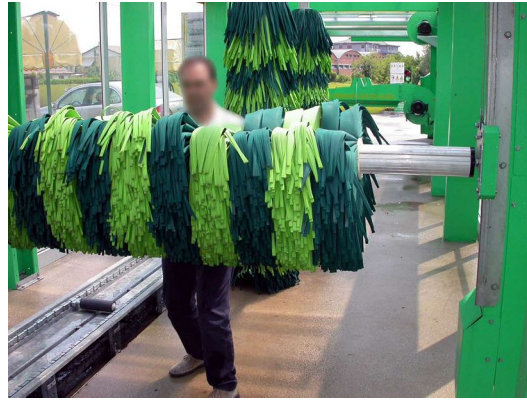


### Fixed Top Brush

The top brush group is stationary and the brush vertical movement is controlled by a counterweight and chain system.

The working pressure is controlled by power absorption.





## 5-Brush Unit “Turbo Evolution”

It is the main group of the washing tunnel.

It is equipped with 4 vertical brushes to wash the front, the sides and the back of the vehicles and with one top brush to wash the front, the roof and the back.

The side brushes are supported by pivoting arms which are hinged on the top cross beam and can follow in a very effective way the shape of the driving-through vehicles.

In order to maintain a uniform washing pressure on the vehicles surfaces, the side brushes are equipped with a tilting system. This feature allows to absorb all irregularities and protuberances (rear mirrors).

The inclination of the brush cannot exceed a pre-set angular value; if this happens, the safety sensors will be activated, starting the side brushes opening cylinders.

When the vehicle reaches the brush station, the first pair of vertical brushes will open on the vehicle front, then wash the sides and finally close on the back and washing it very effectively, due to the brushes direction of rotation.

The second pair of vertical brushes carries out the same movements to wash the front and the sides. Also in this case the direction of rotation improves the adherence of the brushes to the surfaces of the vehicle.

The first and the second vertical brush pairs are washing the vehicles' sides with opposite rotation (climbing the first brush pair, counter-rotating the second one) to obtain a “cross wash” and therefore a better cleaning of the vehicles.

The top brush group is stationary and the brush vertical movement is controlled via a counterweight and chain system. The working pressure is controlled by power absorption.

## Drying Group

It is the last station of the tunnel. The self-supporting structure of the drying unit is made of folded steel elements, connected with beams and stainless steel bolts to the main brush unit.

The contour following top dryer is mounted on the structure. On the top drying nozzle are installed no. 2 fans, each 4 kW, to ensure a good quality drying of the bonnets and the

roof of the vehicles. Three photoelectric cells control the movements of the top dryer, which is raised by a motor gear, through a counterweight system (lifting motor power is 0,37 kW).

Suitable safety devices are fitted on the top dryer to guarantee absolute reliability against its collision with vehicles.

The nozzle side guides are also hinged at the top to allow a certain movement in the vehicles' driving through direction in case of collision.

## High Capacity Dryer

It is the last station of the tunnel.

The self-supporting structure of the high capacity drying unit is made of folded, welded and hot dip galvanized steel elements.

A top dryer of new design is installed on the self-supporting structure. The top dryer follows the profile and is tilted at the rear of the vehicle to allow a better drying result.

The top dryer is equipped with an horizontal fan with reversed blades and a power of 7.5 Kw. This solution allows an high fluid-dynamic efficiency and a sensible reduction of the noise.

Three photoelectric cells control the movements of the top dryer.

The top dryer is raised by a gearbox fitted at the bottom of the support column, through a system of steel ropes linked to a counterweight.

Suitable safety devices are fitted on the top dryer to guarantee absolute reliability against its collision with vehicles.

The shape of the top dryer side guides will stop a falling of the dryer in case of breach of the lifting steel ropes.

Drying of the vehicles sides is carried out by two vertical fans with a power of 11 Kw each, equipped with high efficiency reversed blades impellers.



## Standard claddings

Standard enclosures are made of safety glass panels, fitted to the machine structure. Aluminium and glass side enclosures (option)





The glass frame is made of aluminium profiles which are mounted to the machine structure.

### **Completion (option)**

The side claddings can be completed with a roof of fibreglass or of alveolar polycarbonate, with entry and exit claddings, with roller shutters or gates.



### **Activation and control devices**

#### **Operator's Panel**

The complete range of New-line High Capacity tunnels is equipped with the Operator's

Panel. The device is mounted on the front panel of the remote control board. With the Operator's Panel it is possible to communicate directly with the PLC of the washing unit. The operator can easily read or modify the parameters and data that are stored in the programme.

With the Operator's Panel it is possible to carry out following operations:

- read the daily or total cycle counters;
- carry out the procedure of programming the washing cycle;
- modify the washing cycles;
- activate the frost protection system;
- put one or more stations of the tunnel out of service;
- command manually the movements of the stations;
- prime the dosing pumps;

The operator's panel is equipped with a "touch screen" to start and manage all operations.



## Main options

### Quick Wheel Wash

It features two longitudinal polyethylene brushes, length 2,5 mt, external diameter 410 mm

and 310 mm internal diameter.

The brushes are mounted on a parallelogram system, moved by a pneumatic cylinder. During the drive-through of the car the two brushes are pushed delicately against wheels of the cars and clean them through the combined action of the brush rotation and the translation of the vehicle.

The two longitudinal brushes are equipped with water distribution arches.



### **Short Side Brushes**

This station is dedicated to the washing of the lower part of the vehicles sides.

It is equipped with 2 short side brushes, each driven by 0,75 kW gearbox, fixed on articulated arms that allow the brushes to remain in contact with the vehicles sides.



### **Fixed Pre-wash Arch**

This arch is installed at the beginning of the tunnel to carry out a chemical pre-wash of the vehicle.

The pre-wash chemical (emollient) dissolves the dirt and guarantees a better washing

result.

### **Mobile Pre-wash Arch**

For a better distribution of the pre-wash chemical (emollient), without waste and dispersions in the atmosphere, the Hercules can be equipped with a contour following arch.

The group follows the shape of the vehicle with a mobile horizontal arch that is equipped with two nozzle rows that are inclined so as to spray the product against the front and rear part of the cars.

### **Contour Following High Pressure**

The group follows the shape of the vehicle with a mobile horizontal arch, that can be tilted to direct the water jets towards the front or rear ends of the cars.

The mechanical components fitted to move the arch are of the same type as the ones used for the fixed horizontal brush.

The high pressure arch is equipped with:

- n° 2 HP pump 7,5 kW, 125 l/min, 70 bar ;
- one horizontal contour following high pressure arch
- two self-supporting high pressure side arches
- the high pressure arches are made of stainless steel.

### **Additional fixed Top Brush**

The brush is fitted with an electric lifting system driven by motor and reduction gear through a transmission chain linked to a counterweight.

The working pressure of the top brush is controlled by an electronic power absorption device.

The rotation motor power is 1 HP (0.75 KW); the lifting motor power is 0.37 KW.

### **Additional Top Dryer**

A top dryer of new design is installed on the self-supporting structure.

The top dryer follows the profile and is tilted at the rear of the vehicle to allow a better drying result.

The top dryer is equipped with an horizontal fan with reversed blades and a power of 7.5 Kw. The additional dryer is recommended on all tunnels working at high speed.

## **Further options**

### **Wheel aligning device**

The wheel aligning device allows a better and easier positioning of the vehicle wheel on

the conveyor. The device is particularly useful in such sites where the steering space at the tunnel entrance is limited.

### **Underchassis wash**

The underchassis washing unit is equipped with two rows of nozzles suitably embedded at floor level and fed by an high capacity pump.

### **Snow-shampoo**

The snow shampoo device allows to improve the washing performances without increasing the operation time. The foam is injected into the water arch and is distributed over the car body. This allows a saving of detergent (lowering the amount of the discharged polluting substances), improving of at the same time the performances.

### **Input conveyor**

This unit is an independent conveyor section with wider wheel channel; it is placed at the entrance of the Tunnel, on the right side.

The vehicle is driven on the input conveyor and positioned, the driver comes out from the car and selects the wash program. The push roller of the input conveyor pushes the car into the conveyor of the tunnel for washing. This device is used only with system operated in Self-service.

Following accessories are needed with the input conveyor:

1. Banknotes acceptor
2. Remote pushbutton control
3. Entry traffic lights
4. Entry stop barrier.

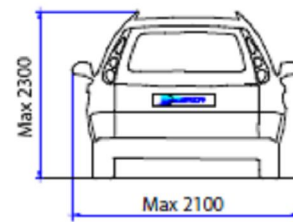
## **Washing dimension**



The maximum allowed vehicle dimensions are shown on the drawing:

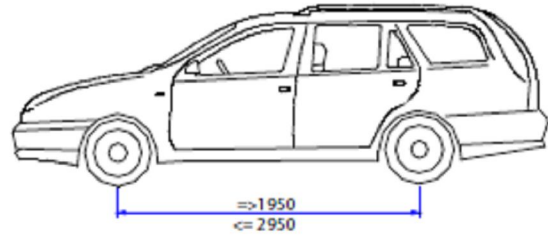
maximum vehicle width 2.100 mm

maximum vehicle height: 2.300 mm



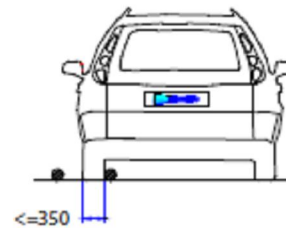
**wheelbase**

between mm 1950 min and 2950 max



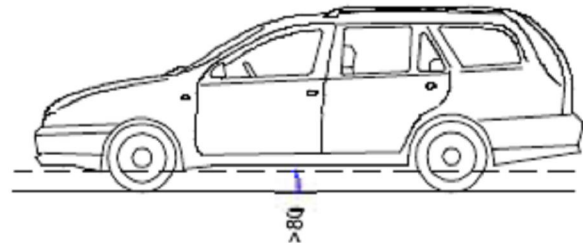
**maximum wheel width track**

(tyre maximum width 350 mm)

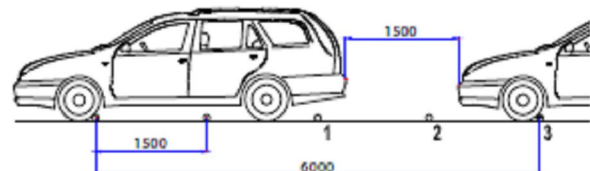


**Car body floor clearance**

(always minimum 80 mm)



**Distance between vehicles**



## Positioning of the chemicals distribution arches

## Wax arch

The wax system includes two vertical pipes with nozzles, fixed on the side beams of the tunnel structure.

It is suggested to leave a minimum distance of 1600 mm from the last washing group.

## Rinsing arch

The rinsing arch includes an horizontal pipe with nozzles fitted on the translating side brushes mobile frame.

## Shampoo Arch

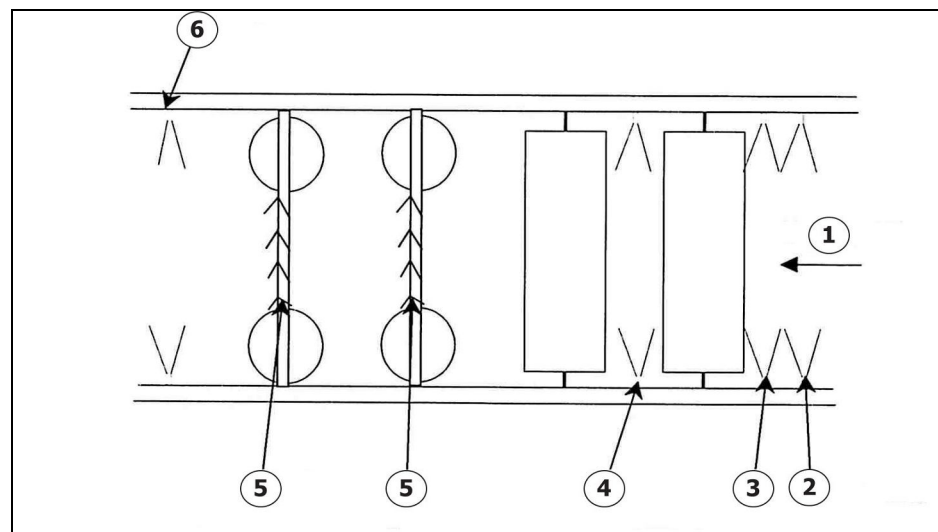
The shampoo system includes two vertical pipes with nozzles that must be fixed 600 mm before the top brush.

## Snow-shampoo arch

The snow-shampoo system includes two vertical pipes and one horizontal pipe with nozzles and must be fixed on the side beam at the same distance of the shampoo arch.

The layout shows the positioning of the shampoo and snow-shampoo arches in a tunnel equipped with additional top brush.

1. Running direction
2. Snow Shampoo Arch
3. Shampoo Arch
4. Top brush rinsing arch
5. Translating side brushes rinsing arch
6. Wax arch



## Consumption

Following consumption data refer to a washing tunnel equipped with:

- Pre-wash chemical arch;
- Low side brushes;
- Contour following high pressure arch;
- 5-brushes station;  
(1st pair translating side brushes + 2nd pair translating side brushes + fixed top brush);
- Super wax arch;
- High capacity dryer.

		Min vehicles/hour	Max vehicles/hour
		60 vehicles/hour	80 vehicles/hour
Wash water	litres	162	94
Water for HP contour following wash	litres	90	60
Water for underchassis wash	litres	240	166
Compressed air	Nlt/1'	102	76
Electric power	kWh	0.64	0.42
Snow shampoo (Neutral pH Shampoo)	ml	20	20
Shampoo (Neutral pH Shampoo)	ml	20	20
Wax (Dual Wax)	ml	12	12
Super Wax (Dual Wax)	ml	12	12
Prewash chemical	ml	27	27

Comments on above data:

- the programmes are indicative;
- the consumption tests were carried out using a vehicle with length of 4.5 metres;
- the power consumptions include the 1.5 KW water pump for the brushes, the 4 KW under-chassis pump and the 18.5 kW high pressure pump;

The chemicals used for the test are those recommended and supplied by CECCATO.

## Water Treatment

The diagram in picture 1 (next page) shows the following process:

- The water used during the various vehicle wash phases is collected in the underground tank ( $V_S$ ), where heavy solids, sand and slurry settle by gravity.
- The water passes from  $V_S$  into the second tank ( $V_D$ ), where the free oils and hydrocarbons separate through gravity and gather on the surface.
- The water is then collected in the accumulation tank ( $V_A$ ). The minimum volume needed for each of the three underground tanks is established according to the volume of the water to be treated.
- After the pre-treatment of sedimentation and degreasing, the water still contains a small quantity of suspended particles, oils and residue detergents.
- The water is taken from the third tank ( $V_A$ ) by the  $P_O$  pump to the filtering column **WS Q** and the activated carbon filter **WS C** and then collected in the underground tank ( $V_R$ )
- The filtering column **WS Q** contains differently grained inert material. Filtration withholds each tiny solid particle that remains in suspension after the primary sedimentation pre-treatment.
- The dirt held back by the filtering bed is removed periodically (once a day) by automatic backwash carried out using fresh water. The backwash water, which contains the particles removed by the quartzite, is taken back to the first underground tank.
- The carbon filter **WS C** is a column filled with highly adsorbent granular activated carbon that withholds the surface-active agents and the other organic pollutants that are still present in the wastewater.
- The carbon is periodically (once a day) back washed automatically to prevent packing caused by the continuous downward flow of the water, and to maintain maximum surface contact between the water and the carbon. The backwash water is taken back to the first underground tank.
- The water treated in this way is then gathered at discharge or, as an alternative, it can be re-used to supply the final rinsing phases of the car wash.
- A **WS A** oxidising line is used by the  $V_A$  and  $V_R$  accumulation tanks to ensure that no unpleasant odours arise, particularly during the hottest periods of the year, caused by the inevitable decomposition of the organic substances (e.g. surface-active agents) contained in solution in the wastewater.

