

# **TUNNEL VACUUM CLEANING TRAIN**

## **Model “Schörling-Sweep-train SST II”**

### **Electrical Version**



### **Introduction**

The often insufficient cleaning of tunnel systems, sometimes over decades, leads to growing problems in the operation of these systems, as well as health hazards for passengers and especially maintenance personnel.

Among these hazards are

- **a risk of tunnel fires due to collection of dirt**
- **failure of electrical drives due to emissions (short-circuiting)**
- **increased wear of the track system**
- **Accumulation of harmful agents and their ingestion by personnel and passengers.**

Only regular, continuous cleaning of **all** tunnel areas can remedy this.

The tunnel vacuum cleaning train made by Schörling show here a universal operability.

Due to the components' versatility, the station areas as well as the differing tunnel profiles can be cleaned effectively.



## The mechanical superstructure

Generally, the tunnel cleaner consists of a **three-part rail vehicle** which can be operated equally from either of the operating positions at the front and the rear of the vehicle.

### Technical data's:

Manufacturer	SCHÖRLING KOMMUNAL
Total length of the two trains	approx. 42.000 mm
Width:	approx. 2.500 mm
Height:	approx. 2.830 mm
Wheelbase front and rear train:	approx. 9.260 mm
Wheelbase middle train:	approx. 5.000 mm
Permissible total weight: (for front and rear train each)	approx. 30.000 Kg
Permissible total weight: (for middle train)	approx. 32.000 Kg
Dirt container volume:	approx. 12 m <sup>3</sup>
Maximum travel speed	up to 80 km/h
Working speed for suction	2 – 5 km/h

### Auxiliary Electro engine: (three for each train)

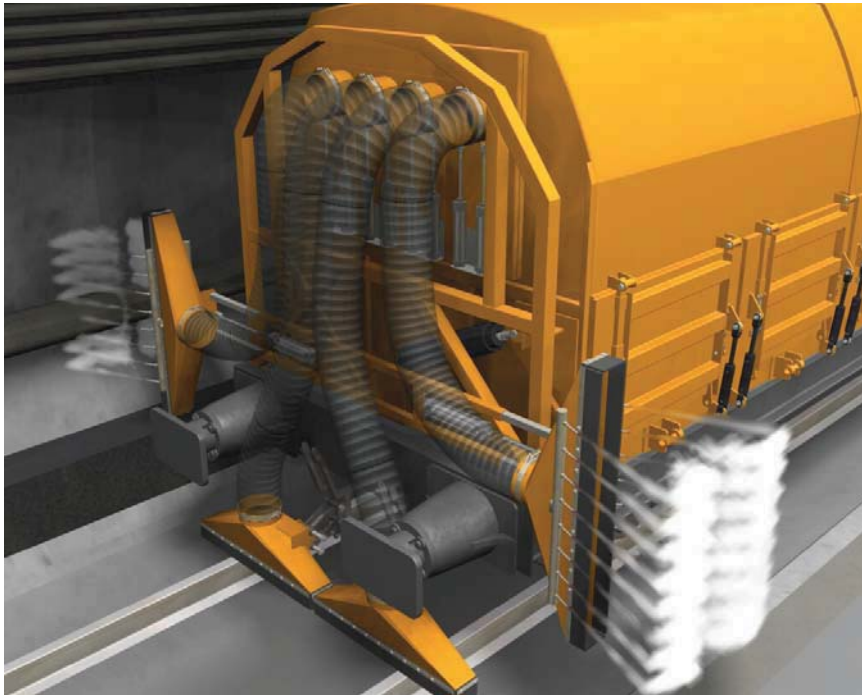
Manufacturer (EURO III):	VEM
Construction type:	K 21 R
Number of poles:	4
Power of each:	200 kW
Power in total:	600 kW
Frequency inverter	Emotron

### Fans: (two for each train)

Air volume:	450 m <sup>3</sup> /min = 54.000 m <sup>3</sup> /h
Nominal speed:	3.000 rpm/min
Pressure:	800 Da/Pa (Dekapascal)

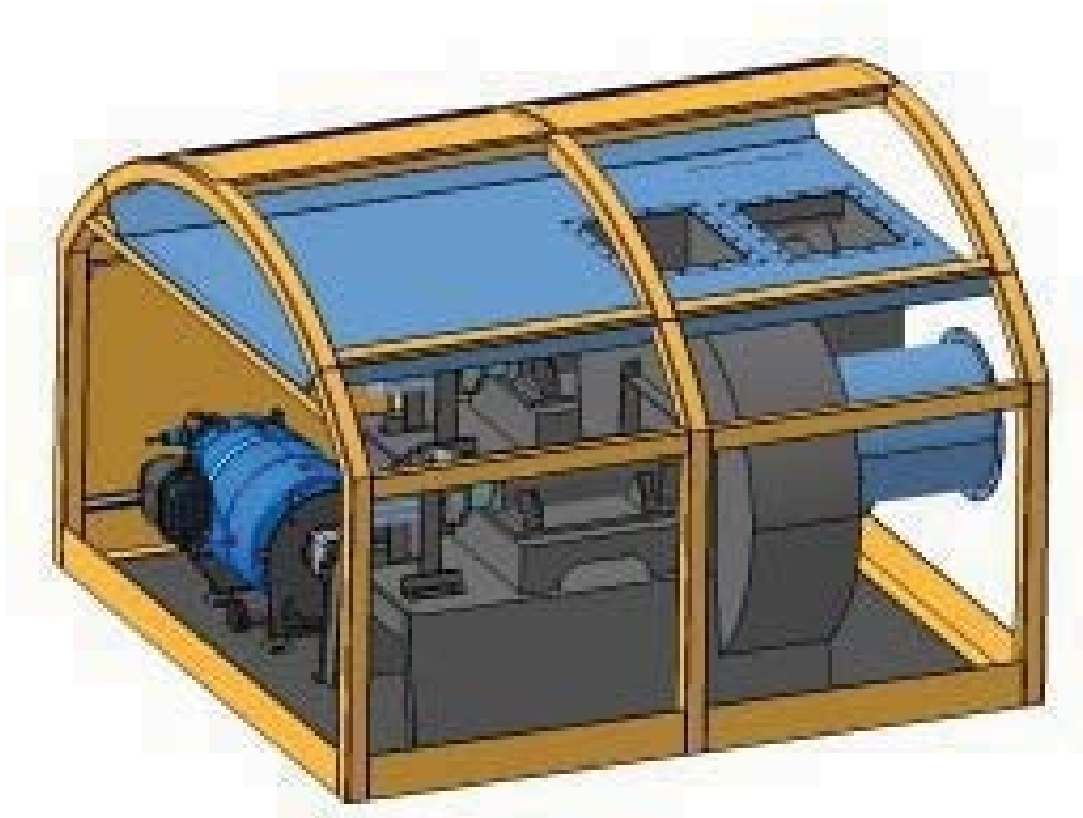
### Compressors: (two for each train)

Air volume:	5.600 l/min
Air pressure:	10-12 bar
Nominal speed:	3.000 rpm/min



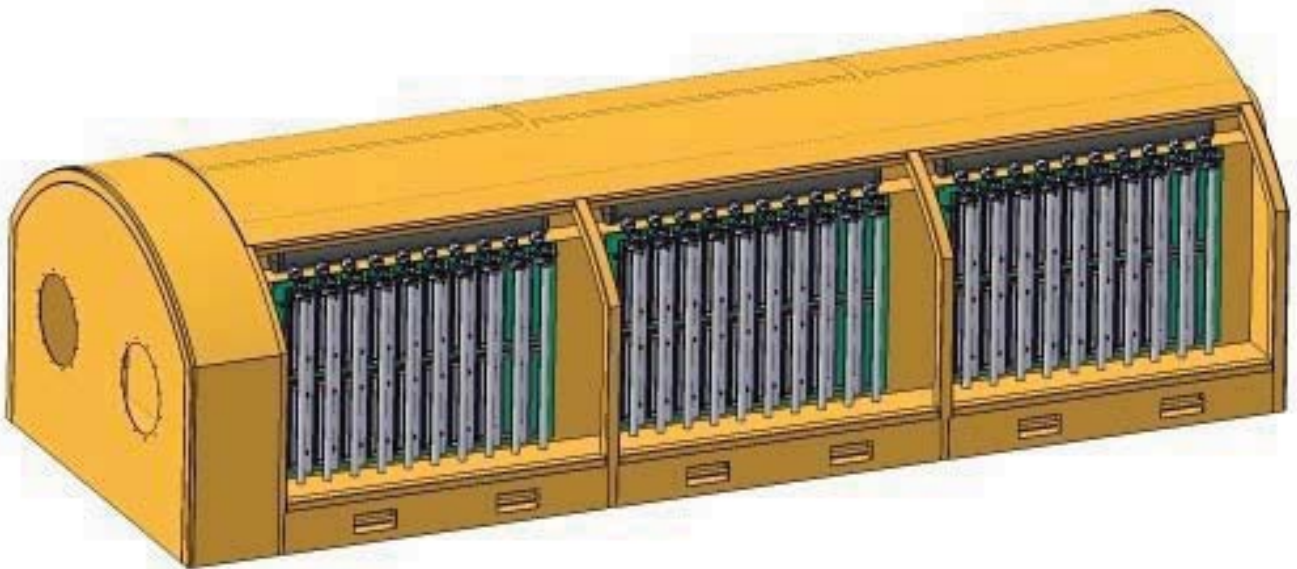
- During this procedure, blow air is used to loosen dirt which is then taken up by high suction force.
- The **blowing air** is produced by four screw compressors which are distributed about the vehicle and which do not need additional reservoirs, simplifying authorization for tunnel operation.
- The blowing jets are mounted in front respectively behind the suction nozzles and are lowered down to a distance of approx. 300-500 mm to the walls to be cleaned and/or approx. 100 mm to the ground by sensor control.
- The blowing jets produce an air veil within which the suction matter is whirled around and taken up by the suction nozzles.

- **Four Fans** with a combined suction force (2 for the front and 2 for the rear train) of approx. 108.000 m<sup>3</sup>/h facilitate suction of nearly all possible dirt.



- The laser controlled automatic system, mounted in front of the front and rear MPU takes over to avoid possible obstacles such as signalling systems in the tunnel, cable ducts, loudspeakers etc. (see laser information attached)
- Furthermore, the suction nozzles with the respective blowing jets can be activated individually in order to intensify cleaning in special areas or to avoid areas that cannot be reached, e.g. in double tunnels.
- Suction and blowing performance is continually variable.
- Via the individual suction hoses, the sucked-up dirt matter is guided into the collecting container where the air speed is lowered so far that the dirt will settle.

## Filtering System



**Insertable Filtering system specially developed for the tunnel cleaning train and mounted in a compartment in each train:**

- Dust filter units with filter plates for casing installation, consisting of:
- clean gas chamber with connection flange, without covering, mounting grid to bring in the filter elements,
- compressed air cleaning system complete placed on top of the clean gas chamber, with compressed air reservoir, 1-inch diaphragm valves and solenoid valves 24 VDC, protection class IP65,
- filter plates of heavy needle felt quality

### **Material and surface treatment:**

- Construction manufactured in sheet steel 3 mm, screws zinc coated, inside and outside undercoated and finished with two component lacquer

### **Technical Data:**

Air quantity	54.000 m <sup>3</sup> /h
Filter area	approx. 800 m <sup>2</sup> (216 x 4,2 m <sup>2</sup> )
Filter resistance	80 - 140 daPa (mm water gauge)



Filter material	polyester-needled felt PN1, mikroporous coating
Kind of dust	brake covering rest, metal dust, general dust
Quantity of dust	aspiration
Consumption of compressed air	ca. 140 Nm <sup>3</sup> /h, 6 bar
Connection for compressed air	¾ inches
Filter casing	+/- 400 daPa (mm water gauge)

Including:

**Controller EC 16**

- The controller EC 16 is to be serve 24 VDC magnetic-valve at filter device with compressed air JET-cleaning systems. After the connecting with supply power works the controller fully automatically.
- The difference pressure sensor shows the actual difference pressure of the filter unit (AP) on a text display. With two independent adjustable AP- switches point works the regulation system of the EC 16 controller (hysterese).
- If the difference pressure arrive the above switch point AP- MAX, the controller starts the bag cleaning program, with the set of impulse time and interval time. According the bag cleaning the difference pressure drops down to the below switch point AP- MIN, arrive the difference pressure AP- MIN, the bag cleaning program stops.
- For monitoring of the filter unit, it is possible to set an AP alarm switch point.

Input voltage:	230 V AC, 50 Hz oder 24 V DC
Output voltage:	24 V DC
Output valves:	16 pcs
AP-metering cap.:	0 - 5000 Pa
Analogue output AP:	4 – 20 mA
Protection class:	casing IP 66
Temperature range:	-20 °C to +60 °C

including:

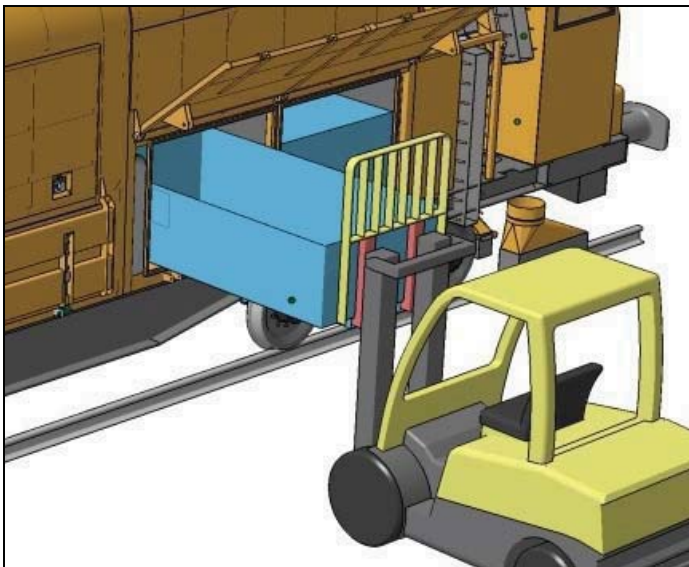
**Central Maintenance Unit for Compressed Air**

- R ¾“ with moisture separator and condensate automatic drain pressure control 24 VDC switch included



**Dust collecting container**

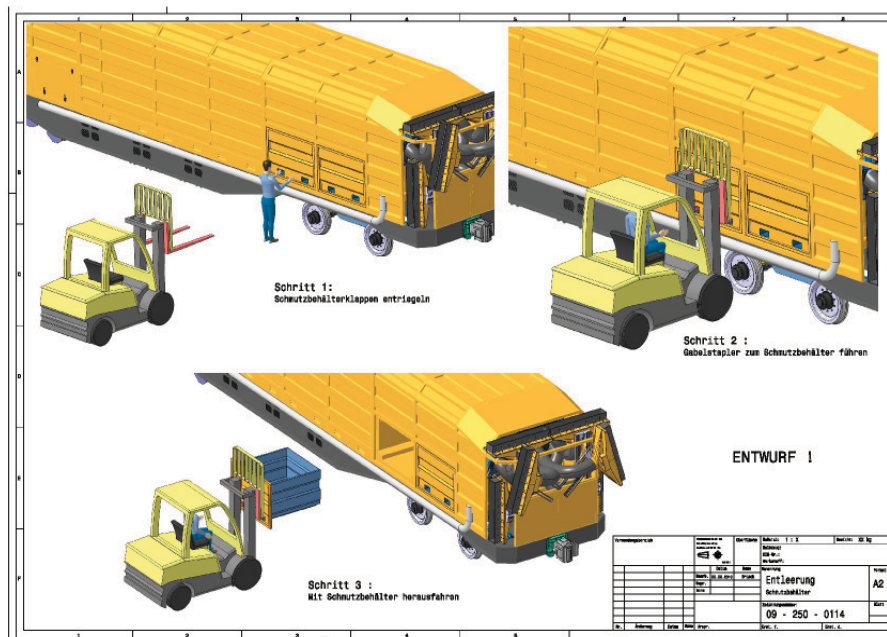
The collecting container can be constructed according to the operator's requirements:



**Inside container can be discharge by a forklift**  
Advantage: can be emptying at any place



**Side emptying action by tilting the container**  
Disadvantage: emptying at only one place



**Mode of discharging the removable dirt containers**

- Alternatively, **other customized** solution can be discussed.