# Cleaning air







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# 1) Pooch Klimatechnik GmbH

POOCH Klimatechnik GmbH has been manufacturing and selling its own products for over 27 years. With Pooch's own components production, the company is almost independent of third-party providers. All customer requirements are met individually. The strict quality control in all stages of production ensures that the entire system functions properly.

Pooch's customers come from all areas of industry, crafts and specialist wholesalers. Specialist planners and engineering offices also trust Pooch's solutions.

Pooch manufactures components and constructions from galvanized steel, stainless steel or aluminum according to customer's specifications. Whether welding, screwing or rivet connections. Everything is possible.

## 2) HVR Milieumanagement B.V.

HVR Milieumanagement was established in 1994 and is now the leader in the field of industrial exhaust gas purification.

HVR Milieumanagement has developed a technology which satisfies these norms, which is the MicroGasWash<sup>®</sup> system, using a biologically-degradable harmless fluid. With this system, VOC and other molecules are bonded and filtered out of the off-gas airflow. It is possible to degas tanks, terminals and means of transport, like ships, railway cars and trucks. Customers are free to choose different service packages from basic maintenance to carefree solutions.

Other applications of HVR's innovative performance are separation of air masses in- and outside of buildings, reducing dust, odour and micro-organisms.

#### 3) Rymotec B.V.

Rymotec was founded in 2009 and offers services related to environmental issues and business administration. The emission of unwanted contamination, unpleasant odours and poisonous vapours often are a source of complaints from employees and neighbours. Rymotec offers effective solutions.

Rymotec specializes in quality control, employee's protection, project planning and HAZOP.

# 4) Air treatment technology

- Ventilating
- Heating
- Air conditioning
- Cleaning air of VOC and odour
- Cleaning air of dust particles
- Preventing air masses to mix
- ... or combinations
- ... and others



# 5) VOC and odour

- Reducing VOC<sup>\*)</sup> and odour, technologies range from:
  - Masking
  - Bio beds
  - Absorption with active carbon
  - Condensation using cryogene technology
  - Burning using icinerators
  - Filtration using (ultra-)fine or electrostatic filters
  - Adsorption using (chemical) scrubbers, MGW<sup>®</sup>
  - ... and more ...

<sup>\*)</sup> VOC: Volatile Organic Compound, for example fossil fuels, benzene, alcohol. VOCs may be highly explosive, poisonous, cancerous and environmentally dangerous

#### MicroGasWash<sup>®</sup>

- Exhaust gas (emission) is being transformed from gaseous phase to liquid phase
- A special injected fluid (FF-AR) bind hydro carbons and other chemicals
- Both polar and non-polar compounds are bonded
- FF-AR is bio-degradable and non-hazardous



#### Scrubber, MGW<sup>®</sup> system





#### Developments with MGW<sup>®</sup>

- Additional to MGW<sup>®</sup>, following technologies can be used:
  - Inlet filtration with active carbon
  - Inlet filtration with dust separation
  - Outlet filtration with active carbon
  - Outlet filtration with UV light
  - Outlet filtration with titanium oxide coated active carbon
  - Combinations of technologies



# 6) Dust particles and odour

- Filtration technologies range from:
  - Mechanical filtration, like
    - Foam
    - Paper
    - Fiberglass, etc
  - Fluid filtration, like
    - Water
    - Oil
  - Electrical filtration, like
    - Ionizers
    - Static electric charge, VFA TiOx-ACF
    - UV light

#### VFA TiOx-ACF technology

- Electrostatic air filtration
- Dust and other particles are collected in filter and do not increase filter static pressure drop
- No ozone or other harmful radicals are created
- Since humidity is not captured, the system remains free of fungi or bacteria



#### VFA TiOx-ACF technology

TiOx-ACF technology removes:

- Dust
- Particulate Matter (PM10, PM2.5, PM1)
- Ultrafine Particulate Matter (submicron- and nano-particles)
- Microbiological contamination (viruses, bacteria, fungi, spores & pollen)
- VOCs and smells (optional by adding a VFA Activated Carbon Filter)



#### Developments with ASPRA

Additional to ASPRA, following technologies can be used:

- Outlet filtration with active carbon
- Outlet filtration with UV light
- Outlet filtration with titanium oxide coated active carbon
- Combinations of above mentioned technologies





# 7) Air separation

- Separation technologies range from:
  - Doors
    - Manually
    - Electrically
    - Automatically operated
  - Screens
    - Manual
    - Electrically operated

#### • Air as separating medium

- Air curtains
- Air doors, ESAS

#### ESAS air doors

- Create effective air separation between climate zones
- Effectively separate temperature zones
- Obstructive strip curtains or high-speed doors are obsolete
- Keep smoke, contamination or insects out of protected area
- Reduce cost of low temperature areas



## ESAS, before and after installation

• Separation of still air inside and windy air outside can be shown in a clear difference in temperatures at the threshold.





# 8) Cleaning tank barges

- Apart from before mentioned applications, MGW<sup>®</sup> can be used for cleaning tank barges and oil terminals if vapour of previous cargo has to be removed, before:
  - a new cargo may be loaded
  - inspections of cargo loads can be done
  - repairs can be done
  - ... and during loading and unloading



# Present solutions, disadvantages

- Degasifying into the ambient air: environmental problem
- Vapour return into unloading vessel or oil terminal storage tank: unloading vessel may have to be cleaned
- Storage tank: explosion risk



# Present solutions, disadvantages

- Icinerator: not cost-effective unless 24/7
- Cryogene systems: not efficient because of wide trajectory of condensating vapour compounds
- Replacing vapours using inert gas: where to store original vapours?



# What does MicroGasWash<sup>®</sup> do?

- Cleans gases by removing contaminants and odours
- Complies with European regulations
- Is environmentally friendly (bio-degradable)
- Cleaning and vapour removal up to 5.000 m<sup>3</sup>/h
- Through Atex technology safe to use in highly explosive atmospheres



## Approval of MicroGasWash<sup>®</sup>

Because the removal of VOC and odour often combines with a (much) smaller emission, MGW<sup>®</sup> system underlies stringent European and local law. In order to prove compliance, MGW systems are approved by many international recognized institutes:

- RIVM approval (Dutch Governmental Institute for Public Health and Environmental Issues)
- Bureau Veritas
- TÜV
- Lloyd's
- Bagt
- REACH (EU regulation on chemicals and their safe use)

#### EU and local law

- Directive 2001/81/EC regulates emission of volatile organic compounds:
  - Maximum allowable emissions
  - Measurements to prove emissions
  - Periodic reports to show periodical emissions
  - Penalties in case of violation
  - Technically feasible techniques are to be applied
- Directive 2001/81/EC has been transformed into local law or regulations; Example: NeR (Nederlandse Emissie Richtlijn, Dutch Emission Directive):
  - Government shall check that emitting companies comply with this rule
  - Penalties in case of violation
  - Best available techniques must be applied

#### MGW<sup>®</sup> delivery system

- Nozzle spraying technique
- Filter technique:
  - Active carbon to optimize the vapour flow into the fluid section
  - Fluid injection section with mechanical filters
  - Active carbon, combined with UV light
- Optional: continuous measuring with feedback
- Continuous on-line reporting to local authorities
- Contaminated fluid may be recycled





#### Testing

- Fact finding: measure emissions from cargo load of tank barge during:
  - Loading
  - Unloading
  - Cleaning
- Prove system performance on small scale
- Validate field measurements, in laboratories





#### Testing

By degassing on a commercial scale, MGW<sup>®</sup> has proven its value:

- Rotterdam, petrol contaminated with high H<sub>2</sub>S content,
  - Efficiency of system 85%
- Amsterdam: level and composition of contamination:
  - $40.000 45.000 \text{ mg/m}^3$
  - H<sub>2</sub>S negligible
- .. and many more in the harbour of Antwerp..





















# For a safer and cleaner world for us and for our children

# **O**RYMOTEC

## For more information

- https://www.pooch-klimatechnik.de/
- microgaswash.com
- www.vfa-solutions.com
- hvrbv.com/esas-luchtdeuren/
- https://rymotec.nl/

#### MicroGasWash®

