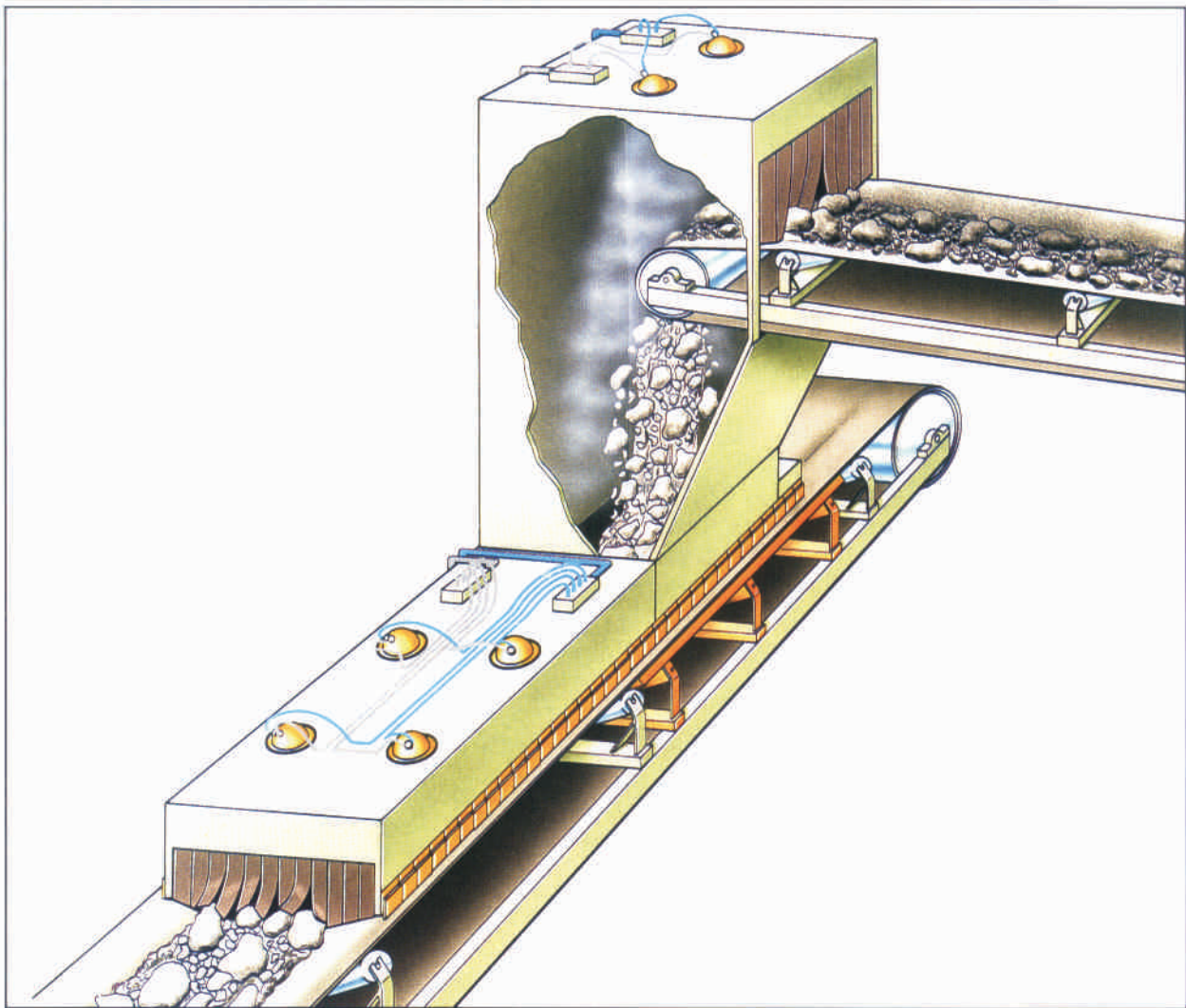


for the suppression of industrial dusts  
and humidifying of manufacturing rooms  
for the cleaning of flue gases  
and cooling of exhaust gases



A combination of know-how  
system parts  
water and  
pressurized air



# DUSTEX® Water Dispersion-System



Plant without **DUSTEX®**

2



Plant with **DUSTEX®** in operation

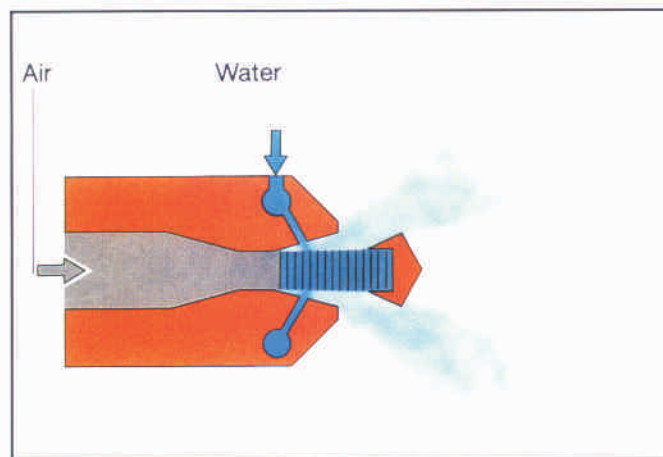
3

## DUST

At many installations it is often necessary to either stop or limit production, even completely encapsulate certain areas to enable air cleaning to be carried out. Otherwise it is dangerous for the employees or aggressive towards the environment and the local neighbourhood. The criteria for permitted values of dust are getting more and more severe. A right for clean air is developing. With all these factors in mind, the **DUSTEX®** system has been developed to supply a cheap and effective weapon against dust-laden air.

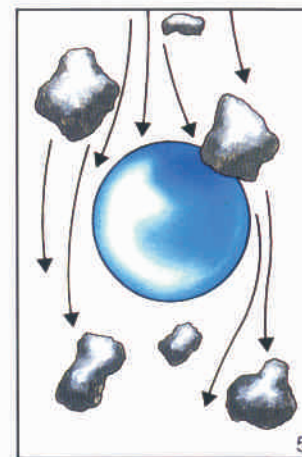
## High pressure atomizing

It has long since been known that heavily dust-laden air can be cleaned by atomization, with very fine water particles, normally no special wetting agents or additives are needed. Ordinary water nozzles form fine particles, but create an uneven range of drop sizes and above all do not achieve the required fineness.

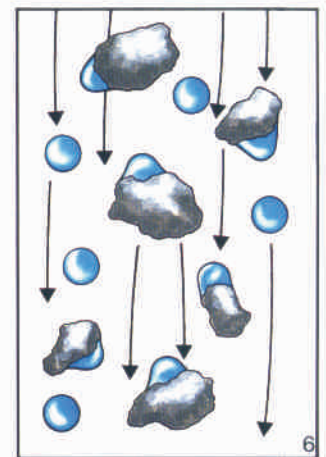


Scheme of the **DUSTEX®** Nozzle

4



5



6

The different influences of large and fine water droplets.

Creating large areas of wetness, eventually silting up and failing. Even high pressure nozzles with pressures in excess of 50 or even 300 bar have little success, showing high wear rates and high installation costs. Larger water drops have a much higher air-speed and a higher surface tension, so repelling dust particles and being unable to react with them.

## The **DUSTEX®** process

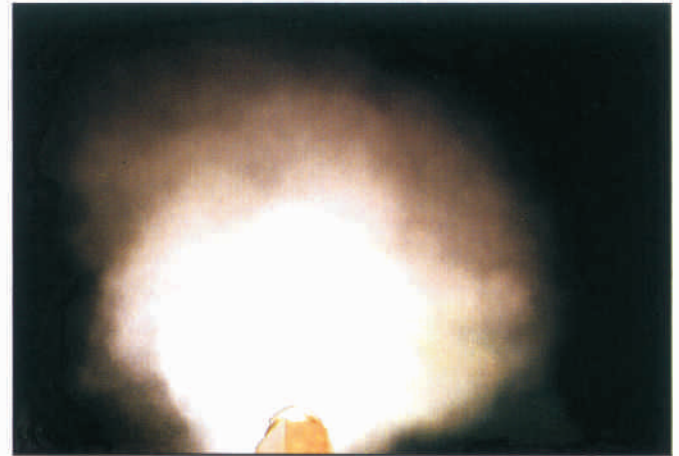
With the **DUSTEX®** system, pressurized air is introduced at sonic speed into the resonance chamber of the two component nozzle. Simultaneously, water is sprayed into the chamber through a circular hole of relatively large diameter. This water is being atomized to form very fine droplets in the energy zone of the chamber. The drops are carried away as a fine fog by the escaping pressurized air.

For flue gas cooling ...





DUSTEX® cupola nozzles in operation 7



DUSTEX® nozzle type 5510, fog lobe 8

The water drop size can be adjusted over a wide range from 1-50  $\mu\text{m}$ . With increased fineness of the drops their surface affinity for dust increases. The droplets now wet the dust particles instead of repelling them so becoming bound by the water and suppressed in the fog.

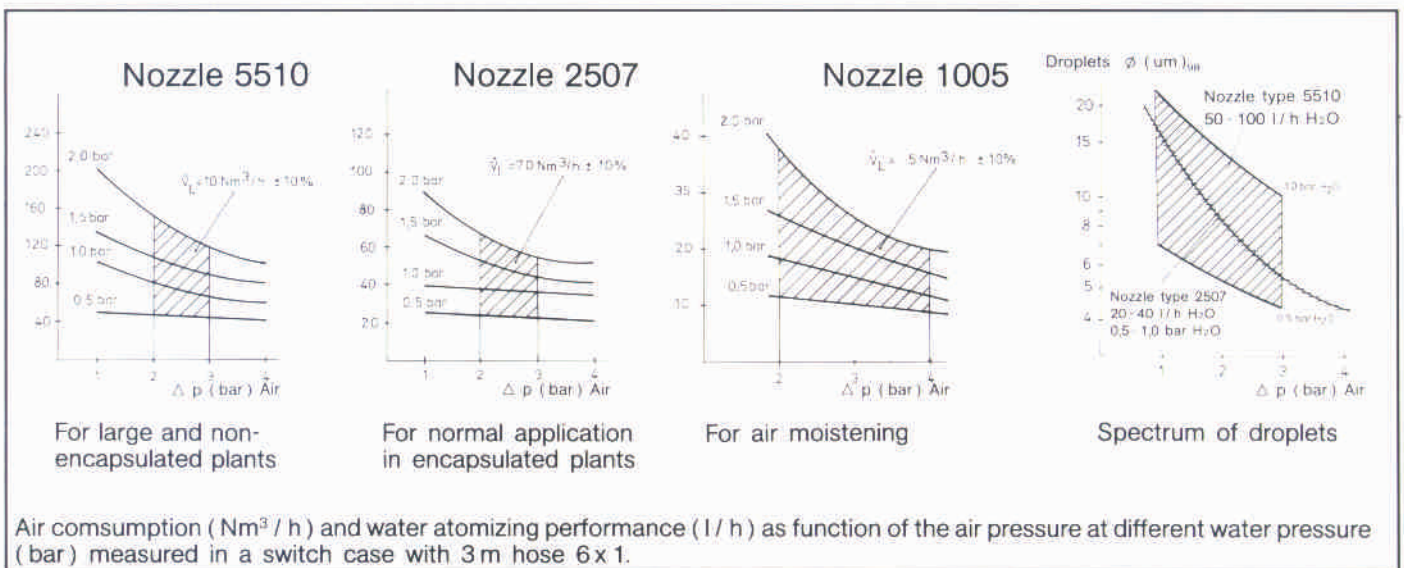
Usually the droplet size is adjusted to 5-10  $\mu\text{m}$  while the normal water only spray nozzles have a drop diameter of far more than 50  $\mu\text{m}$ . Due to the 10 times smaller drops of the DUSTEX® nozzles, a 1000 times higher drop density is produced in the dispersed fog. Thus work can be done at essentially higher effect with considerably less water consumption.

**DUSTEX® minimizes water contamination**

The highly increased number of droplets is also advantageous for better evaporation during air moistening and flue gas cooling or for odour removal and chemical reactions.



DUSTEX® type 5510 F, fan fog 9





# DUSTEX® Water Dispersion-System

## DUSTEX® Effect

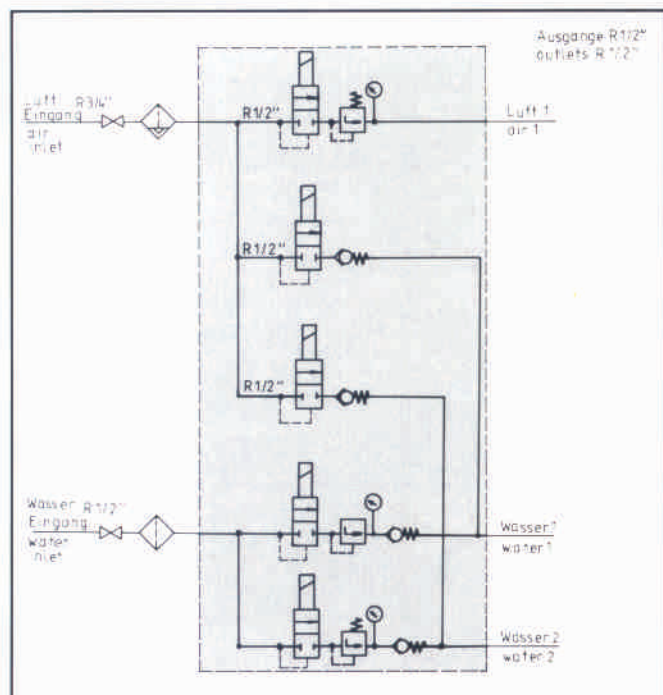
With the **DUSTEX®** system, the dust portion in the air can be reduced within the range of the TA air prescriptions. So the criterion "There will be no visible dust in the air any longer" may be the basis of our guarantee along with a take back obligation.

## DUSTEX® Installation

For the best effect from any dust suppression system it is important to achieve the correct water atomization along with a constantly correct droplet size and speed, from strategically placed nozzles.

It is also important to be aware that the satisfactory effect can only be achieved when the fog "lobes" are adjusted to fill the working area and are allowed to mix with the dust undisturbed, over the correct period of time. This can be achieved by the following measures:

- In the specially designed stainless steel fog nozzle the spraying angle of the **DUSTEX®** nozzle can be adjusted through 60° via turning the angle adapter, all without changing the installation position of the fog nozzle itself. Inspection and cleaning are made easy due to the nozzles simple and efficient design, allowing quick removal and replacement. However in very severe build up areas cleaning can be made simple by incorporating an air injector.
- By encapsulating and other measures such as guiding plates and aprons, the air stream has to be reduced to less than 0,5 m/sec and redirected.
- To allow a sufficient dust fog reaction area the encapsulation has to be enlarged to give a reaction zone of 0,4 up to 1,2 m height and about 1 m<sup>3</sup> volume per nozzle.
- Thanks to nozzle rails with nozzles installed at a distance of about 0,5 m and a depth of effect of up to 5 m, large dust emission areas can be managed.



Control scheme SE 2/2 for installations with 2 independent nozzle systems

11

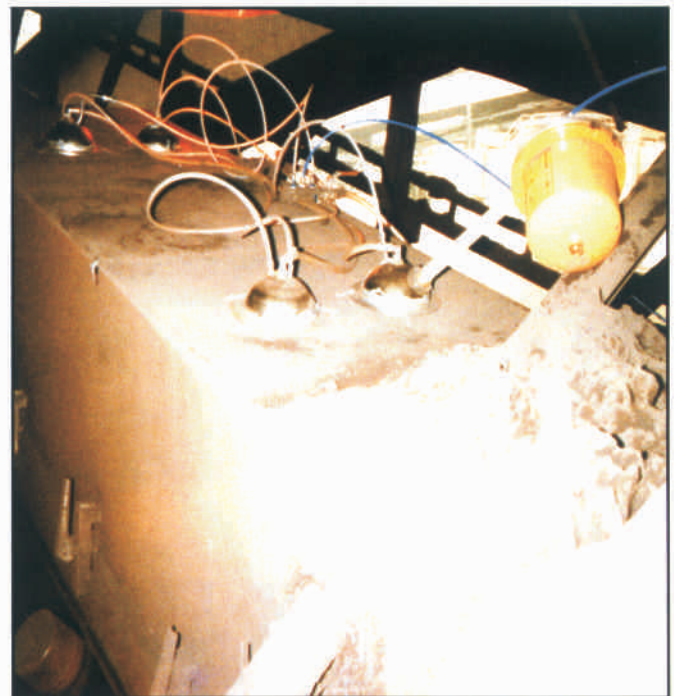
## Materials

The following materials are particularly suited for the **DUSTEX®**- treatment:

coal, coal dust, ore, waste molding sand, gravel, sand, lime and crushed stone, fly ash, chemical products, alum earth, fertilizer, agricultural products, domestic waste.

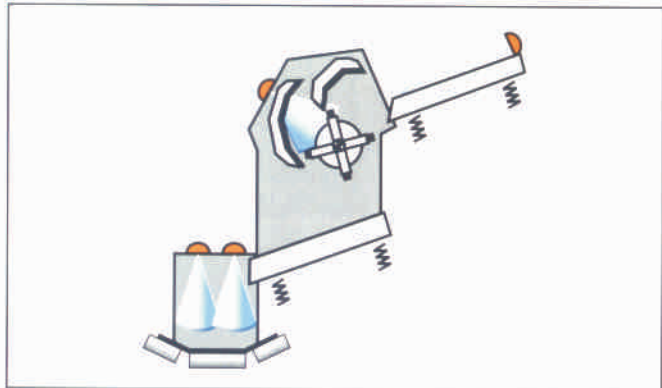
## These are the fields of applications:

- **Installations for material treatment**  
by crushers, sieves, blenders, pelletizers, classifiers, and conveyor belt transfers.
- **Installations for feeding material**  
Filling of stock piles and tip bunkers, ship loading by telescope chutes, vehicle loading from silos.
- **Silos, stock houses, material depots**  
workshops, where dust has to be quickly removed for inspection or other operations.
- **Moisture Rooms, Manufacturing Plants**  
Chemical or other manufacturing processes where a minimum content of humidity has to be kept or where dust has to be avoided, like in textile, tobacco, paper or timber industry.
- **Installations for removal of material**  
by drilling, milling, sand blasting.
- **Danger of Combustion / Fire, Dust Explosion Zones**  
Removal of the critical conditions for the starting and spreading of fires and explosions.
- **Chemical and Biological Processes**  
Atomizing of aerosols or water with additives for gas cleaning and gas reaction or for removal of odours.



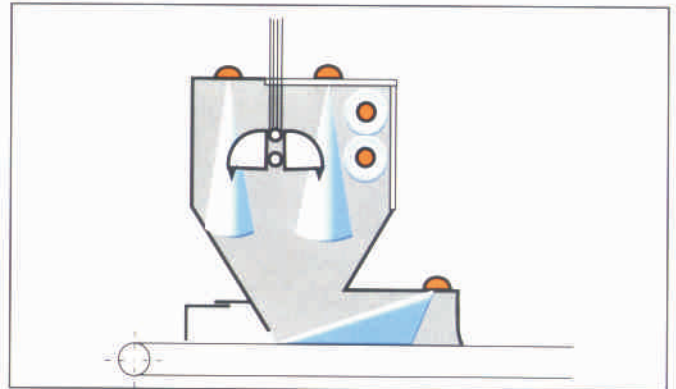
Regular pneumatic impulse cleaning with **ERPULSOR®** and blowing mushroom at thermally treated materials.

12



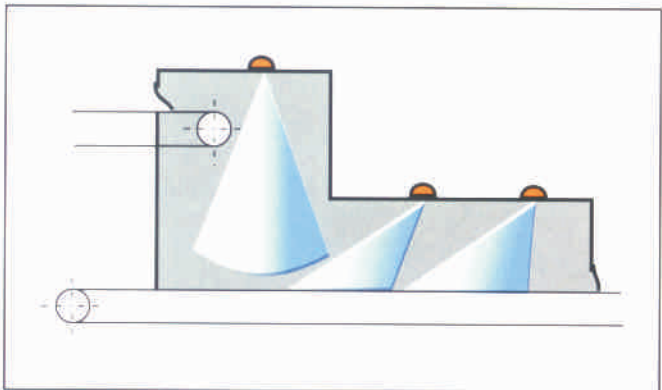
Crushers

13



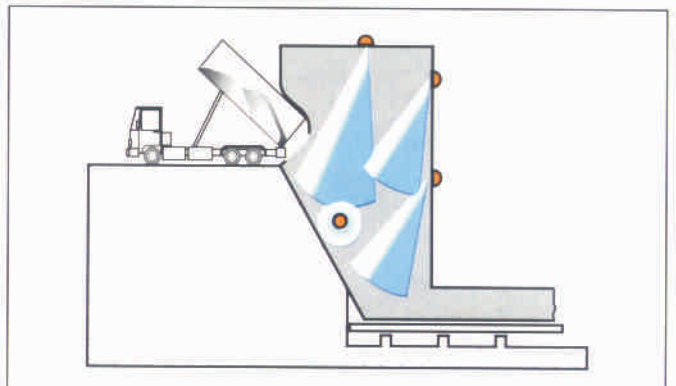
Grab operation

14



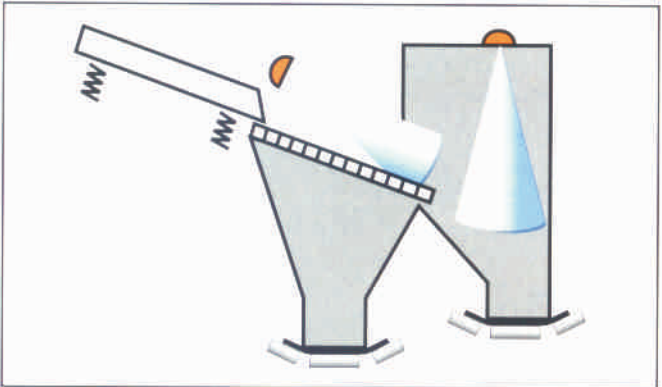
Conveyor belt transfers

15



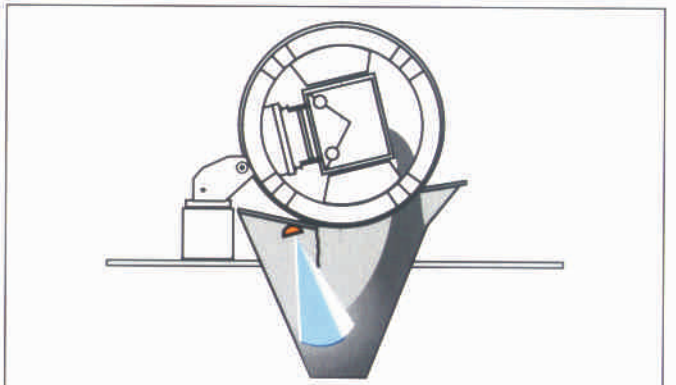
Tip-truck bunkers

16



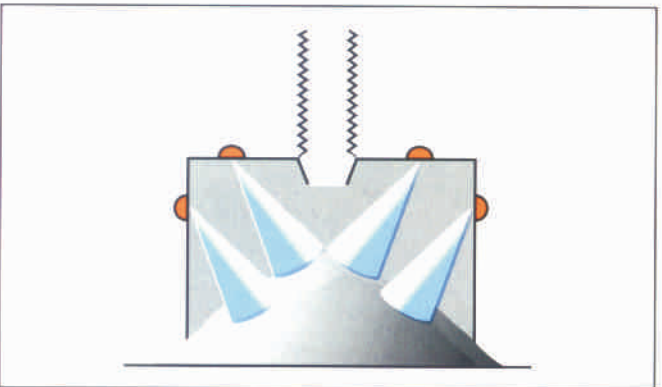
Sieves / screens

17



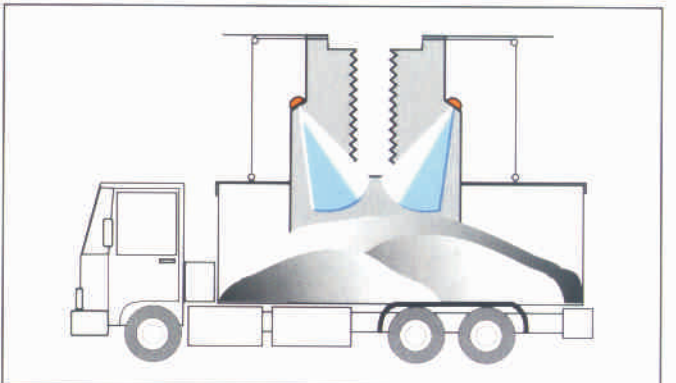
Railway pit bins

18



Shiploading

19

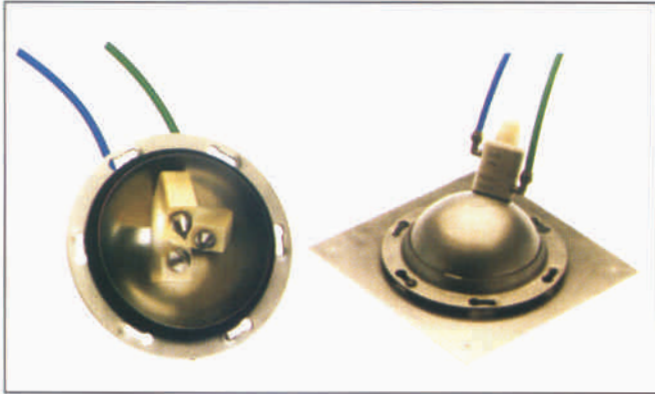


Truck loading

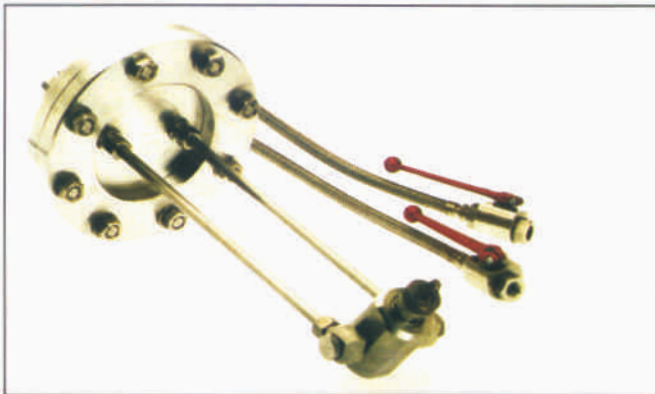
20



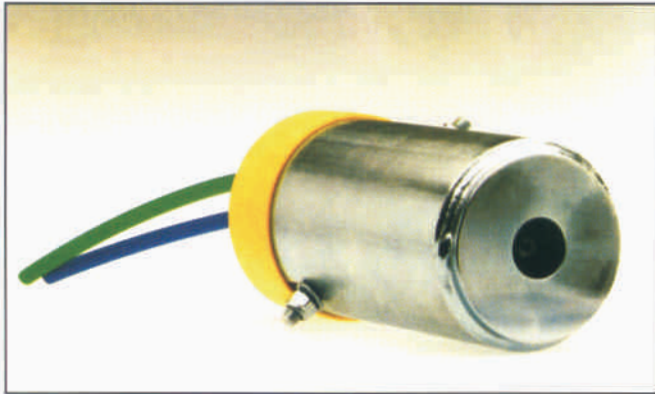
# DUSTEX® Components



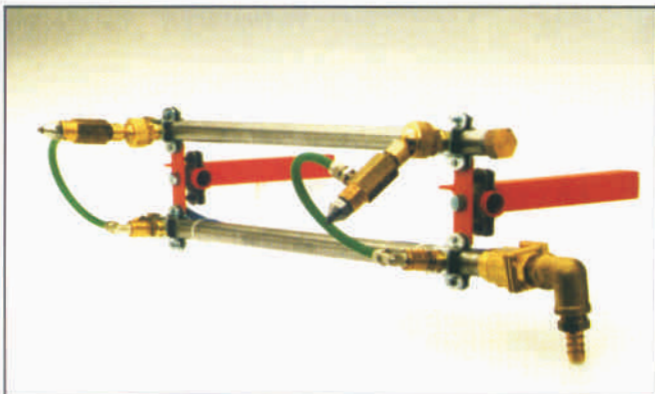
Nozzle Cupola with nozzle adapter for universal adjustment



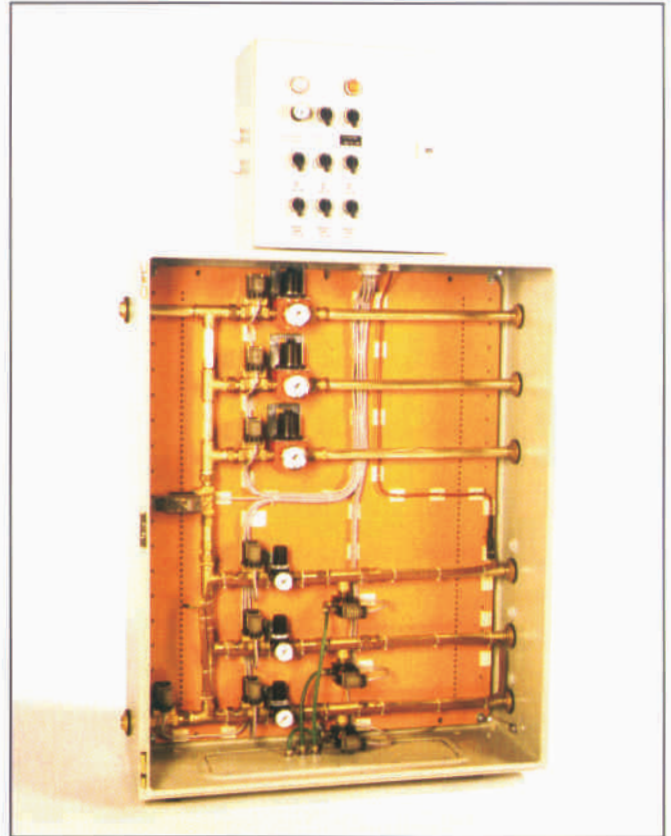
Conditioning Nozzle



Fog Pipe



Nozzle Device



Control Unit



Control Unit with motor regulating valves

The **DUSTEX®** System is effective and kind to the environ



# DUSTEX® A Procedure against many Dust Problems

## Water and compressed air consumption

There are 3 different sizes of **DUSTEX®** nozzles, which have a water penetration of 5 - 120 l/h depending on the pressure, as well as a conditioning nozzle with a water penetration of 1 m<sup>3</sup>/h. The water pressure is adjusted to 0.3 - 1.5 bar overpressure. Common values are 25 l/h at 0.5 bar overpressure with the middle-sized nozzle.

The consumption of compressed air per nozzle is 5 - 12 Nm<sup>3</sup>/h in an overpressure range of 2 - 4 bar.

## Winter operation

It is well known that fog does not freeze. The critical drop size is below 20. This applies to the **DUSTEX®** process as well, so it can also be operated in winter. Because of the danger of freezing during standstill the system should be automatically dewatered after switching off. Control cabinet and water pipings have to be heated and isolated during operation. Therefore, isolating and heating components are available.



28

## The Advantages of the **DUSTEX®** System

- **Stunningly high effectiveness, often also in "unsolvable" problem cases.**
- **Low consumption of water and compressed air.**
- **The addition of 1 ltr. water only to 1 ton material.**
- **Little mounting expense.**
- **Robust, universal, and easy-to-maintain system parts.**
- **Anti-freezing device against disturbances in low temperature operation.**
- **Self cleaning of the nozzles by ultra sonic effect.**
- **Pneumatic fog cupola cleaning in extreme cases.**



29

**Ask the specialists of VSR for a complete project study or a trial application. Make your decision for more cleanness and environmental protection. No dust should be visible in the air.**

**References are available. Tell us your problems!**

**VSR**

Industrietechnik GmbH

Am Alten Schacht 6  
47198 Duisburg  
Postfach 17 04 62  
47184 Duisburg

Tel. +(0) 20 66 - 99 66 30

Fax +(0) 20 66 - 99 66 62

www.industrietechnik.de info@vsi-industrietechnik.de

Technical modifications reserved. © VSR GmbH · Mülheim/Ruhr · Germany · 1/96