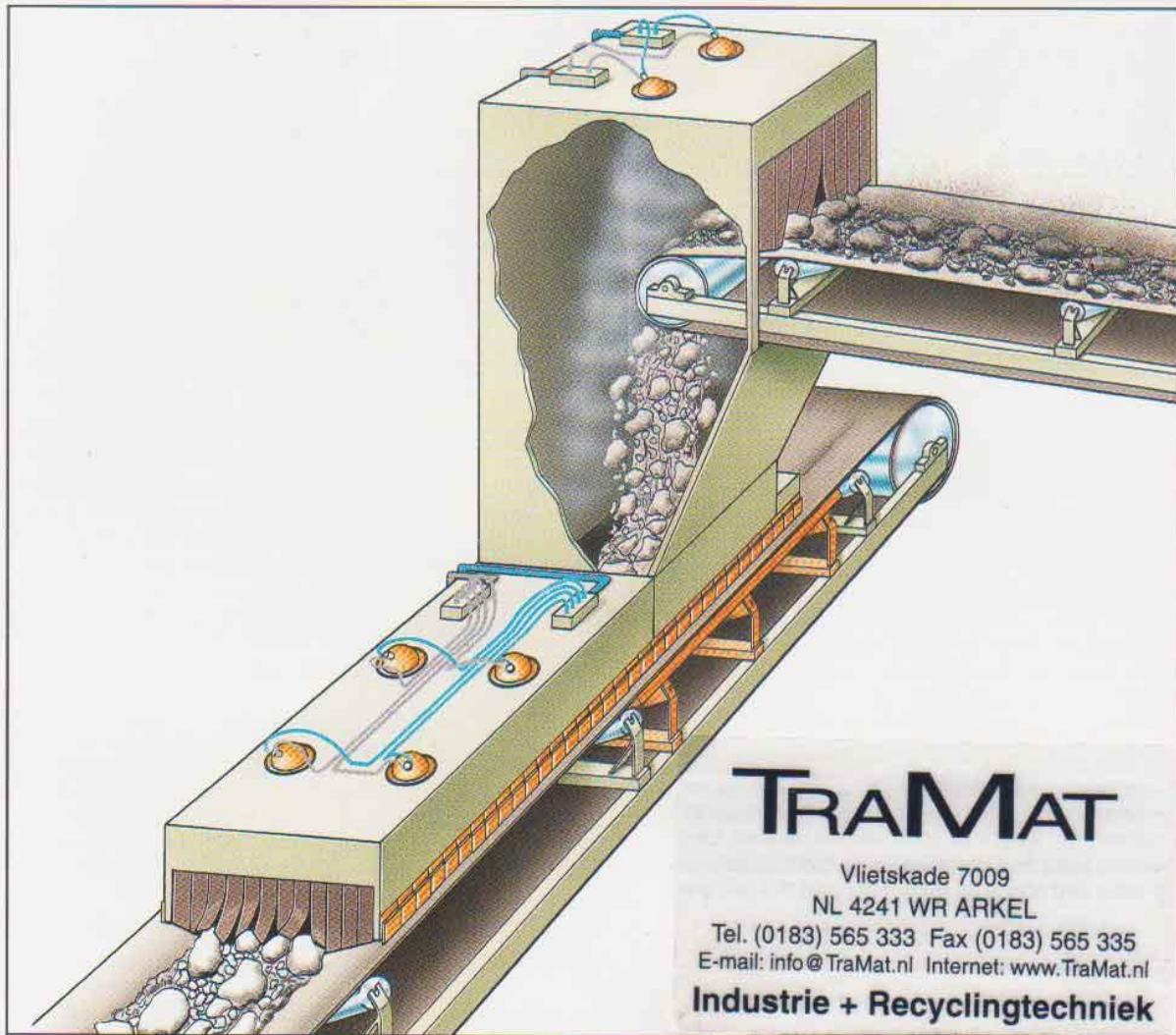


for the suppression of industrial dusts  
and humidifying of manufacturing rooms

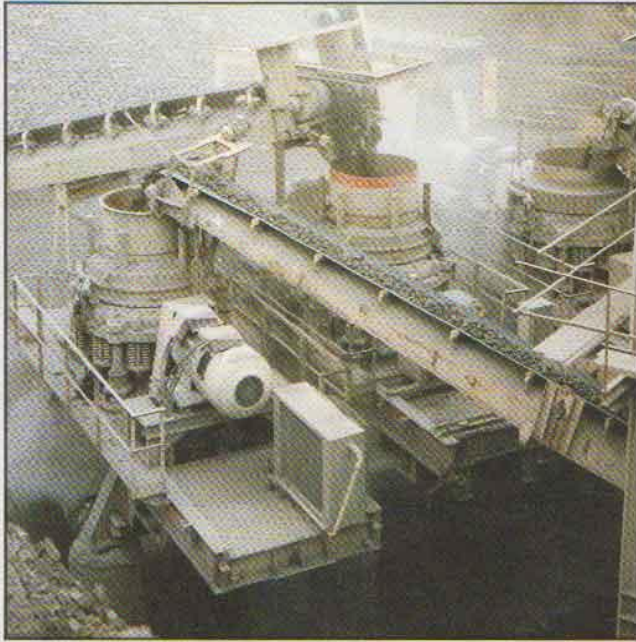
for the cleaning of flue gases  
and cooling of exhaust gases



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

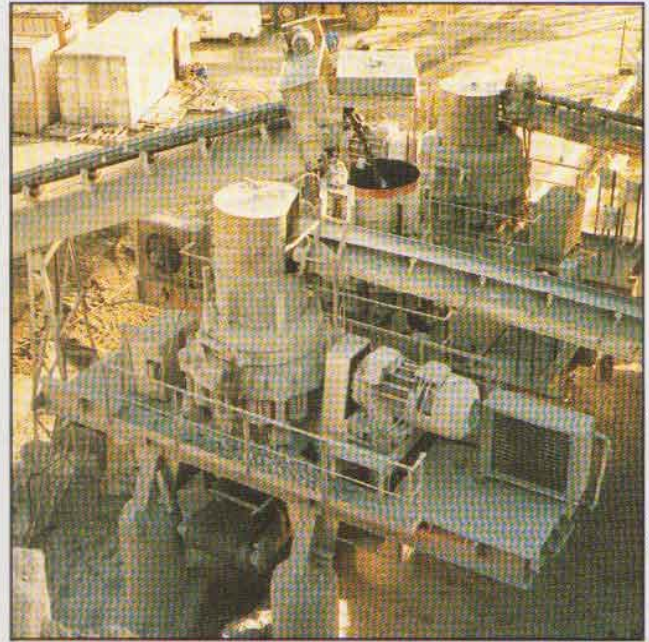
**... for a dust-free environment**

# 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.

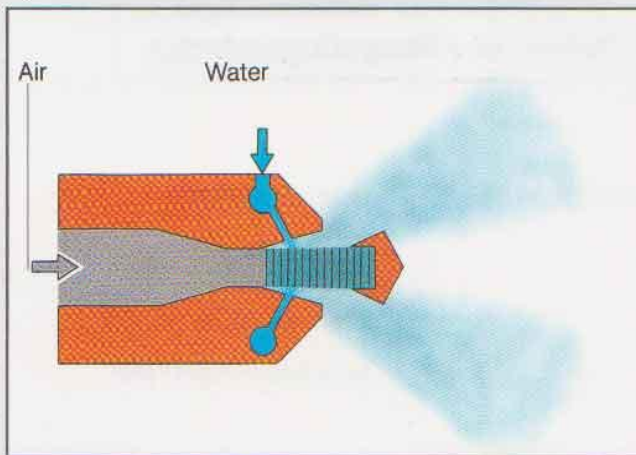
### High pressure atomizing

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.

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.

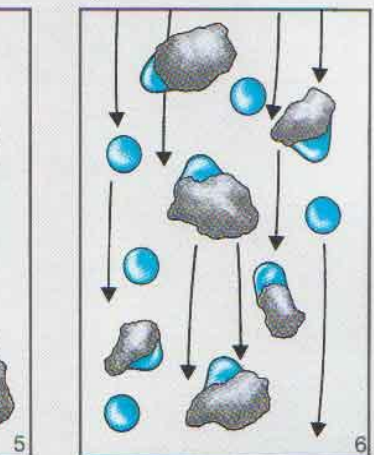
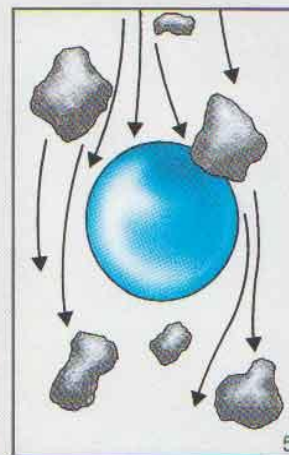
### The **DUSTEX®** process

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.



Scheme of the **DUSTEX®** Nozzle

4



The different influences of large and fine water droplets.

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.

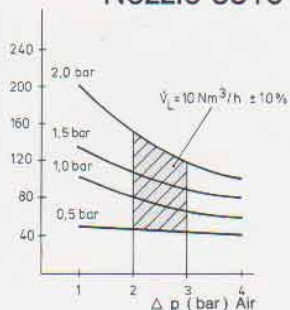
**DUSTEX® minimizes water contamination**

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.



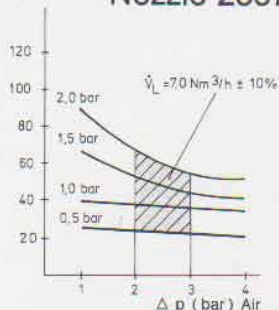
DUSTEX® type 5510 F, fan fog 9

**Nozzle 5510**



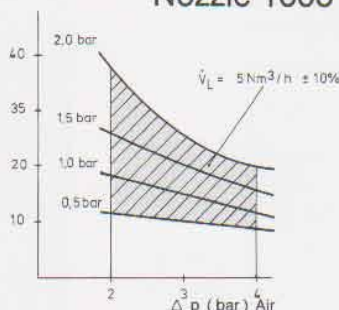
For large and non-encapsulated plants

**Nozzle 2507**



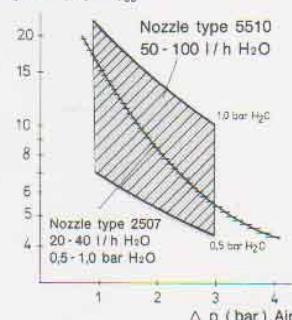
For normal application in encapsulated plants

**Nozzle 1005**



For air moistening

**Droplets  $\phi$  ( $\mu\text{m}$ )<sub>98</sub>**



Spectrum of droplets

Air consumption ( $\text{Nm}^3/\text{h}$ ) and water atomizing performance ( $\text{l}/\text{h}$ ) as function of the air pressure at different water pressure (bar) measured in a switch case with 3m hose 6 x 1.

# DUSTEX® Water Dispersion-System

## DUSTEX® Effect

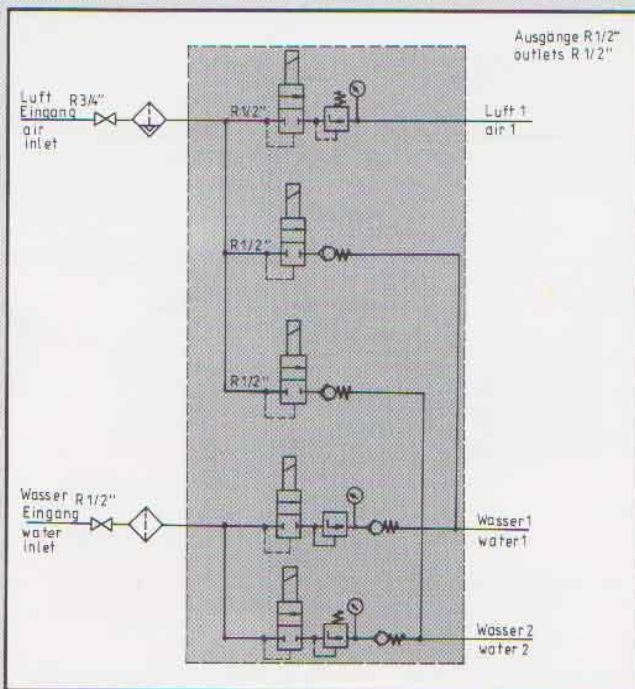
With the **DUSTEX®** system, the dust portion in the air can be reduced within the range of the TA air prescriptions. So the criterion "There will be no visible dust in the air any longer" may be the basis of our guarantee along with a take back obligation.

## 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 m³ 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

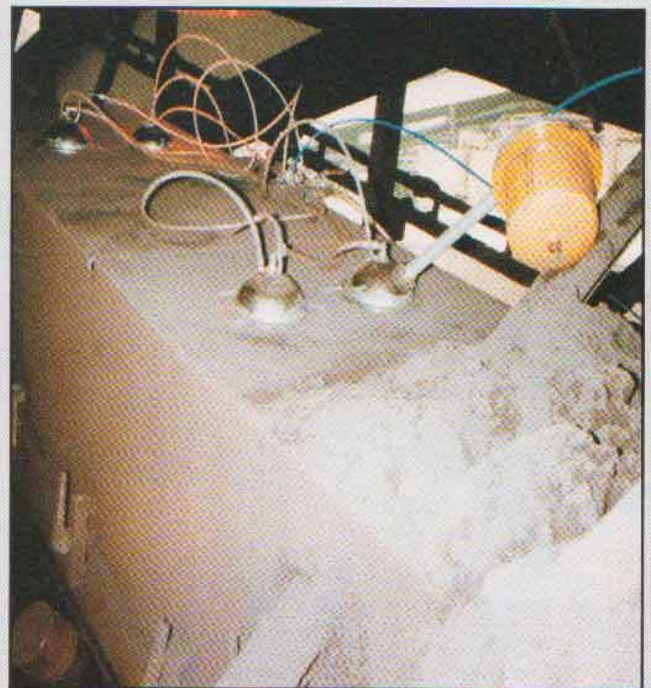
## Materials

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

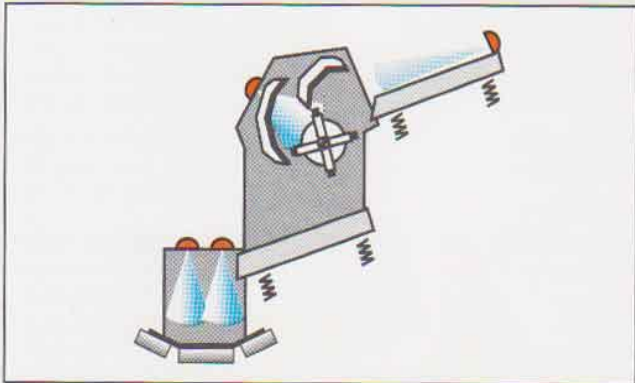
coal, coal dust, ore, waste molding sand, gravel, sand, lime and crushed stone, fly ash, chemical products, alum earth, fertilizer, agricultural products, domestic waste.

These are the fields of applications:

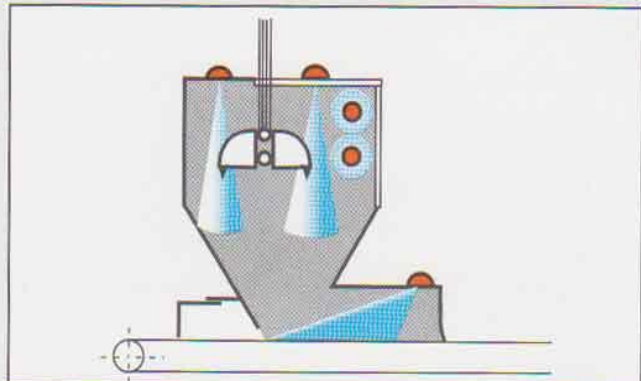
- **Installations for material treatment**  
by crushers, sieves, blenders, pelletizers, classifiers, and conveyor belt transfers.
- **Installations for feeding material**  
Filling of stock piles and tip bunkers, ship loading by telescope chutes, vehicle loading from silos.
- **Silos, stock houses, 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.



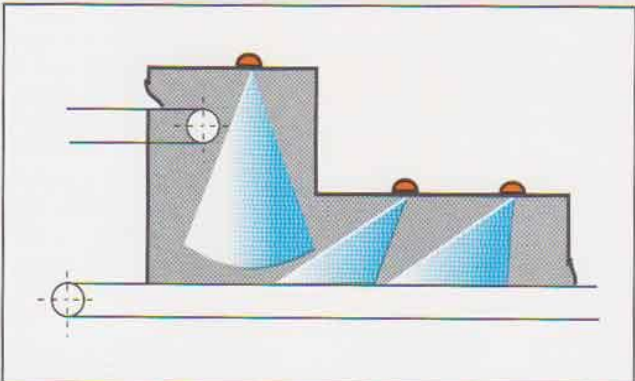
Regular pneumatic impulse cleaning with **ERPULSOR®** and blowing mushroom at thermally treated materials.



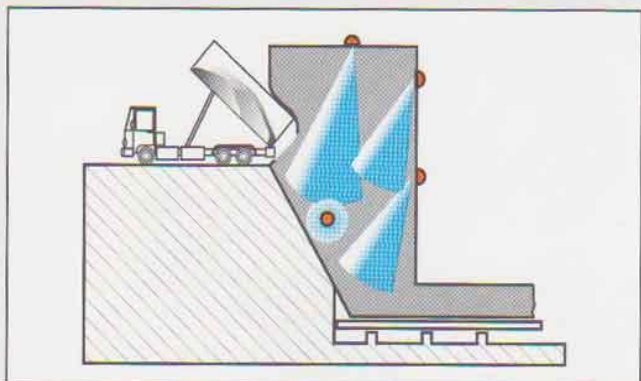
Crushers 13



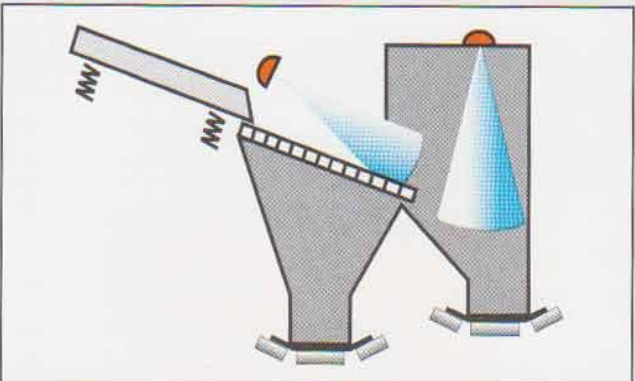
Grab operation 14



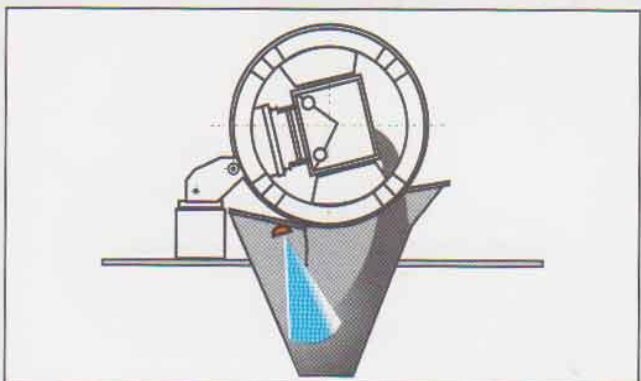
Conveyor belt transfers 15



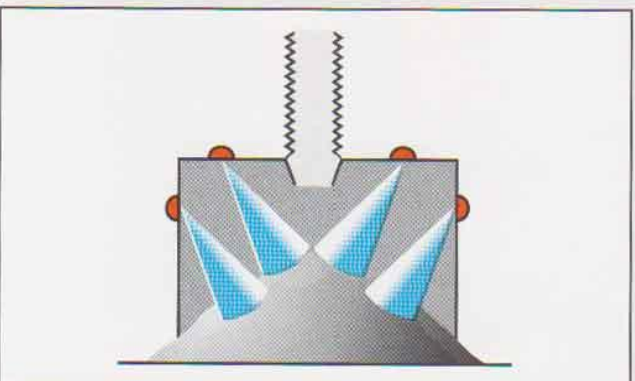
Tip-truck bunkers 16



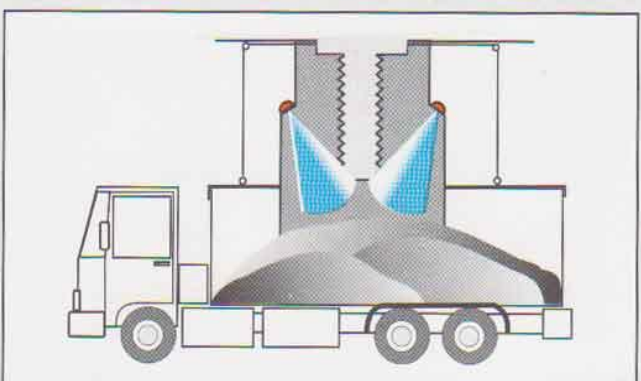
Sieves / screens 17



Railway pit bins 18

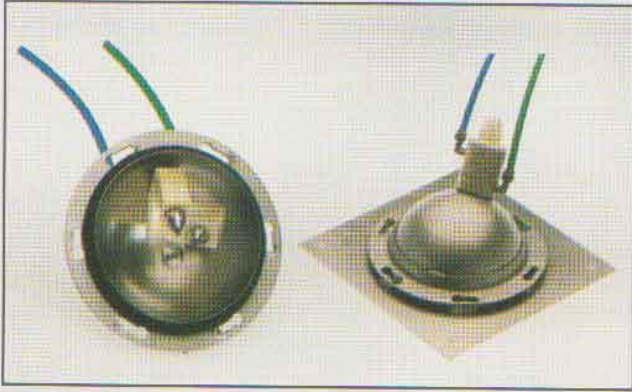


Shiploading 19



Truck loading 20

# DUSTEX® Components



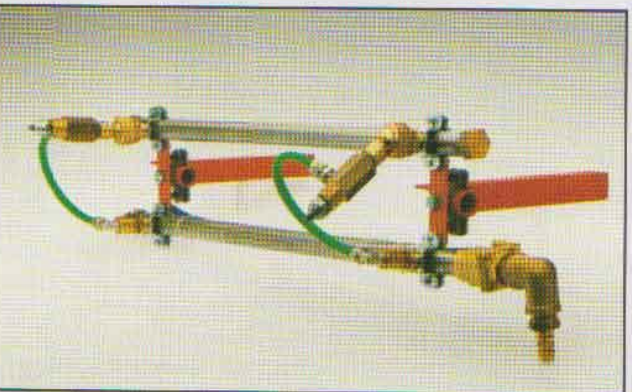
Nozzle Cupola with nozzle adapter for universal adjustment



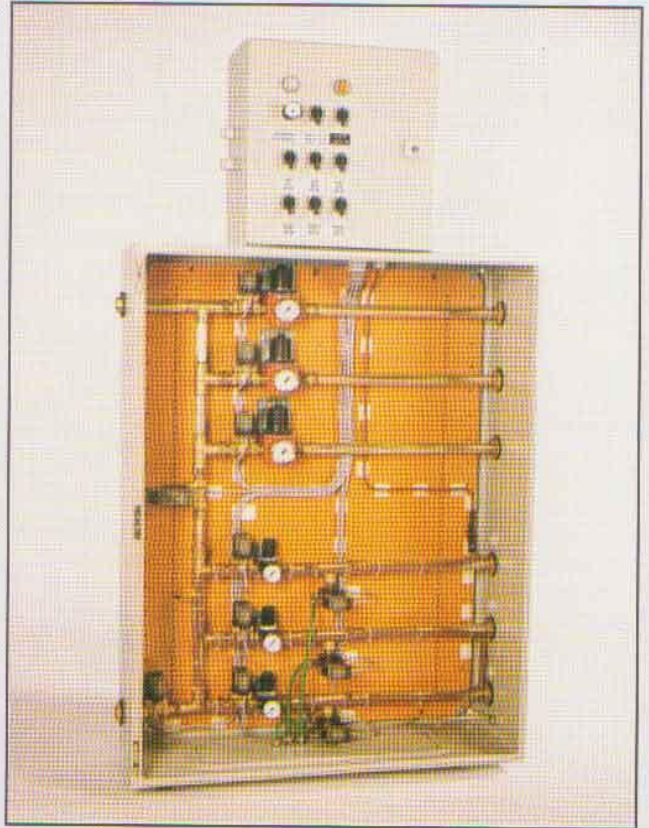
Conditioning Nozzle



Fog Pipe



Nozzle Device



Control Unit



Control Unit with motor regulating valves

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

With evaporative cooling, the flue gas temperature can be reduced by fine water drops. The flue gas is conditioned. The energy for transforming water into steam is taken away from the gas. Naturally the energy content of gas with higher humidity remains the same as no energy is removed.

**With 1 m<sup>2</sup> water at 20 °C, for example, about 23700 Nm<sup>3</sup> flue gas (in a particular application) can be cooled from 300 °C to 200 °C.**

The size of the drops decides on the rate of evaporation and thus on the speed of cooling. The smaller the drop, the higher the relative surface, i.e. the relation of surface to volume, and the quicker it evaporates and attracts the energy from the flue gas. Thanks to the fine fogging of the cooling water the dimensions of the gas conditioning installation and with it the costs can be considerably reduced.

Through the fine fogging of the water the drops can also react with the dust particles of the flue gas and lead to a relief of the electrostatic filter. This is another advantage. The degree of efficiency of the electrostatic filter does not only increase with increasing cooling of the gas, but also with the optimized content of humidity.

With regular fine fogging with **DUSTEX**<sup>®</sup> conditioning nozzles a high cooling effect is achieved and the developing of mud and cakings in the direct spraying range reduced in the swamp of the cooling tower often appearing with ordinary spray nozzles and a surface corrosion or damaging by washing effects are avoided.

As the **DUSTEX**<sup>®</sup> nozzles work with low pressure, they have relatively large diameters and are less susceptible to clogging or wear than high pressure nozzles. The reliability of the cooling system increases. Normally filtered industrial water can be used.

By adding components like milk of lime to the cooling water chemical reactions with the flue gas are possible, including other advantages.

A control system guarantees a constant exit temperature, even with differing entering temperatures and gas streams and varying gas pressures.

## Fields of application:

### Cement and lime industry

Evaporation coolers for roller mill bypass, alcali bypass, furnace exhaust and klinker cooling.

### Glass industry

Cooling of the exhausts of glass tanks and furnaces.

### Low temperature installations

Cooling of the exhausts of drying kilns, cooling of textile exhaust.

### Foundries

Cooling of cupola melting furnaces.

### Operation in the NE- metal industry

Cooling plants for the basic industry, cooling plants for the manufacturing of copper, brass, lead zinc.

### Furnace power plants (waste and coal)

Flue gas cooling.

## Advantages of the Application of **DUSTEX**<sup>®</sup> Conditioning Nozzles

1. Cooling to a desired low temperature over very short cooling distances.
2. No silting-up, no cracking of the linings due to shock effects.
3. No excessive water, as the whole amount of water evaporates in an optimal way.
4. Larger range of effectiveness of the electrostatic filter.
5. High reliability due to low water pressures and low wear.
6. Easy mounting, variable adjusting of the fog columns and quick maintenance.
7. Use of industrial water.
8. Avoiding of expensive dust vacuuming installations.

