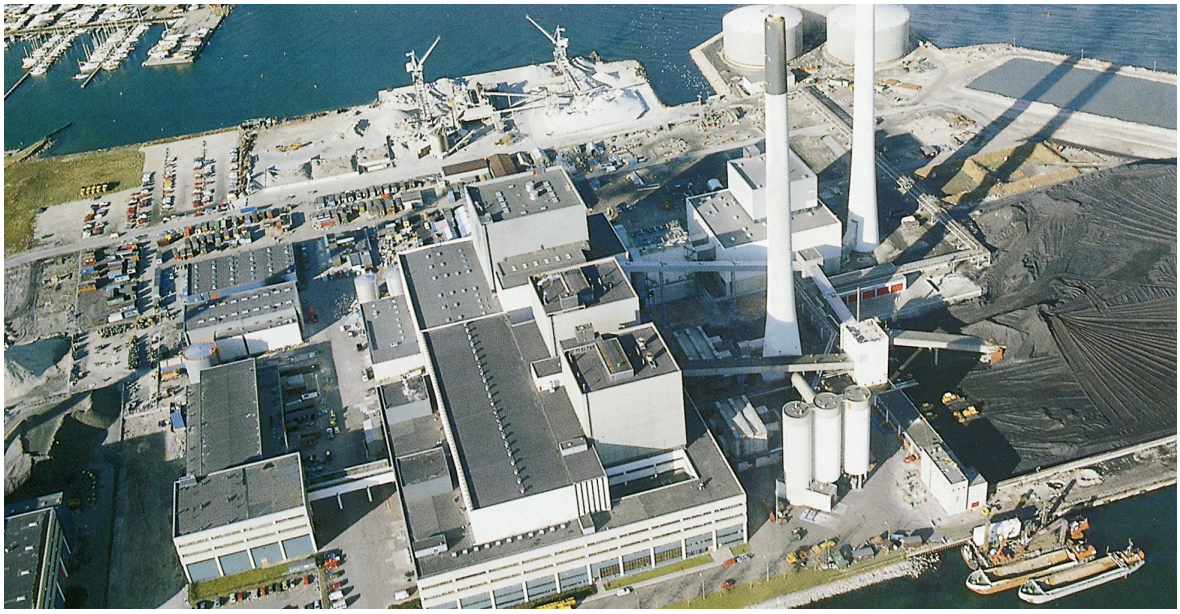
Densit® wear protection in the coal-fired

# Power generation

- ensures continuous operation of critical components



**Continuous operation is essential for coal-fired power plants both to maximise return on investment and to provide a reliable power supply. For economical running, maintenance costs must be minimised throughout the plant, requiring engineering skill and reliable components so that shutdowns can be scheduled.**

In particular the boilers must always run as first priority. Unscheduled shutdowns must be avoided, primarily to avoid production loss but also to minimise maintenance costs.

Optimisation of efficiency is also an important factor in running an economical plant, affecting many aspects of process flow and component selection. Compliance with environmental performance legislation is an increasing and vital priority.

Densit® wear protection systems is a useful tool in the ongoing battle for continuous improvement and minimum operating costs.
Reliable wear linings are essential for effective maintenance planning, and a Densit® solution offers both reliability and long life: less frequent planned maintenance, no unscheduled maintenance, and no unexpected leaks. Densit® wear protection systems can be designed to minimise heat loss in components, ducts and pipes.

Densit

## DENSIT® ECONOMY WITH SEAMLESS AND FLEXIBLE LININGS

The intrinsic nature of Densit® wear lining systems means that they are completely jointless, and can be formed into any geometry. This flexibility provides the capability for installing seamlessly graduated eccentric linings of variable thickness. In this way the most economical lining solution is achieved, thicker protection being applied where wear is most extreme, and thinner protection where less wear occurs, with smooth graduation in between. This feature is particularly recommended for lining components such as pipes, ducts and cyclones, where wear exposure varies within the component. For the same reason, eccentric linings are especially recommended for pipe bends.

### IN-SITU INSTALLATION

Densit® wear protection is applied by casting, trowelling or spraying, depending upon the component size and geometry. Densulate insulated linings are suitable for high-temperature applications where minimising heat loss is critical.

### DENSIT® COMPONENTS

Pre-lined Densit® components in any geometry are also available, for situations where in-situ lining is impractical or uneconomical.

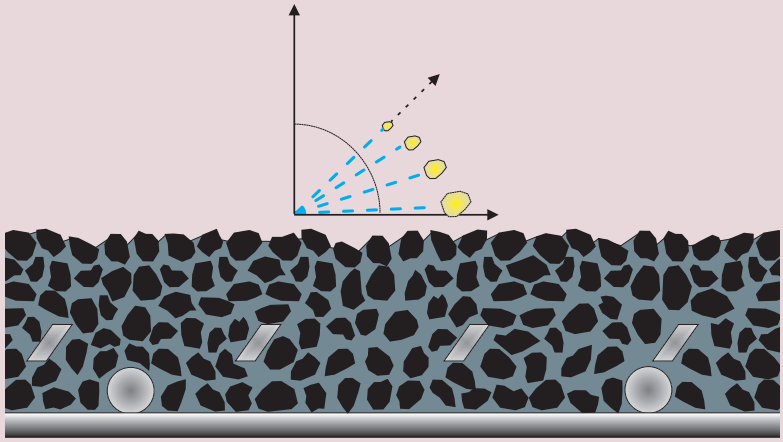
General

# Technical Guidelines

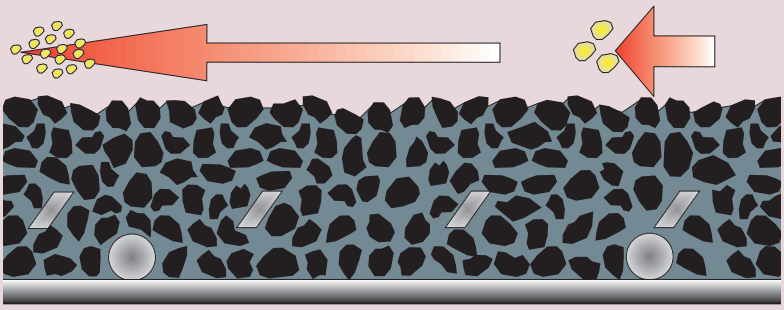
The lifetime of Densit® wear protection increases with reduction in particle size, slower particle velocity, and a smaller angle of particle impact.

**Wear rates increase exponentially with particle velocity.**

**Wear rates increase with hardness and angularity of particles, determined by media mineralogy and physical form.**



*Relation of particle size to angle of incidence*



*Relation of particle size to air velocity*

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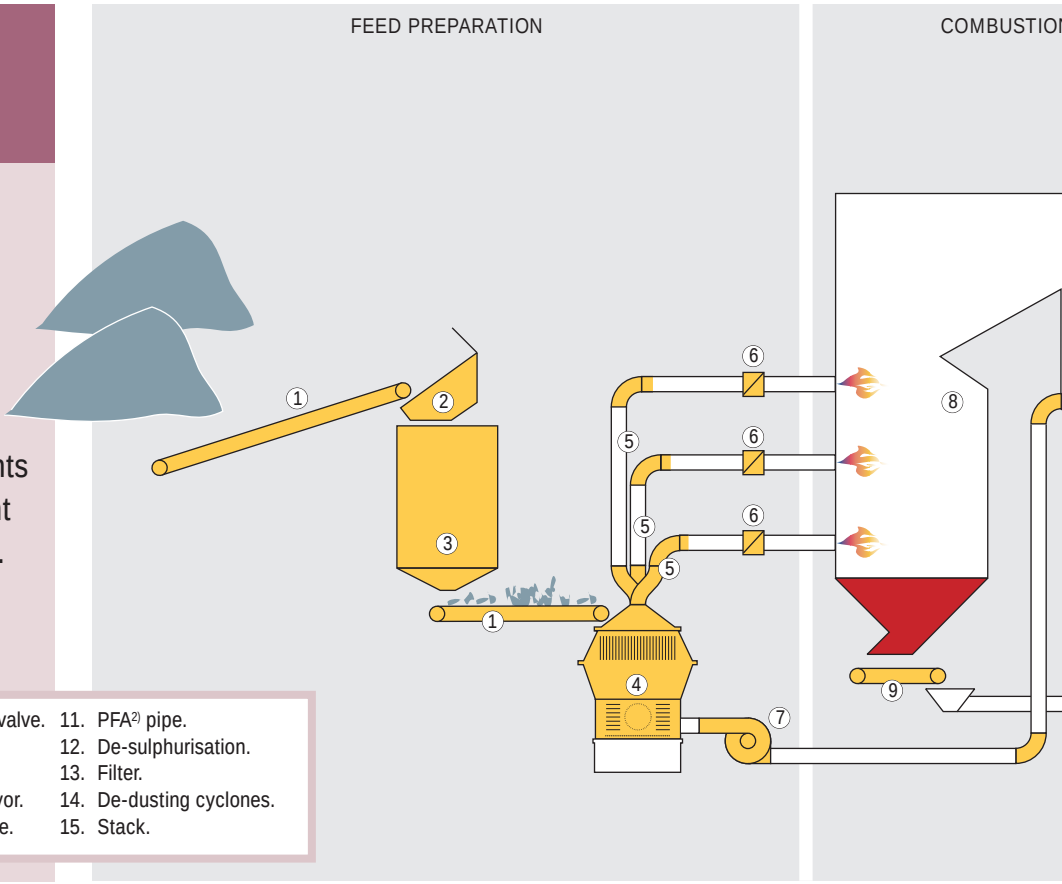
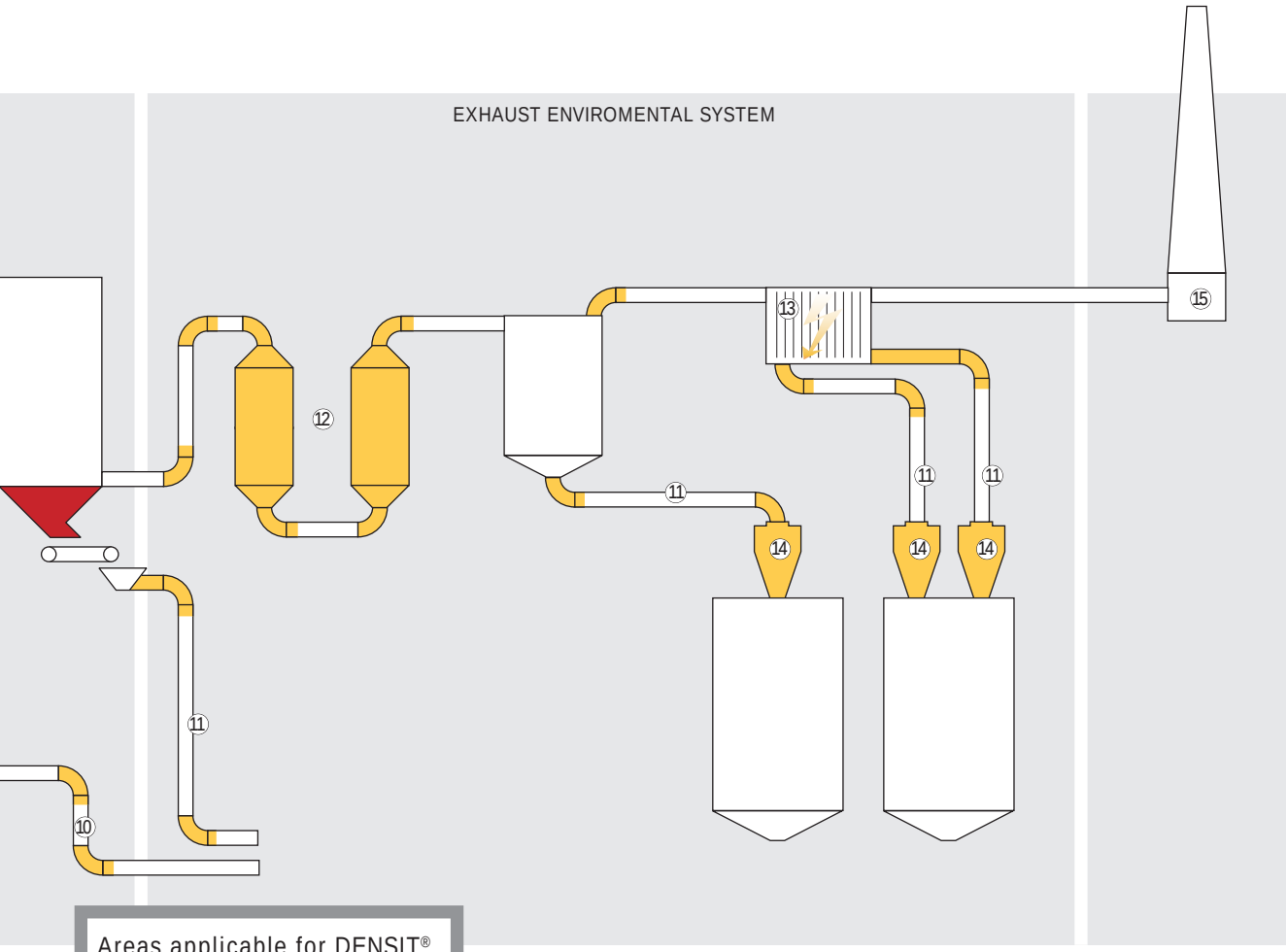
# FLOW SHEET

Typical process flow in the coal-fired power generation industry, showing components where Densit® wear-resistant lining solutions are installed.




1. Conveyor.
2. Duct.
3. Silo.
4. Pulverising mill.
5. PF[1] pipes.
6. Non-return valve.
7. Fan.
8. Boiler.
9. Slag conveyor.
10. Slag pipeline.
11. PFA[2] pipe.
12. De-sulphurisation.
13. Filter.
14. De-dusting cyclones.
15. Stack.

| COMPONENT | PROCESS PARAMETERS | MEDIA TYPE | TYPICAL SERVICE TEMP. | RECOMMENDED DENSIT® SOLUTION |
|---|---|---|---|---|
| **Pipes, branch pipes, conveyors, valves, ducts and bends** | Transport of process air, ground media, flue gases, containing dust in variable concentrations. | Coal, PF[1], PFA[2], lime. | Up to 800°C (1470°F) | WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type. WearFlex 2000 HT for T>400°C. Densit® components. Eccentric or seamlessly graduated linings. |
| **Non-return check-valves Powered valves** | Safety valve isolating PF[1] feed pipes from boiler backfire. | PF[1]. | Up to 200°C (390°F) | WearFlex/Cast 500 or WearFlex/Cast 2000 depending on media type. Densit® components. Seamlessly graduated linings. |
| **Forced draft fan Induced draft fan** | Ventilation for environmental control system for exhaust gases. | PF[1], PFA[2]. | Up to 350°C (660°F) | WearFlex 500 or WearFlex 2000 depending on media type. Seamlessly graduated linings. |
| **Pulverising mill** | Crushing of coal. | Coal, PF[1]. | Up to 350°C (660°F) | WearFlex 500 or WearFlex2000 depending on media type. |
| **Pulverising mill separator** | Separation of fine particles from process air or flue gases. | Coal, PF[1]. | Up to 350°C (660°F) | WearFlex 500 or WearFlex 2000 depending on media type. |
| **Conveyors** | Transport of coal, slag, ash and lime. | Coal, slag, PFA[2], lime. | Up to 100°C (210°F) | WearFlex 500 or WearFlex 2000 depending on media type. Seamlessly graduated linings or prefabricated panels. |
| **Dedusting cyclones** | Separation of fine particles from process air or flue gases. | PFA[2], flue gases. Presence of sulphur dioxide, nitrogen dioxide. | Up to 400°C (750°F) | WearFlex 500 or WearFlex 2000 depending on media type. WearFlex 2000 HT for *T*>400°C. Seamlessly graduated linings for most exposed sections (inlet, vortex finder, base outlet). |
| **Bag house or electrostatic filter** | Separation of fine particles from process air or flue gases. | Flue gases, PF[1], PFA[2]. | Up to 250°C (480°F) | WearFlex 500 or WearFlex 2000 depending on media type. Lining for inlets and outlets only. |




Areas applicable for DENSIT®

Shade matches operating temperature:

- 0 – 400°C (32-750°F)
- 400 – 1200°C (750-2190°F)

## FEED PREPARATION

**General process parameters relevant for wear:**

Processing of coal, limestone and other minerals.
Low temperature.

### COMPONENTS

**Chain conveyor.**

**Chutes.**

**Screw conveyors.**

## COMBUSTION

**General process parameters relevant for wear:**

Processing of PF[1].
Low and high temperatures.

### COMPONENTS

**Pulverising mill:**
Inlet, outlet and housing.

**Coal mill separator.**

**PF[1] pipes.**

**Non-return check valves.**

**Powered valves.**

**De-dusting pipe:**
Mill to cyclone and filter (pipe bends, inlet to filter housing).

**Forced draft fan.**

**Inlet to coal burner.**

## EXHAUST ENVIRONMENTAL SYSTEM

**General process parameters relevant for wear:**

Transport of flue gases, PFA[2], slag, presence of sulphur dioxide, nitrogen oxide.
Low and high temperatures.

### COMPONENTS

**Induced draft fan:**
Housing.

**De-dusting cyclones.**

**Baghouse filters.**

**Electrostatic precipitators.**

**PFA pipes.**

**Silos.**

**Chutes.**

**Conveyors.**

[1] *PF = pulverised fuel.*
[2] *PFA = pulverised fly ash.*