TRACK RECORD

ITW Densitillä on yli 30 vuoden kokemus luotettavien kulutus-suojauksien kehitystyöstä ja valmistamisesta.

Densit® kulutusvuorauksia sovelletaan useiden eri teollisuus-alojen prosesseissa ja komponenteissa.

Useat merkittävät laitetoimittajat käyttävät Densit® vuorauksia prosessilaittedensa kriittisissä kohteissa.

ITW Densit tarjoaa korkeatasoisia ratkaisuja asiakkailleen ISO 9001, ISO 14001 standardien ja OHSAS 18001 laatusysteemin mukaisesti. Lloyd's Register Quality Assurance'n sertifioimana.

Oikean Densit® kulutussuojausratkaisun valinta tehdään yksilöllisesti kohteen edellyttämien erityisvaatimusten mukaisesti.

ITW Densit

Kulutussuojaus

Densit® WearFlex
Densit® WearCast

- prosessiteollisuuden sovelluksiin

Prosessilaitteden kulumisesta johtuvat odottamatomat seisokit aiheuttavat ylimääräisiä kustannuksia ja tuotannon menetyksiä. Kuluminen on merkittävä ongelma erityisesti teollisuudenaloilla, joilla käsitellään suuria määriä abrasiivisesti kuluttavia materiaaleja.

Kehitystyömme lähtökohtana on seisokkien ja huoltoaikojen minimointi joka palvelee prosessiteollisuuden vaatimuksia kustannustehokkuudesta.

ITW Densit'in ainutlaatuiseen teknologiaan perustuvat tuotteet suojaavat tuotantolaitosten koneita ja laitteita kulumista vastaan. ITW Densit'lle on vuosien varrella kertynyt vahva tietotaito erilaisten kulumisongelmien ratkaisemisessa.

"Within the framework of the Densit® technology, we fulfil the needs of specific market segments for materials and systems to reinforce areas which are both exposed to severe demands and are critical to the end users' activities."

Tuotekatsaus

- MATERIAALIT

WEARFLEX WEARCAST

DENSIT® WEARFLEX

Densit® WearFlex on tuoteryhmä joka koostuu erittäin kovista partikkeleista ja kulutusta kestävistä sideaineista. Densit® WearFlex'in maksimikäyttölämpötila on 400°C. Erilliseen kiinnityverkkoon muuratessa voidaan WearFlex tuotteita käyttää ilman erillisiä teräskuituja. Vaihtoehtoisesti WearFlex HT-massaa voidaan käyttää 1200 °C:een saakka. Densit® WearFlex tuotteet voidaan muurata suoraan ankkurointiverkoilla varustettuihin pintoihin käytettäessä 20-50 mm:n (3/4"-2") vuorauspaksuutta.

DENSIT® WEARCAST

Densit® WearCast on erittäin kovista partikkeleista ja kultusta kestävistä sideaineista koostuva valumassa. Densit® WearCast'in lämpötila- sekä sovellusalueet ovat vastaavat WearFlex'in kanssa. Densit® WearCast'in avulla voidaan valaa kulutuspinta vaihteleviin ja vaativiinkin muotoihin.

- CONCEPTS

COMPONENTS DENSULATE

DENSIT® KOMPONENTIT

Vuoraus tapahtuu saumattomasti ilman muotorajoituksia.

Joustavuus ja saumattomuus tarkoittaa sitä, että vuoraus voidaan muotoilla ideaaliin muotoon. Paksuutta säädellään eri komponenttien osien tarpeiden mukaan ja, kuinka paljon suojausta tarvitaan.

DENSIT® LÄMPÖERISTETTY KULUTUSSUOJAUS

Densulate lämpöeristetyt kulutussuojaukset on suunniteltu suojaamaan komponentteja kulutuksen lisäksi säteilylämpöhäviöitä vastaan. Lämpöeristys asennetaan Densit kulutusvuorauksen alle.

Wear protection for many industries

Densit® wear-resistant linings are especially suitable for protecting processing parts in pneumatic transport and the transport of slurries, and also against wear by bulk solids. Densit® wear solutions are mainly installed in these industries:

- ✓ Cement and lime.
- ✓ Coal-fired power generation.
- ✓ Steel.
- ✓ Paper.
- ✓ Mineral sands.

UNIQUE SOLUTIONS

Densit® wear protection provides unique solutions to wear problems in many industries by:

- ✓ Increasing lifetime of new and existing components.
- ✓ Increasing safety margins against unscheduled shutdowns.
- ✓ Minimising maintenance costs.
- ✓ Optimising pollution control of plants by reducing particle emissions through exposed wear areas.

WEAR PROTECTION APPLICATIONS

ITW Densit provides **wear protection solutions** which are **especially suited to extreme industrial situations** where low **maintenance costs and minimum** shutdown time are critical to the **operation.**

ITW Densit **delivers** wear-resistant **linings** for process machinery exposed to erosive wear such as:

- ✓ **Cyclones.**
- ✓ **Ducts.**
- ✓ Pipes and **bends.**
- ✓ **Venturis.**
- ✓ **Chutes.**
- ✓ **Separators.**
- ✓ **Mills.**
- ✓ **Fan casings.**
- ✓ **Valves.**
- ✓ **Sluices.**
- ✓ **Bunkers.**
- ✓ **Pits.**
- ✓ **Outlet/cyclones.**
- ✓ **Hoppers.**
- ✓ **Back house filters.**

Densit® anchoring/reinforcement

- auxiliary products for use in Densit® wear protection

Steel mesh is used for anchoring of Densit® wear-resistant linings for a range of process temperatures.

The Densit® Anchoring mesh 400°C is mainly used when installing a Densit® WearFlex or Densit® WearSpray
lining, but is also suitable for installing Densit® WearFlex HT in cases where max. operating temperature is limited to 500°C.

At higher operating temperature Densit® Anchoring mesh 800°C must be used. Depending on installation situation the mesh must be placed in an appropriate distance from the steel casing.

Further details for choosing the right method of installation at given lining thickness are outlined in the Densit® WearFlex Installation Manual.

PROPERTY		Anchoring mesh 400°C	Anchoring mesh 800°C
Material type		Mild steel	AISI 304 L stainless steel
Weight	kg/m² (lb/ft²)	4.4 (0.9)	2.0 (0.4)
E-modulus	GPa (Msi)	205 (30)	205 (30)
Maximum service temp.	Celsius	500 (930)	800 (1470)

When installing the new improved WearFlex products (except HT-products) on expanded metal mesh fibres are generally NOT required.

Fibres protect the wear-resistant lining against settlement cracks and random impact of larger particles. Steel fibres are suitable for use with WearFlex and WearCast products, for service temperatures up to 1200°C. WearSpray fibres are suitable for use with WearSpray product, and due to the properties of the polypropylene material the lining is protected against settlement cracks only.

PROPERTY		Steel fibres 400°C	Steel fibres 800°C	Steel fibres 1200°C	WearSpray fibres
Material	DIN 17140 Werkstoff	Hardened mild steel	1.4006 Stainless steel	1.4841 Stainless steel	Poly-propylene
Length	mm (in)	12.5 (0.50)	12.5 (0.50)	12.5 (0.50)	6 (0.25)
Diameter	mm (in)	0.4 (0.016)	0.4 (0.016)	0.4 (0.016)	N/A
Thickness	µm	N/A	N/A	N/A	35-40
Width	µm	N/A	N/A	N/A	100-150
Density	g/cm³ (lb/in³)	7.8 (0.28)	7.8 (0.28)	7.8 (0.28)	0.9 (0.033)
Tensile strength	MPa (ksi)	1200 (175)	900 (130)	1600 (235)	425 (62)
E-modulus	GPa (Msi)	205 (30)	205 (30)	205 (30)	13 (1.9)
Ultimate strain	%	N/A	N/A	N/A	7
Maximum service temp.	°C (°F)	400 (750)	800 (1470)	1200 (2190)	100 (210)

Technical Guidelines

- wear protection systems

The Densit® range of wear protection systems comprises:

- ✓ Densit® wear protection products.
- ✓ Densit® components.
- ✓ Densit® insulated wear protection.
- ✓ Auxiliary products.

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

Densit® products are safely recommended for wear protection in environment where:

- Impacting particle size is up to 4 mm in diameter
- Impacting particle velocity is up to 25 m/s
- Impact angle is smaller than 45°
- When alkalis are present in the environment by more than 2 % (by weight) it will in some cases attack Densit® products

- Densit® products willl show optimal performance when the environment pH-value is in the range 6-11

Based upon the physics of wear mechanisms the general thumb rule is that the wear rate can be assumed to increase with maximum particle size raised to the third power and with maximum particle elocity raised to the third power (i.e. a 25 % increase in particle size or velocity will double the wear rate). Also, the wear rate increase with hardness and angularity of the particles, determined by media mineralogy and physical form.

Densit®
WEAR 2000

Comments	LOW TEMPERATURE Cast	Flex	HIGH TEMPERATURE Cast HT	Flex HT
Description	Castable product. To use in pipings/elbows and precast shapes, where in-sito lining is geometrically impractical or would involve extended outage time.	Trowel product. To use in almost all kind of application. Very good for complex geometry. Fast and easy installation.	Castable product for high temperature applications. Excellent for wear/heat protection of piping/elbows and precast shapes, where in-sito lining is geometrically impractical or would involve extended outage time.	Trowel product for high temperature applications. Excellent for use as wear/heat protection in almost all kind of application. Very good for complex geometry. Fast and easy installation.
Density of material Kg/m³ (lb/ft³)	2950 (184)	2900 (181)	3050 (190)	2900 (181)
Hardness Mohs scale	9.0	9.0	9.0	9.0
Compressive Strength MPa (Kpsi)	170 (24.7)	160 (23.2)	170 (24.7)	133 (19.3)
Flexural strength MPa (Kpsi)	23 (3.3)	20 (2.9)	16 (2.3)	15 (2.2)
Coefficient of thermal exp.1/°C 1/°F)	$10x10^{-6}$ ($5.6x10^{-6}$)	$10x10^{-6}$ ($5.6x10^{-6}$)	$10x10^{-6}$ ($5.6x10^{-6}$)	$10x10^{-6}$ ($5.6x10^{-6}$)
Thermal conductivity W/m °C	1.5	1.5	1.5	1.5
Maximum service temper. °C (°F)	400 (750)	400 (750)	1200 (2190)	1200 (2190)
Abrasion resist. cm³/50 m²	1.5-2.0	2.0-3.0	1.5-2.0	0.5-1.0
Erosion resistance min./cm³	140	130	170	140
Casting Shrinking vol. %	0.2	0.2	0.2	0.2
Chemical composition % CaO	18	18	6	6
% Sio	25	25	6	6
% Al O +TiO	55	55	87	86
% SiC				
% Fe O	< 0.2	< 0.2	< 0.3	< 0.3
% Cr^{6+}	< 0.0002	< 0.0002	< 0.0002	< 0.0002