

Technical Data

Properties		Standard	Densit® WearFlex 2000™
Density	kg/m ³ (lb/ft ³)	EN 1015-6	2900 (181)
Compressive Strength	MPa	EN 12190	160
Flexural Strength	MPa	EN 196-1	20
Dynamic E-modul	MPa	EN	70 - 80 10 ³
Casting Shrinkage	vol. %	-	0.2
Thermal Conductivity	w/m°C	-	1.5
Coeff. of Thermal Expansion	1/°C (1/°F)	EN 1770	10x10 ⁻⁶ (5.6x10 ⁻⁶)
Heat Capacity	KJ/kg°C	-	0.9 - 1.0
Max. Service Temp.	°C (°F)	-	400 (750)
Abrasion Resistance	cm ³ /50cm ²	DIN 52108	0.5 - 1.0
Erosive Resistance	min/cm ³	-	130
Chemical Composition	CaO	EN 196-10	18%
	SiO ₂		25%
	Al ₂ O ₃ + TiO ₂		55%
	Fe ₂ O ₃		<0.2%
	Cr ⁶⁺		<0.0002%
Bag Size	kg (lb)	-	25 (55)
Pallet Size	kg (lb)	-	1250 (2755)

What's in a name? When the name is ITW Densit® and Wear-Concepts, it means you are protected. Why? Because of what's on the inside of the product and the company that will make a stand even under pressure. Do you need a partner that will stand with you through adversity? If so, call us and we'll give our word on it!

The ITW Densit® line of wear products are sold exclusively in North America by Wear-Concepts, Inc. It can be installed by Wear-Concepts' Field Services Crew or by your own maintenance team. Call for details.



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Solution

Applications

Applications

Solution

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Densit® Secret Formula

by Mike Sexton

My dad used to say to me when I was growing up, "Son, what a person looks like on the outside doesn't matter. It's what's on the inside that counts. The integrity of your name is the only thing that you have that is worth anything. Let your word be your bond." When the pressure is on, who I am on the inside and standing for what is right has always seen me through adversity.

This principle also holds true when it comes to wear-resistant products. A shining example of material integrity is the ITW Densit® line of products. Their WearFlex 2000™ is a chemically bonded, corundum ceramic, wear-resistant lining. It is a one-component, ready-mix, wear compound made with wear-resistant aggregate to provide a tough and long-lasting wear solution. WearFlex 2000™ is applied directly to an anchoring mesh in thicknesses from 3/4" to 2", providing seamless graduation in lining thicknesses on almost any shape without vulnerable joints. WearFlex 2000™ is good for use just 24 hours after installation.

But what makes it so tough and wear-resistant? Well, "It's what's on the inside." ITW Densit® refers to their products also as Ultra High Performance Concrete (UHPC). To achieve UHPC, ITW Densit® has developed a "secret formula." So what's in it? It's a secret, but here's a little peek.

The basic recipe for common concrete is aggregate + sand + grey Portland cement + water = concrete. Pretty simple. Portland



Extruded mesh being installed.



Densit® WearFlex™ being mixed.

(continued on page 2)



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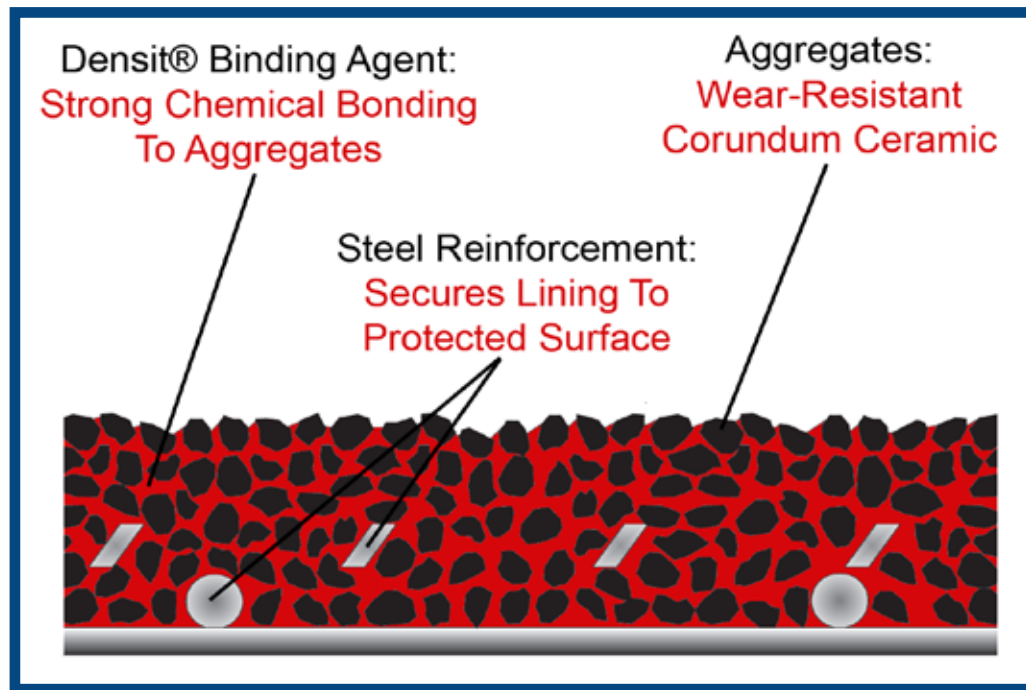


cement is the binding agent. Without it you have rock soup. Now here is the **Densit® WearFlex 2000™** recipe. (But don't tell anybody!)

1. The aggregate in the **WearFlex 2000™** is Corundum. The name "corundum" is derived from the Southern Indian Tamil word, "kuruntam" which means "ruby." Corundum is a crystalline form of aluminum oxide with traces of iron, titanium, and chromium. Transparent specimens are used as gems such as rubies and sapphires. Because of corundum's hardness (pure corundum is defined to have 9.0 Mohs hardness), it can scratch almost any other mineral. It is commonly used as an abrasive on everything from sandpaper to large machines used in machining metals, plastics, and wood. In addition to its hardness, corundum is unusual for its density of 4.02 g/cm³, which is very high for a transparent mineral composed of the low atomic mass elements, aluminum and oxygen. Therefore, corundum ceramic is extremely wear-resistant. It's a gem, literally!

2. The cement used in **WearFlex 2000™** is white Portland cement. Not grey! White Portland cement is finer, purer, and more expensive. Why? Because white Portland cement is mainly used in pre-cast concrete products, and it is commonly made to a high, early strength specification, such as ASTM C 150 Type III. This aids production rate and higher potential strength. In other words, it bonds tighter and more completely on a molecular level.

3. In order to produce a stronger wear-resistant prod-



DENSIT® - MATERIAL COMPOSITION

- **Cement:**
 - Binding material, contributes to the main part of the compressive strength
- **Microsilica:**
 - Densifies, contributes to the compressive strength, "lubricates" the aggregates
- **Superplasticizer:**
 - Lubricates and packs the particles
- **Aggregates**



● **The Densit® technology or the DSP-technology is invented and developed (DSP – Densified Systems with ultra-fine Particles)**

CEMENT PASTE
(Cement particles and water)
w/c = 0,50-0,70

SUPER PLASTICIZED CEMENT PASTE
(Cement particles, Superplasticizer and water)
w/c = 0,30-0,35

DSP TECHNOLOGY
(Cement, Microsilica, Superplasticizer and water)
w/p = 0,18-0,22

Concrete Densit®

Microstructure 0.01 mm

Thin Section 1 mm

Fracture Surface 10 mm

uct, **ITW Densit®** specifies to add less water. Normally this would make a concrete mixture less workable and difficult to mix thus "starving" the mix. This necessitates the use of a super plasticizer. A super plasticizer is a dispersant additive that increases the plasticity or fluidity of a material. The properties of the **WearFlex 2000™** material are improved greatly when blended with a plasticizer, because it improves workability with less water. Unless the mix is "starved" of water, the strength of the UHPC is inversely proportional to the amount of water added or water-cement ratio. In layman's terms, the super plasticizer breaks the surface tension of water making the water wetter and slicker. Less water means less shrinkage, making **WearFlex 2000™** less porous with tremendous density.

4. Microsilica, also known as silica fume, is an amorphous (non-crystalline) polymorph of silicon dioxide silica. It is an ultra-fine powder collected as a by-product of the silicon and ferrosilicon alloy production from bauxite. Microsilica consists of spherical particles with an average particle diameter of 150 nm. The main field of application is as pozzolanic material for high performance concrete. This fine particulate is the final ingredient that fills in all of the microscopic gaps where the white Portland cement is lacking. Porosity is virtually nonexistent now.

How strong is **Densit® WearFlex 2000™** chemically bonded, corundum ceramic wear-resistant lining? See the chart above and on page four. When subjected to stress testing, **WearFlex 2000™** Wear Compound breaks through the aggregate, not around it. That means that the composition of the **Densit® WearFlex 2000™** total material is consistently bonded together and super hard through and through even under pressure. Now that's integrity!

