

# Specialized coatings for turbomachinery parts

## HiCoat A24 – antifouling coatings

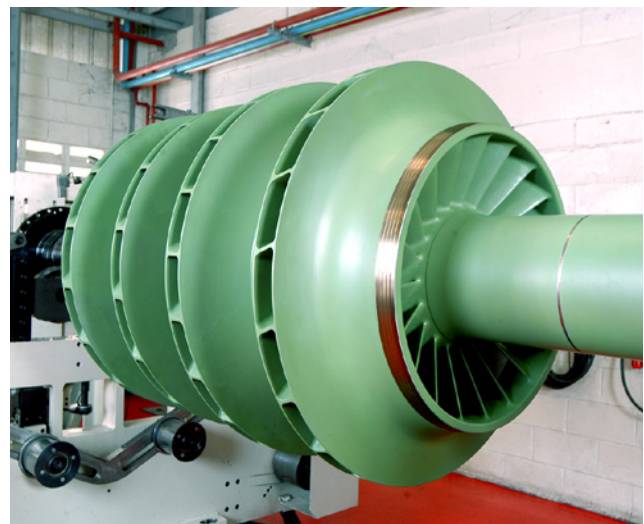
Turbomachinery components either extract energy from moving fluids (combustion gases, steam, air, etc.) or impart energy to those fluids. In service, these components are subjected to corrosion and fouling. Fouling is the adherence of particles and droplets to the surface of turbomachinery components and negatively affects the performance. There are various forms of fouling. However, corrosion and particulate fouling are most pertinent to the turbomachinery industry. Corrosion fouling is classified as a chemical reaction between the reacting fluid and the component surface.

### Coatings for increased efficiency

Many metals form adherent oxide coatings that passivate the surface and prevent further corrosion. Although this is a self-defense against further fouling, metal oxides typically exhibit quite high frictional properties. Even relatively thin coatings of oxides may significantly affect turbine performance. Particulate fouling results from the presence of small particles in the ingested air streams. This can cause a sort of sand dune effect and distort the oncoming laminar flow. This degrades flow capacity and reduces efficiency in a short period of time.

### Current generation coatings found

Fouling is a serious problem, particularly in the oil and gas industry where sticky hydrocarbon aerosols are universally present. Traditionally, no accommodation has been made in designing turbines to tolerate the deposition tendencies of particulate-laden gas streams. There have been recent developments in such coatings to improve the antifouling and corrosion/erosion resistance and to restore the surface finish of turbomachinery components. Sulzer has developed such a coating, HiCoat A24, to increase the corrosion/erosion resistance of turbomachinery.



- Innovative features
- Extended lifetime
- Cost effective



## HICoat A24 antifouling coating

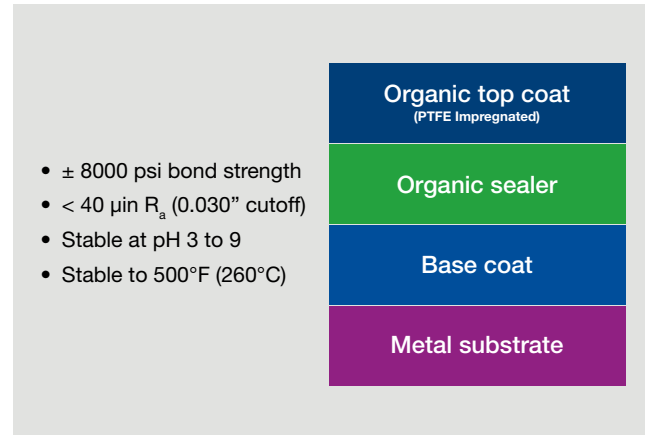
The thickness between 3-5 mils (75-125 microns) is sealed using an inorganic sealer to enhance the corrosion resistance. A final layer utilizing Teflon® is applied to give it a low-friction property that assists in the antifouling quality. The aluminum in the base coat prevents corrosion by acting as a sacrificial coating on ferrous substrates.

## Recommended thickness

HICoat A24 is useful in most situations that require antifouling resistance and a fine surface finish. Stationary and rotating compressor blades, diaphragms, guide vanes, rotors, impellers, and shrouds are all components that would benefit from this coating system. Although most alloys can be coated with HICoat A24, the material works especially well on ferrous alloy. The average recommended thickness is 3-5mils (75-125 microns) for most applications: However, the coating can be applied more thinly or thickly if necessary. Roughness typically ranges between 30 to 40 Ra ( $\mu$  inch) at 0.030 inch (0.75 mm) cutoff.

## The cathodic protection

The principle of cathodic protection was discovered by Sir Humphry Davy and Michael Faraday almost two centuries ago. When two metals are electrically connected to each other in an electrolyte, e.g., seawater, electrons will flow from the more active metal to the other, due to the difference in the electrical potential. When the most active metal (anode) supplies current, it will gradually dissolve into ions in the electrolyte, and at the same time produce electrons, which the least active (cathode) will receive through the metallic connection with the anode. The result is that the cathode will be negatively polarized and, hence, be protected against corrosion.



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