SYMCOAT
METAL PROCESSING

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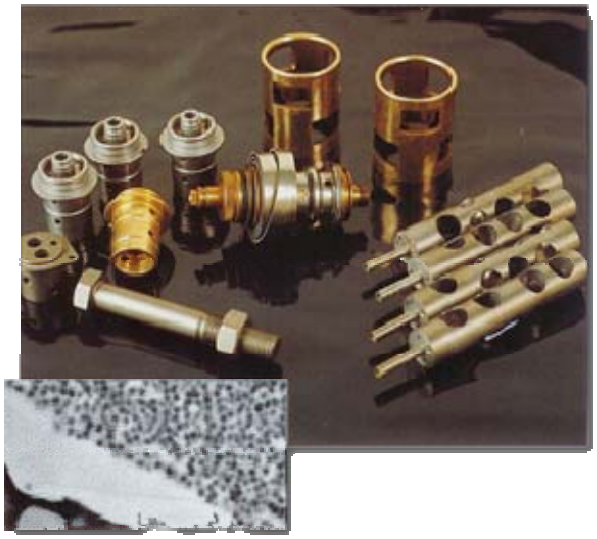
Symcoat Apticote

Apticote 450 is a unique, improved self-lubricating Nickel Alloy Composite which gives even lower friction and greater load carrying capacity than before. It is a revolutionary coating for design engineers, combining the dimensional accuracy of electroless nickel with the excellent sliding properties of PTFE.



Apticote 450 can be applied in very thin deposits with high dimensional precision on most metallic substrates, including mild steel, stainless steel, cast iron, aluminum and titanium. This allows the designer to choose his substrate and mating parts on the basis of a need for strength, light-weight or corrosion resistance. Any problems of galling or wear which might occur with such materials can be completely overcome with Apticote 450.

Features

- Extremely low friction
- Superb accuracy of depositionCompletely uniform coverageThin deposits i.e, 5-10 Microns
- Extended component life
- Non-stick
- No post-matching
- Plates on most metals
- Excellent anti-galling Can be hardened to 400Hv
- Very low wear
- Electrically conducting
- Pleasing visual appearance

Benefits

Low Friction

The superior friction properties of Apticote 450 are invaluable in an unlubricated situation. The uniform dispersion of polymer within the coating produces low friction throughout the component life.

Apticote 450 also imparts non-stick properties, with a reduced drag or torque during initial running. Additional polymer is available on the coating surface to provide a start-up and assembly aid.

Surface Finish

Apticote 450 is available in thickness from 2 microns to a practical maximum of 20 microns; on thin coatings the manufactured finish is maintained after plating, however, on thicker coatings above 10 microns there is a deterioration of the post plating finish.

Uniformity
Apticote 450 provides predictable uniform coverage in the range 5 to 20?, depending on the application. It can be applied to your finished product without the need for post machining. It can even coat internal surfaces, thread forms and bores.

Applications
- Mould
- Tools
- Connectors
- Fasteners
- Circuit Breaker Components
- Valve Seats
- Pump Bearings
- Machine Tools

SURFACE	Friction vs Hard Steel
Steel	0.50
Electroless Ni	0.45
Hard Chrome	0.40
MoS?	0.20
APTICOTE 450	0.08

Substrate Materials
Symcoat has solved all the pre-treatment problems, so that Apticote 450 can be applied with confidence to materials like Titanium and Aluminium as well as the more usual range of mild steel and stainless steels.

Often, Apticote 450 can bring desirable tribological properties to a light-weight material - a vital property for aerospace and automotive applications.

Low Wear and Anti-Galling
In lightly loaded situations, Apticote 450 has been known to show no detectable wear for many thousands of operations, such is the efficiency of its self lubrication. At higher loads, it wil exhibit some wear, but it is excellent for threads or connectors which can always be undone, no matter how tight you fasten them - even with stainless steel threads, galling is a thing of the past.

Hardness
Apticote 450 has a bulk hardness of about 250VPN, although this can be increased after heat treatment of the coating at 300°C for four hours to 400VPN. There is no reason to doubt that the matrix in Apticote 450 has a hardness of at least 500VPN, increasing to 1000VPN after this type of heat treatment.

DEPOSIT PROPERTIES

COMPOSITION	
Nickel	80-83% by weight
Phosphorus	9-11% by weight
PTFE (Polytetrafluoroethylene)	8-9% by weight (20-25% by volume)
DENSITY	6.5 to 7.5 g/cm^3

HARDNESS HVN/100	
As plated	300-350 or approx. 31-36 HRC
Heat treated, 500°F (260°C), 4 hours	400-450 or approx. 41-45 HRC
MAXIMUM HEAT TREAT TEMPERATURE	550°F (288°C)
PTFE decomposition	645°F (340°C)
COEFFICIENT OF FRICTION, ASTM D-2714	
Dry	0.2 or less
Wet	0.1 or less
SURFACE FINISH, Ra	0.5 micrometers or better
WEAR RESISTANCE - Sliding surfaces	Low load / Moderate speed, or Moderate load / Low speed
TABER ABRASER WEAR (1,000 cycles, CS-10 wheel 1,000 g. load)	
as plated	16 mg
Heat treated, 480°F (250°C), 6 hours	12 mg
CORROSION RESISTANCE - ASTM B-117	
0.5 mil	650 hours
1.0 mil	1,000 hours

The deposit properties listed are typical values. Depending on the application, the deposit composition may intentionally be modified to optimize specific properties.