



# NYEBAR TYPE P

A Fluorocarbon Barrier Film to retard oil migration in mechanical devices and prevent environmental fouling of electric contacts and printed circuitry.

## Theory of Wettability and Oil Creep Prevention

Liquids will spread upon or "wet" any surface where surface energy is higher than the surface tension of the fluid. Because of the very high surface energies of metals, fluids would be expected to spread or creep on any truly clean metal surface. By modifying in advance the surface of a metal or other solid with a stable, durable film of low surface energy, it is possible to retard the migration or creep of fluids on that surface. Wettability of surfaces can be controlled and protection can be obtained from very thin film coatings.

## NyeBar-Type P

NyeBar - Type P is a stable fluorocarbon polymer with a surface energy well below the surface tension (at room temperature) of most lubricating fluids, including the easily-migrating silicones. The NyeBar polymer is supplied in solution in fast-evaporating perfluoralkane solvents. At room temperature, the film remaining after evaporation of the solvent will prevent "wetting" of the surface and creep of oils across the film surface. Spreading can, however, occur from gravitational or inertial forces, as (1) when fluid quantity is sufficiently large that it literally "falls" across the barrier film; or (2) when rotational speeds are sufficiently high that they sling the fluid over the film.

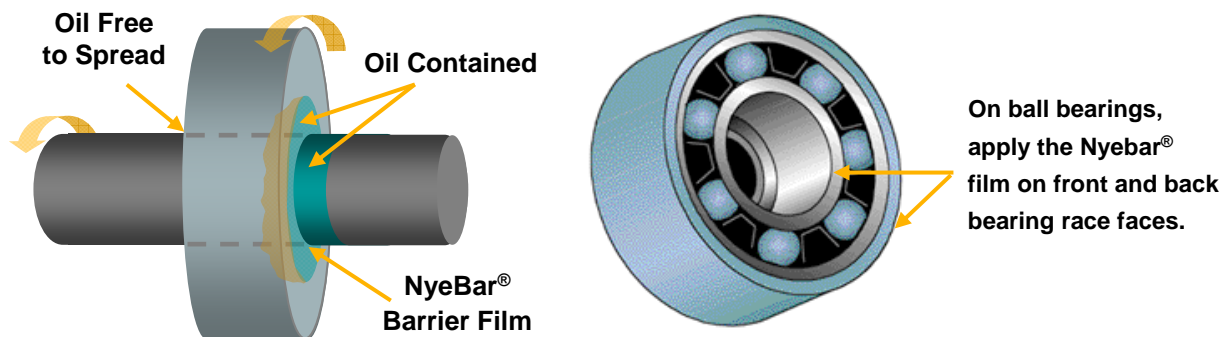
NyeBar - P films can endure temperatures to 200°C and can control creep of even low surface tension methyl silicone oils at that temperature. The principal vulnerability of the applied film would be its resistance to abrasion. Handling of treated parts should be minimized.

## Application of NyeBar

NyeBar - Type P can be applied to any clean metal, plastic or glass surface by dipping the component in the solution, by spraying the solution on the part, or, for small areas of a device, by brushing the area to be protected. Air drying for five minutes permits evaporation of the carrier solvent, and a very thin but fully effective film will remain. Some customers have found that baking the applied film for 10 minutes at 90°C produces a more durable and abrasion resistant film and reduce the surface energy.

## Prevention of Lubricant Migration

When using NyeBar - Type P to prevent migration of lubricating oils, the NyeBar solution should not be applied in the area requiring lubrication but rather as a dam or barrier around that area. For a pivot bearing, a "doughnut" around the pivot is a useful solution. Where it is desired to prevent oil from spreading along a rotating shaft, a simple ring around the shaft should suffice. For ball bearings, inner and outer race faces should be coated with barrier film. Shields, shims, shield retainers and retaining rings should be coated also. Extreme care should be taken that no barrier film be permitted to contact bearing race lands, separators, balls or ball grooves.



Contamination of these latter components with the barrier film would render them non-wettable by the lubricant, resulting in possible lack of lubrication and subsequent bearing failure. The NyeBar films are readily dissolved by fluorinated solvents and to a lesser extent by chlorinated solvents. NyeBar - Type P is relatively resistant to other commonly-used solvents, however, prolonged immersion of the film should be avoided. An immersion of NyeBar - treated bearings or components in any effective solvents can dissolve the film and redeposit it in a bearing raceway or other vulnerable area and bearing failure can result. Mark all treated components 'BC' ("barrier-coated") to alert bearing users to the hazards of solvent immersion.

### Protection of Electric Contacts and Printed Circuit Boards

An ultra-thin coating of NyeBar - Type P can serve to protect electric contacts from contamination caused by creep of silicone or other oils from nearby apparatus. NyeBar has been proven in such use in telephone relay systems. Current flow and signal integrity are not affected by the presence of the thin NyeBar film. NyeBar films can also be used to protect printed circuit boards from atmospheric and environmental contaminants. They can repel moisture, oil and attendant dust entrapment and yet be sufficiently thin to permit current flow. Such films can serve as alternatives to the traditional thicker conformal coatings which require masking of contact points during application.

### Product Characteristics: NyeBar - Type P

Appearance	Clear and colorless liquid
Solvent	Fluoroalkane
Concentration of resin in solvent (avail. limits)	0.1% to 2.0%
Flash point of solution	Non-flammable
Boiling point of solvent	56°C
Specific gravity of solution, 25°C	1.7
Surface energy of film	Approx. 10 dynes/cm

### Solvents and Dilution

Theoretically a monomolecular layer of the NyeBar - Type P film should be effective in most protective or oil retarding applications. Experience has shown that the standard 2% solution can be diluted certainly to 0.2%, and in some cases to as low as 0.1%, with successful results and substantial economic saving.

**The export of this product is regulated by the US Department of Commerce. Please contact Nye Lubricants, Inc. for specific information.**

The typical properties shown on this product data sheet should not be used as a basis for preparing specifications. Refer to our product Material Safety Data Sheet for detailed safety information