VISCOPLEX® Pour Point Depressant (PPD) solutions from the low-temperature lubricant specialists

EVONIK
POWER TO CREATE

SOLVING LOW-TEMPERATURE CHALLENGES FOR OVER 80 YEARS

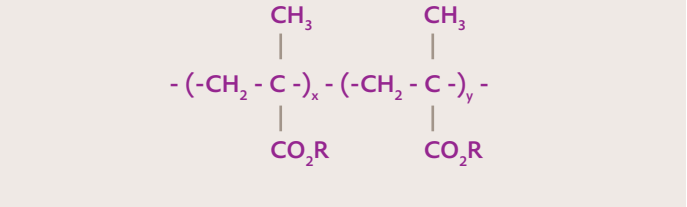
Evonik, the creative industrial group from Germany, is one of the world leaders in specialty chemicals. With 80 years of lubricant industry experience, the Oil Additives specialists at Evonik provide a unique combination of rheology expertise, formulation assistance and customized solutions.

SUSTAINING LUBRICANT FLOW IN THE COLD

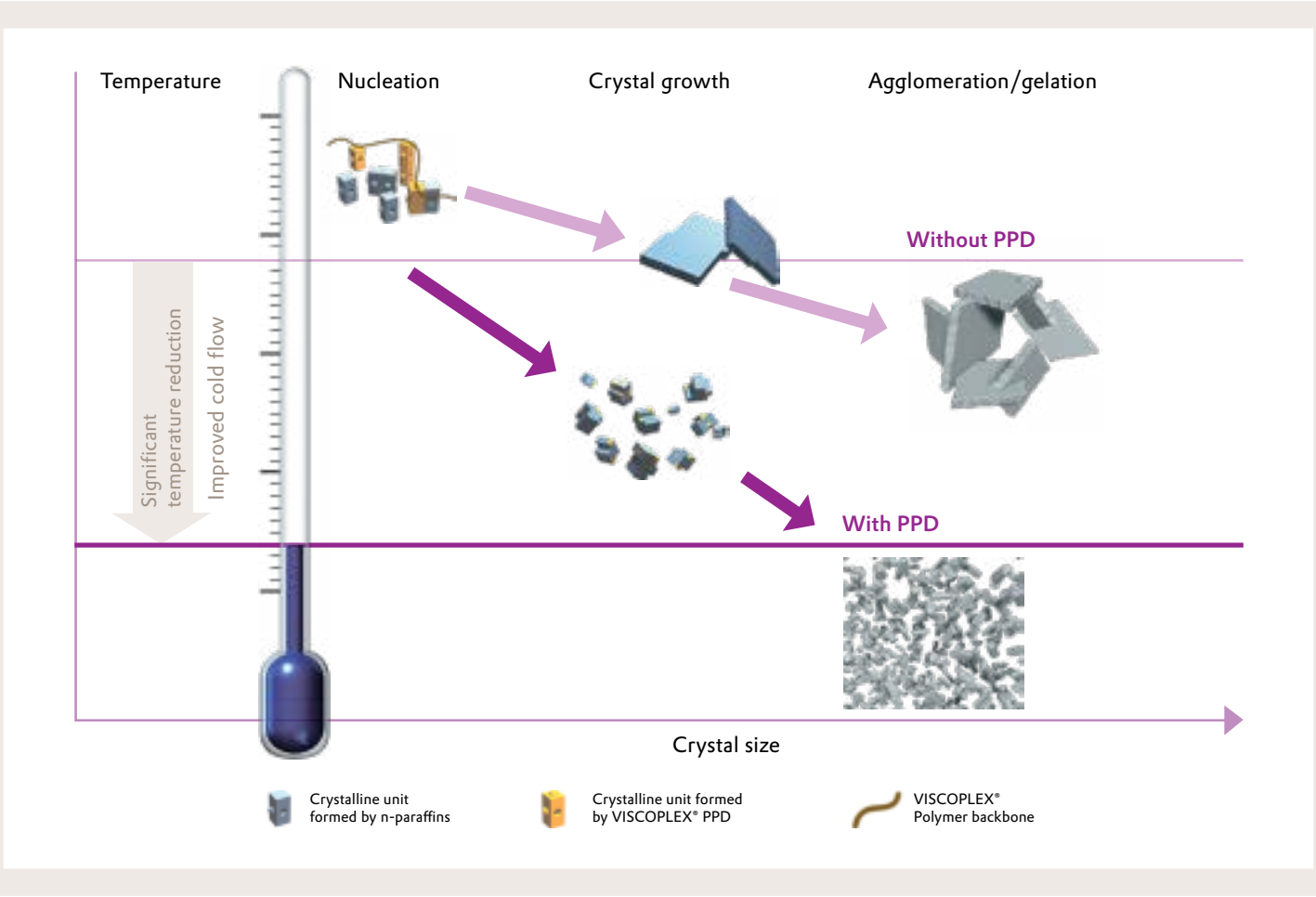
Lubricants are prone to wax crystal buildup as they cool. VISCOPLEX® pour point depressant technology controls wax crystallization, ensuring pumpability, optimal lubricant performance and formulation compatibility. Turn to the Oil Additives specialists at Evonik for solutions to meet low-temperature challenges, including the latest industry standards.

EVONIK PPD SOLUTIONS LEVERAGE PAMA'S FLEXIBLE MOLECULAR STRUCTURE

PAMAs (polyalkylmethacrylates), the first of the polymeric PPDs (patented by Rohm and Haas, an Evonik legacy company), continue to be regarded as the predominant chemistry available today. Their molecular structure offers tremendous flexibility, and provides blenders with a single product that supports a full range of lubricant applications.



Group R is a mixture of alkyl groups from C1 to C22



VISCOPLEX® PPDs MODIFY WAX CRYSTALS AS A LUBRICANT COOLS

Pour point depressants do not affect the temperature at which a wax species crystallizes or the amount of wax that precipitates in a lubricant. Rather, when wax crystals form, pour point depressants co-crystallize along with the wax species present in the oil and modify the growth pattern of wax crystal structures. Additionally, the wax crystals remain separated from each other by the PPD backbone and, because of this steric hindrance, the wax crystals are no longer able to form three-dimensional structures that inhibit flow.

Evonik's PPDs enable lubricant formulators to meet demanding OEM specifications and industry standards.

BASE STOCK IS NOT THE ONLY COMPONENT TO CONSIDER

A small amount of PPD can have a big impact on low-temperature performance. Without the proper selection and treat rate of a PPD, an oil lubricant formulation may exhibit poor low-temperature properties, which can lead to "lubrication starvation" and equipment failure.

When selecting a PPD and treat rate, several factors should be considered, including:

- Base stock
- Performance additives:
  - Detergents
  - Friction modifiers
  - Viscosity modifiers
- Test methods required by specifications
- Aged-oil pumpability requirements

THE LATEST IN LOW-TEMPERATURE TESTING

Evonik's laboratories are equipped with all industry-standard low-temperature tests, including:

- Pour Point (ASTM D97)
- Brookfield Viscosity (ASTM D2983)
- MRV TP-1 (ASTM D4684)
- Scanning Brookfield (ASTM D5133)
- ROBO (ASTM D7528)
- Low Temperature Pumpability (CEC L-105)

COMMITTED TO ONGOING SUPPORT

As industry trends and specifications shift, formulators may need to modify formulations to continue providing state-of-the-art fluids. Evonik's comprehensive line of PPDs deliver robust performance that adapt to a variety of base stocks, performance packages, and viscosity modifiers.

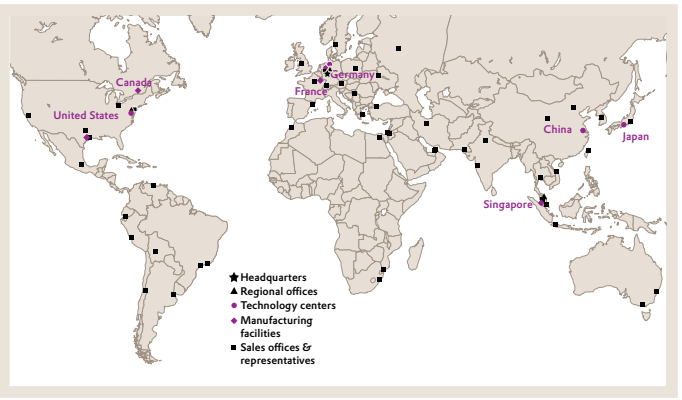
The Oil Additives team at Evonik is committed to providing ongoing support – not just during your initial PPD selection, but also throughout fluid formulation, production and future development.

Evonik PPDs enable lubricant formulators to meet demanding OEM specifications, and national and international performance standards and regulations. Global, as well as regional and local lubricant marketers, turn to Evonik for complete support.

Evonik is the world's leading supplier of PPDs.

GET AN EDGE WITH EVONIK

Advanced regional technology centers, modern global manufacturing centers and a secure and reliable supply chain worldwide enable Evonik's continuous development of tailored solutions for customers anywhere on earth. Forward-thinking, resource-efficient technologies, products and formulation guidance are the result of Evonik's drive for innovation that achieves distinctive solutions. You will find an Evonik specialist wherever they are needed. Evonik's value proposition – **Let it flow.**



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