

## LP™ 111

For Crude Oil

### Background

LP™ 111 Flow Improver is part of the LiquidPower Specialty Products Inc. (LSPI) portfolio of innovative and technologically superior flow improver solutions. As part of the portfolio, LP™ 111 Flow Improver provides the answer to systems facing challenging needs.

### Characteristics

LP™ 111 Flow Improver has been designed for both multiphase pipelines and applications where the logistical costs of transportation and shipping products can be high. This is often the case for offshore applications.

LP™ 111 Flow Improver has a higher concentration of active polymer in the product, allowing high performance using fewer gallons.

The polymer technology developed by LSPI allows greater amounts of active polymer to be deployed in a fixed amount of product while improving the dissolution dynamics.

The polymer of choice shows excellent hydrocarbon affinity and is able to attain elevated levels of drag reduction under varied operating scenarios. The nature of the polymer provides additional buffering from shear effects.

Similar to the other LiquidPower® Flow Improver products, LP™ 111 dissolves into flowing product without coating pipeline walls.

### Handling

LP™ 111 Flow Improver is easy to handle, store and clean up. It flows easily and does not require pressurized storage tanks.

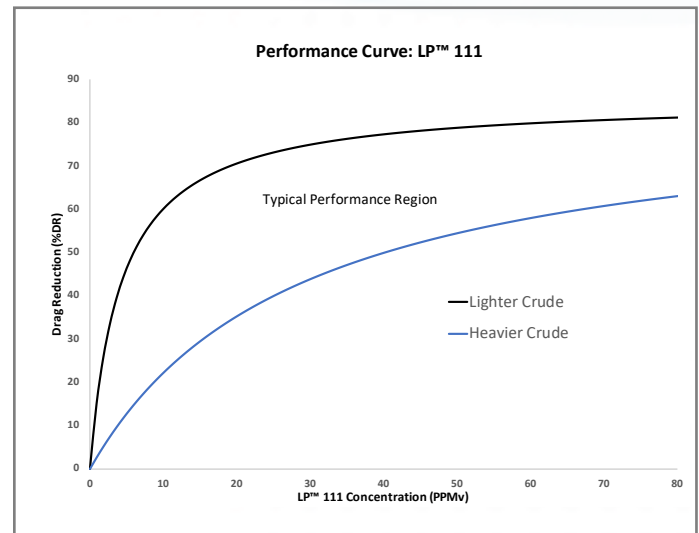
### Benefits

#### Great Performance:

- Provides additional buffering from shear effects
- Increases flow rates while maintaining current pipeline pressures
- Maintains flow while reducing pipeline pressures
- Allows shutting down of intermediate pump stations

#### Superior Technology:

- Improves pipeline capacity without capital investment
- Lower injection rates than other drag reducers
- Faster dissolution rates than other drag reducers
- Reduces crude heat loss
- DRA of choice for multiphase systems
- Multiphase modeling and performance forecasting available



This performance curve demonstrates the range in which LP™ 111 Flow Improver can operate, depending on pipeline and fluid conditions.

### GENERAL

Application	Light and medium petroleum crude oil
Flow Improver Type	Suspension
Carrier	Water

### PERFORMANCE

Maximum Drag Reduction	Greater than 80% in 100% crude oil
Typical Concentration	5 to 50 ppm

### TYPICAL PROPERTIES

Color	White
Density	7.0 – 8.1 lbs/gal (0.84 – 0.97 g/cm <sup>3</sup> )
Typical Density	8.09 lbs/gal (0.97 g/cm <sup>3</sup> )
Flash Point	Not applicable
Viscosity	50 – 200 cP @ 511s <sup>-1</sup> (Non-Newtonian) @ 77 °F/25 °C
Freezing Point	32 °F (0 °C)
Boiling Point	212 °F (100 °C)
Vapor Pressure	0.46 psia (23.8 mm Hg) @ 77 °F/25 °C

### HANDLING

Operating Range	32 °F to 120 °F (0 °C to 49 °C)
Product Stability	Stable suspension Intermittent agitation required
Pressure and Heating	No nitrogen or pressurized vessels required Heating tracing and heating required under freezing conditions Climate control environment available

### INJECTION EQUIPMENT

Pumps	Various designs available for different injection range and environments
Range	5 to 2,500 gal/day (20 to 9,500 L/day)
Flow Meter	Mass (Coriolis)
Automation	Standard

### SAFETY AND ENVIRONMENTAL

#### Reference country specific Safety Data Sheet for local requirements

Safety & Health	Nonflammable. This material is not classified as hazardous under the criteria of the U.S. OSHA Hazard Communication Standard 29 CFR 1910.1200.
Environmental	Not classified as an environmental hazard per GHS. Uncontaminated waste product is non-hazardous as defined by U.S. RCRA.

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