

propipe-sch

DRAG REDUCER ADDITIVES



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A Great History

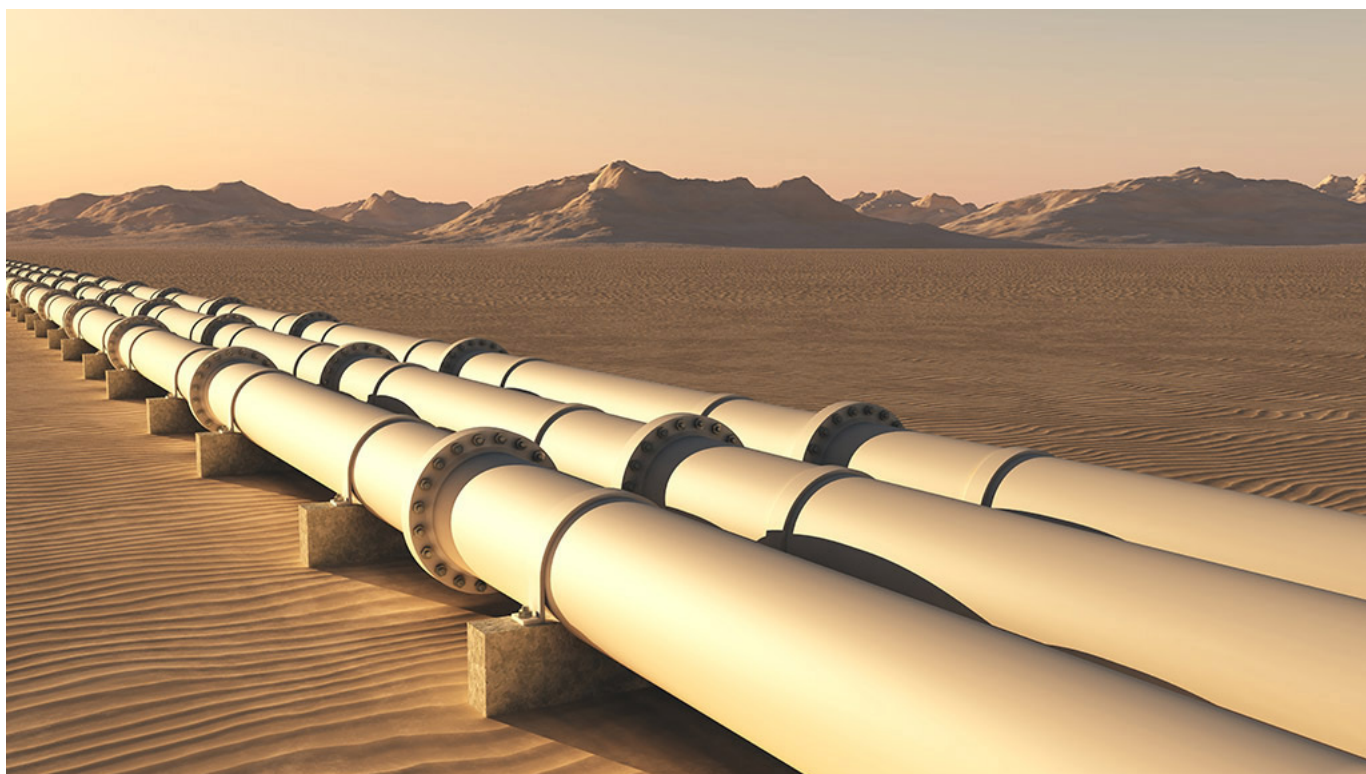
It was not until the late 1970's during the construction of the Tran-Alaska Pipeline that polymer drag reducers were seriously considered for a large scale commercial application. It was considered a significant variable in the cost optimization of the construction and operation of the system along with diameter, number of pump stations and horse power. This is why we have to look at this as a tool much more than a typical use of chemicals.

The builders of this pipeline realized that this tool called drag reducer would enable them to significantly reduce cost. It was from this industry wide effort that **ProFlo** emerged.



Drag reduction additives (DRAs) improve flow in pipelines by reducing turbulence. They can dramatically increase flow using minimal additional energy, or they can sustain a given flow rate using less energy.

In most petroleum pipelines, flow is turbulent. Non-linear currents and friction cause much of the energy applied to move the fluids to be wasted. Drag Reducers are long-chain hydrocarbon polymers that reduce friction near the pipeline wall and within the turbulent core, dampening rotational flow and thereby decreasing energy loss.



Hydrocarbon flow is turbulent in most petroleum pipeline systems. Turbulent motion results in energy loss due to friction between the flowing fluid and the pipeline wall as well as friction between the flowing fluid itself. Pipeline drag reducing agents (DRA) reduce turbulence and frictional losses in pipelines to improve throughput and energy efficiencies.

Drag Reducer Agents (DRA)

Laboratory

Ultra high molecular weight polymer dispersed in an organic non-solvent.
Reduces frictional pressure losses and increases flow rate in pipelines restricted by either pump capacity or pressure limits.

Viscosity, diameter, velocity
Reynolds number > 4,000



DRA functions on a molecular level to decrease turbulence, thereby reducing the frictional pressure losses in a pipeline. ProFlo Drag Reduction Agents are long-chain hydrocarbon polymers that reduce friction near the pipeline walls and within the turbulent fluid core. Flowchem DRAs reduce energy loss by dampening rotational flow and fluid turbulence in crude and fuel pipelines.

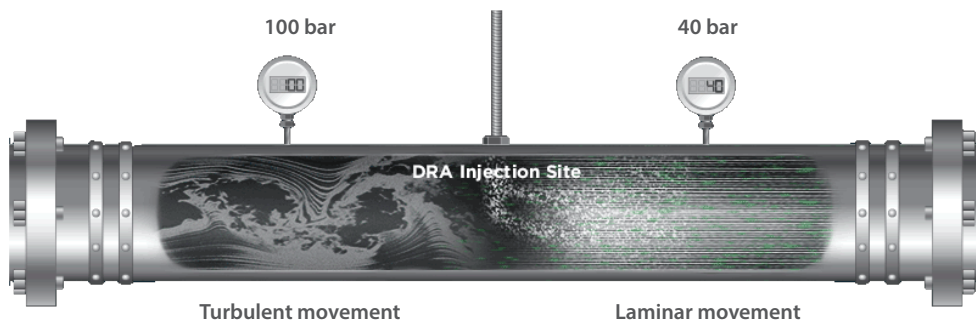


How DRA works?

Inhibits propagation of turbulence near wall.

In turbulent liquid flow, the hydrocarbon molecules move in a random pattern rather than a linear flow, creating drag within the pipeline. Turbulence causes energy loss and reduces throughput of a pipeline.

The Reynolds number (N_{re}) is a dimensionless number used to determine the level of turbulence in a pipeline. Once the Reynolds number (N_{re}) is calculated, the effectiveness of ProFlo and the reduction of the frictional losses can be predicted.

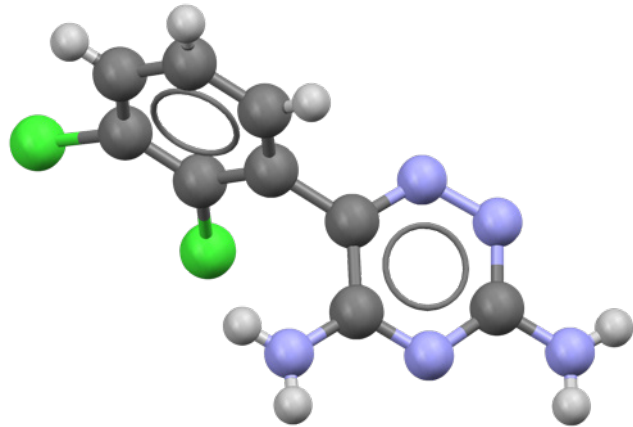
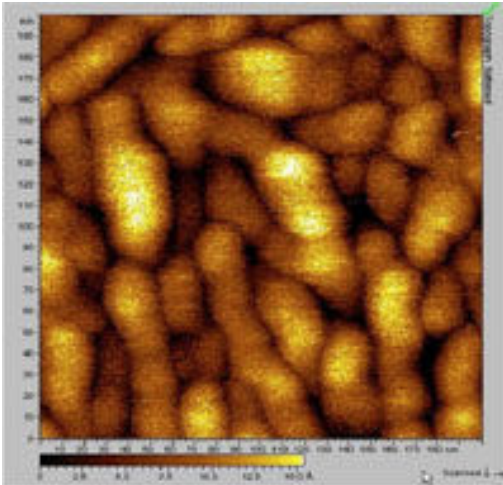


Pipeline operations depend on pumping pressure as their lifeline to deliver flow capacity. Due to aging systems, corrosion, abrasions, and pipeline bottlenecks, lowered MAOP - Maximum Allowable Operating Pressure can result in reduce throughputs. Utilizing DRA allows the pipeline to maintain the same throughput while operating at the lowered MAOP.

DRA benefits flow to the bottom line

ProFlo flow improvers have reduced drag up to 80% and have increased flow up to 100% and the results were immediate. Performance depends largely on the properties of the fluid being transported and the condition of the pipeline.

Drag Reducers can bring substantial improvement to your bottom-line profit by maximizing the flow potential and throughput capacity of your pipelines, saving energy, and giving your operations greater flexibility.



How much DRA is needed

Highly efficient ProFlo flow improvers are used in very small concentrations (parts per million). The dosage that will optimize flow in a pipeline is dependent on a number of factors, including petroleum composition and viscosity, pipeline diameter and condition, fluid velocity, and temperature.

The typical cost to use our Drag Reducer is pennies per barrel per pipeline segment.

Propipe specialists will work with you to determine the best solution based upon your particular situation and objectives. Propipe ensures optimization of each application by:

- ⓪ Predicting ProFlo product performance thoroughly.
- ⓪ Evaluating your pipeline system and operating objectives.
- ⓪ Conducting field trials to confirm efficiency estimates.
- ⓪ Assisting with equipment installation and commissioning.

A field trial is required to determine the precise Drag Reducer dosage to optimize a specific flow-improvement

Increase flow, reduce energy, or both

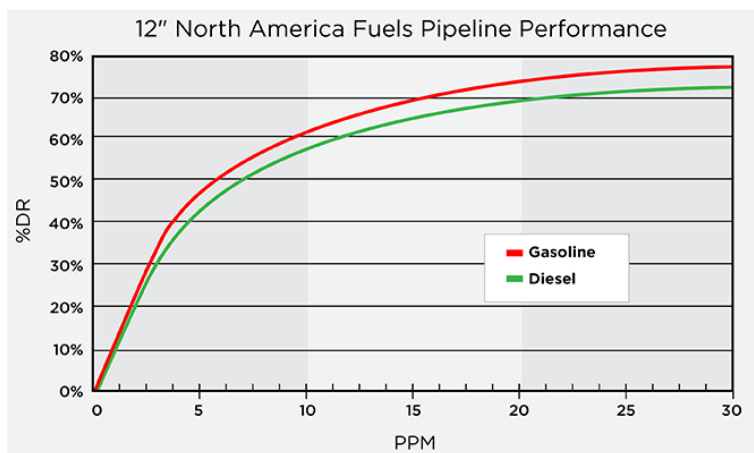
ProFlo flow improvers reduce pressure in the pipeline to let you increase flow rates or use less energy. Or you may opt to do both. Our Drag Reducers are the answer if you need to lower your operating pressure for safety reasons, but you can't afford to reduce throughput capacity.

Use your flexibility to avoid capital expansion

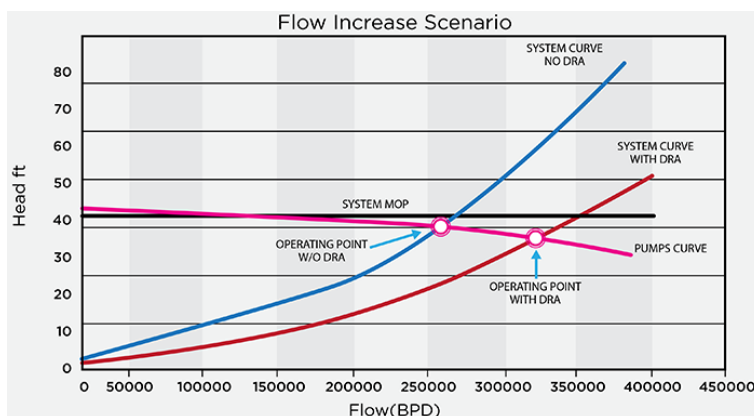
The optimized throughput you achieve with ProFlo Drag Reducers may enable you to bypass existing pump stations or avoid adding intermediate stations. You can also use our flow improvers to eliminate bottlenecks without having to upgrade equipment.

Use your flexibility to accommodate temporary conditions

You needn't gamble on getting the return you want from high-dollar capital improvements in uncertain markets. ProFlo Drag Reducer provide a cost-effective means for achieving high throughput today that may not be required tomorrow. Increased short-term and seasonal demands can be handled efficiently and very cost effectively.



Percent drag reduction compares the differential frictional pressure drop required to move a given fluid in a set pipeline with and without DRA. The graph represents a range of performance curves for ProFlo DRA in various hydrocarbons. DRA injection rate is shown in parts per million (ppm) versus the delivered performance measured in percentage drag reduction (%DR).



ProFlo drag reducing agents align turbulent fluid molecules to create a linear, energy efficient flow. By adding only a few parts per million of ProFlo DRA, drag within a pipeline system can potentially be reduced by as much as 80% and the flow rate can increase up to 100%. Utilizing DRA allows the pipeline to operate at a higher flow rate while maintaining the same pressure.

Product Data Sheet

ProFlo-X101

Description

Propipe **ProFlo-X101** is a slurry composed of long chain poly alpha olefin in vegetable oil.

TYPICAL PROPERTIES

Appearance:	White free flowing liquid
Physical State:	Polymer suspension
Odor:	Slight hydrocarbon
Water Content (Wt. %):	<0.01
Specific Gravity:	0.88-0.92
Vapor Density (Air = 1):	1.1
Vapor Pressure:	97 @ 20C (68F)
Boiling Point:	147F (64.5C°)
Melting Point:	- 4F (-20C°)
Flash Point:	>142F (61C°) TCC
Solubility:	Hydrocarbon soluble, water insoluble
% Volatiles by Weight @ 70F (21C):	<1 %

Product applications

Propipe **ProFlo-X101** may be injected into pipelines by means of positive displacement pumps.

ProFlo-X101 can be used in either crude or finished products pipelines. The use rate may vary and should always be used in accordance to the feed rate recommended by Propipe.

Shipping & handling

ProFlo-X101 is a non-hazardous material and can be shipped accordingly. The product is very slippery and spills should be cleaned up immediately to avoid potential injury. Product should be kept in covered areas, with no exposure to direct sunlight.

Product Data Sheet

ProFlo-X410

Description

Propipe **ProFlo-X410** is a slurry composed of long chain poly-alpha-olefin in an liquid carrier (water/glycol), designed for cold weather applications.

TYPICAL PROPERTIES

Appearance:	Cream to white, free flowing
Physical State:	Liquid
Odor:	Slight hydrocarbon
Specific Gravity:	0.95 - 0.99
Boiling Point:	> 100C°
Freezing Point:	-51C°
Flash Point:	Not Applicable
Operating Range:	-40C° to 60C °
Solubility:	Miscible in Hydrocarbons
Carrier:	Water/Glycol mix

Product applications

ProFlo-X1410 is utilized in crude oil pipelines to decrease operating pressure and increase pipeline flow rate. ProFlo-X410 is injected via industry standard chemical injection systems recommended and designed by Propipe. Consultation with a Propipe representative is recommended to ensure the proper Propipe solution.

Shipping & handling

ProFlo-X410 is a non-hazardous material and can be shipped accordingly. Product should be kept in covered areas, without exposure to direct sunlight.

ProFlo-X410 should be homogeneously mixed before injection.

Chemical injection skids

Injection metering pump systems can be configured for any ProFlo pipeline application.

- ⊗ Onshore or offshore
- ⊗ At pressures to 2,500 psi
- ⊗ At volumes to 1,500 gallons per day
- ⊗ Fully compliant with international standards
- ⊗ Explosion proof, Division 1 or 2
- ⊗ For 190/380 VAC – 50 Hz or 240/480 VAC – 60 Hz

Dosage is metered by an onboard programmable logic controller that can be set and adjusted locally or remotely. The controller also operates the spare pump that is included with each system for 100% backup capacity.

Special equipment designs are no problem. All units are pre-wired and thoroughly tested to ensure faultless startup and operation.

Propipe customizes skids to the size and level of automation that suit your requirements.



A totally redundant PLC-operated injection system can be controlled remotely or locally

Injection point

The injection point should be located after launcher & receiver traps as the product can not go thru bends or partial open valves.

Instruction to install the injection point:

1. Install a 2" **propipe** Thread-O-Ring Fitting at desired ProFlo injection location.
2. Tapping the pipeline to an opening diameter of 1-½" or 2" by a Series 1000 TM.
3. Withdraw insertion device. Close 2" block valve. Remove insertion tool.
4. Connect back flow check valve. Connect ProFlo supply piping.

To contract Hottap fittings or operations contact **propipe** Hottap division.



Injection point



T.O.R Fitting



propipe PTM-1000

Vessel

Mamor tote is an UN IBC which features a lock-collar butterfly valve with NPT threads assembled on a steel pallet. Mamor stacks up to three high in the warehouse and up to two high transporting.



Normal Capacity:	275 gallon (1,040 L)
Normal Length:	40" (1,000 mm)
Normal Width:	48" (1,200 mm)
Normal Height:	45.8" (1,143 mm)
Approx. Tare Weight:	137 Lbs (62 Kg)
Max Gross Weight:	4,490 Lbs (2,037 Kg)
Design Code:	UN marking certifies UN31HA1 design



DRA in Algerian Desert



France - Trapil



DRA for ExxonMobil Italy



2000 USG Vessel - Spain



Middle East Region



Injection skid

Some of clients of Propipe Holding Group



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