

## ENHANCED EFFICIENCY AND PRODUCT QUALITY

How technologies from Kraton Performance Polymers, Inc. and Shell Process Oils are combining to add value for optical cable gel producers and optical cable manufacturers



# A NEW COMPETITIVE EDGE

“The optical cable market is competitive,” says Sandrine Duc, Sales Development Manager – Performance Products, Kraton Performance Polymers Inc. “To meet growing customer expectations, optical cable manufacturers need to deliver reliable, high-quality products efficiently: products that offer outstanding performance in different environments. Optical cable gel manufacturers face similar demands. They too are striving to maximise productivity and increase process efficiency and product performance.

“The combination of our polymers and Shell Risella X oils offers an exciting enhancement in process efficiency and product quality with the potential to give both cable and gel manufacturers a new competitive edge.”



## DEMONSTRATING THE ADVANTAGE

The white oils typically used in optical cable gels are refined from crude oil. Although aromatics are removed by post-processing, these mineral oils can contain a large number of species, including paraffins, isoparaffins and about 30% naphthenics. In contrast, Shell Risella X oils, which are synthesised from natural gas, are aromatic-free and have a low naphthenic content. Like white mineral oils, Shell Risella gas-to-liquid (GTL) oils are water white, have high flash points and good stability, but they also offer lower viscosities, high viscosity index and low pour points.

Kraton and Shell Process Oils have combined their expertise by working together to develop a new generation of optical cable gels that offer gel and cable manufacturers enhanced process efficiency and product quality.

Rigorous testing has demonstrated the performance advantages of these gels made using Shell Risella X 420 oil and Kraton™ hydrogenated polymer.

## ABOUT OPTICAL CABLE GELS

Optical cable manufacturers use an oil-based gel to flood rigid tubes containing optical fibres. These tubes are packed together, flooded with gel again and enclosed in an outer jacket to form the optical cable. The gel needs to display thixotropic behaviour: to flow easily into place under shear but to become viscous once in place to protect the fibres. It must also be free from impurities that could compromise the optical cable's performance and continue performing by remaining stable and avoiding oil bleed.

## SHELL RISELLA X: NEXT-GENERATION PROCESS OILS

Shell Risella X oils are manufactured at Shell's world-class Pearl GTL plant in Qatar, which is the culmination of about 40 years of research and development. It is also the world's largest source of GTL products.

### Extra purity

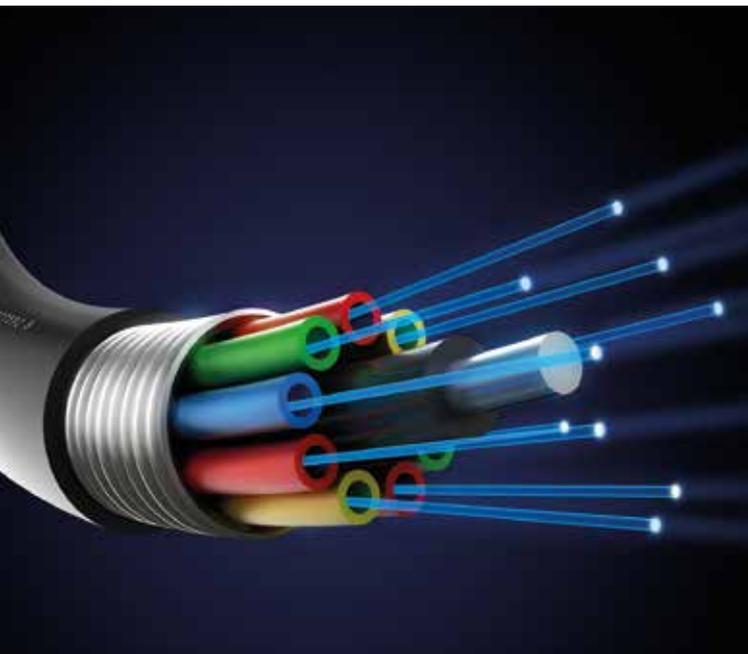
Shell Risella X oils provide key qualities for many applications, thanks to their high paraffinic hydrocarbon content and exceptional purity. For instance, they

- are colourless
- are almost odourless
- contain virtually no sulphur, nitrogen or aromatics
- have an extremely narrow hydrocarbon distribution range.

### Excellent performance

Shell Risella X synthetic process oils can enhance the performance of the applications in which they are used by offering an outstanding combination of characteristics, including

- low volatility
- low pour point
- high flash point
- high viscosity index
- outstanding UV and thermal colour stability.



## BETTER PROCESS EFFICIENCY

Tests demonstrate that Shell Risella X based gel has a lower viscosity under shear than a competitor's mineral oil based gel with the same 8% Kraton™ hydrogenated polymer concentration. This means easier mixing for gel manufacturers and faster filling for cable manufacturers.

Despite Shell Risella X's lower viscosity at low shear rates, the same volume of Kraton polymer was sufficient to create a gel with no signs of oil bleed under standard test procedures (24 hours at 100°C), see Figure 1.

## ENHANCED PRODUCT QUALITY

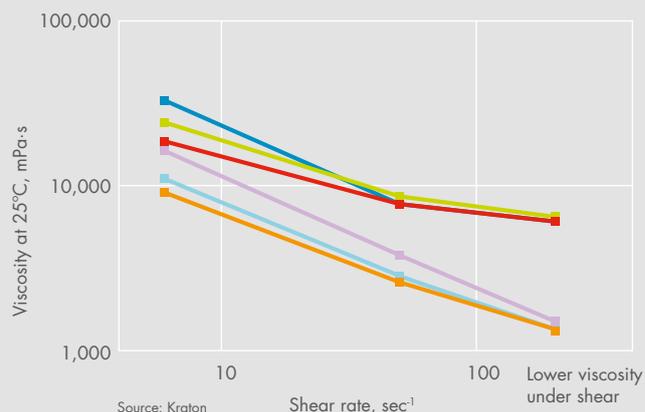
Oils containing contaminants or that breakdown can produce gels that compromise the performance of the finished optical cables.

Because they are made using GTL technology, Shell Risella X oils are exceptionally pure compared with conventional white mineral oils (Figure 2). They also have better UV and thermal colour stability, polymer compatibility and lower pour points. These properties combine to give Shell Risella X based gels the purity and stability needed by optical cable manufacturers for enhanced product reliability and quality.

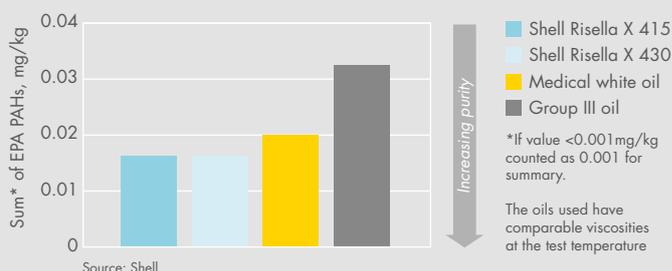
## NOTES AND RECOMMENDATIONS

### Mixing and testing procedure used for the tests

- Unless otherwise indicated, blends were prepared by mixing with a Silverson rotor/stator mixer for about 35 min at 2,500 rpm at 130°C. All formulations also contained 0.2 %w Irganox 1010.
- Viscosity of the gels was measured with a Brookfield DV-II+ Pro cone and plate viscometer at 25°C using the CPA-52Z cone spindle.
- Oil bleed resistance was measured by placing about 20 g of gel into a conical metal screen, suspending the screen over a tared beaker in an oven at 100°C for 24 hours and measuring the amount of oil that dripped from the screen into the beaker.



**FIGURE 1: ENHANCED EFFICIENCY.** Shell Risella X based gel is easier to mix and fill tubes with compared with a mineral oil based gel with its lower viscosity at high shear rates. The difference becomes more pronounced at very high shear rates. Although Shell Risella X gel has a lower viscosity at low shear rates, no oil bleed was observed, which demonstrates the stability of the gel. The results are consistent across different mixing temperatures. Source: Kraton



**FIGURE 2: MEDICAL GRADE PURITY.** Contaminants can compromise product quality. Shell Risella X oils have polycyclic aromatic hydrocarbon (PAH) levels comparable with white oils certified for medical applications. Group III mineral oils are typically used to make optical cable gels. Source: Shell

### Recommendations for processing conditions

To blend the Kraton™ hydrogenated polymer and Shell Risella X oil, we recommend the following equipment and process parameters:

- a high-shear mixer (type Silverson)
- 2,000–6,000 rpm for a high-shear mixer, 50–300 rpm for a low-shear agitator
- 120–150°C for any mixer
- 8–12%wt polymer concentration
- ~30 min to 1 h mixing time for a high-shear mixer, 2–12 h for a low-shear mixer.

## ABOUT KRATON

Kraton Performance Polymers, Inc. is a leading global producer of engineered polymers used to enhance the performance of products that touch virtually every aspect of our lives. The original inventor of styrenic block copolymer chemistry in the 1960s, Kraton has a history of innovation dating back over 50 years that drives growth for its customers.

The company has a broad portfolio of value-enhancing polymers used in a wide variety of applications, including consumer and personal care items, adhesives and coatings, electronics, medical supplies, automotive components, and paving and roofing materials. Kraton offers its products to a diverse group of more than 800 customers in over 60 countries worldwide and collaborates with customers on custom solutions to meet specific needs.

## ABOUT SHELL PROCESS OILS

Shell is one of the leading process oil manufacturers and has more than 25 years' experience in the process oils business. We recognise the crucial role that process oils play in your products and operations.

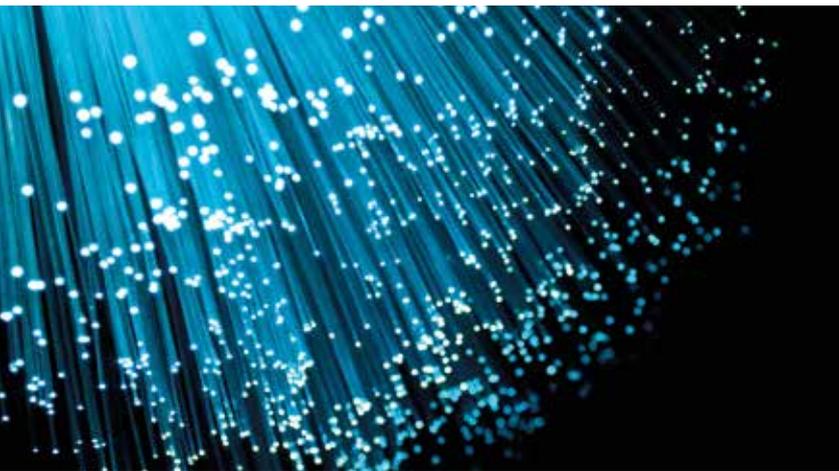
We also understand that the quality of these vital oils is paramount and that using a process oil that has a highly consistent quality can have a major bearing on the success of your business.

Whatever your needs and applications, Shell can provide a full range of process oils. Customers in a wide range of industries have unlocked value by using Shell process oils. We also offer expert consultation and technical advice to support your business needs.



### FIND OUT MORE: TALK TO SHELL PROCESS OILS

If you are interested in unlocking valuable performance advantages, talk to us about the benefits that Shell Risella X could have for your business.



**SHELL RISELLA X OILS ARE MANUFACTURED AT SHELL'S WORLD-CLASS PEARL GTL PLANT IN QATAR, WHICH IS THE CULMINATION OF ABOUT 40 YEARS OF RESEARCH AND DEVELOPMENT. IT IS ALSO THE WORLD'S LARGEST SOURCE OF GTL PRODUCTS.**



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