ISODEWAXING® and ISOFINISHING®

Chevron Lummus Global

Overview

Chevron Lummus Global (CLG) licenses ISODEWAXING® and ISOFINISHING® lubes technologies. ISODEWAXING technology revolutionized catalytic dewaxing when it was commercialized in 1993. Rather than removing the wax (and lowering yield), it catalytically isomerizes the molecular structure of the wax into C20+ isoparaffins. These isoparaffins have high viscosity index (VI), low pour points, and excellent resistance to oxidation. Furthermore, because the ISODEWAXING process preserves the base oil's paraffinicity, it can produce higher product VI and/or higher yields than other dewaxing processes. A broad range of feeds can be processed – from feeds with low wax content to those with close to 100% wax – to produce a broad range of base oils with VI ranging from 95 to 140 and above.

The ISOFINISHING technology uses noble metal catalysts to almost completely remove aromatics, obtain excellent oxidation stability and produce a practically water-white product. Noble metal catalysts require lower operating temperatures than base metal catalysts for the equivalent product oxidation stability, which in turn results in superior color. These exceptional results are achieved at lower pressures and smaller reactor volumes than those required when using base metal catalysts. When producing white oils, the ISOFINISHING technology can be used as a stand-alone process.

Chevron pioneered, developed, and commercialized base oil manufacturing hydroprocessing technologies, including ISOCRACKING®/hydrotreating, ISODEWAXING and ISOFINISHING. There are numerous ISODEWAXING/ISOFINISHING units currently in operation that utilize a wide range of feedstocks derived from various crudes.

CLG is a joint venture between Chevron U.SA. Inc. and Lummus Technology.

Technical Advantages

Process Features	Process Benefits
Dewaxes by isomerizing paraffins	• Higher overall yield than solvent or conventional catalytic dewaxing • High VI retention • Superior cold flow properties • Ability to make Groups II and III base oils • Better response to pour point depressants
Hydrofinishes with high activity noble metal catalyst	• Almost water-white products with ultra-low aromatics, high color stability, high oxidation and thermal stability • Lower operating temperature and pressure • Higher space velocity, smaller reactor, lower investment
Integrated dewaxing/hydrofinishing with common recycle gas loop	• Minimizes investment

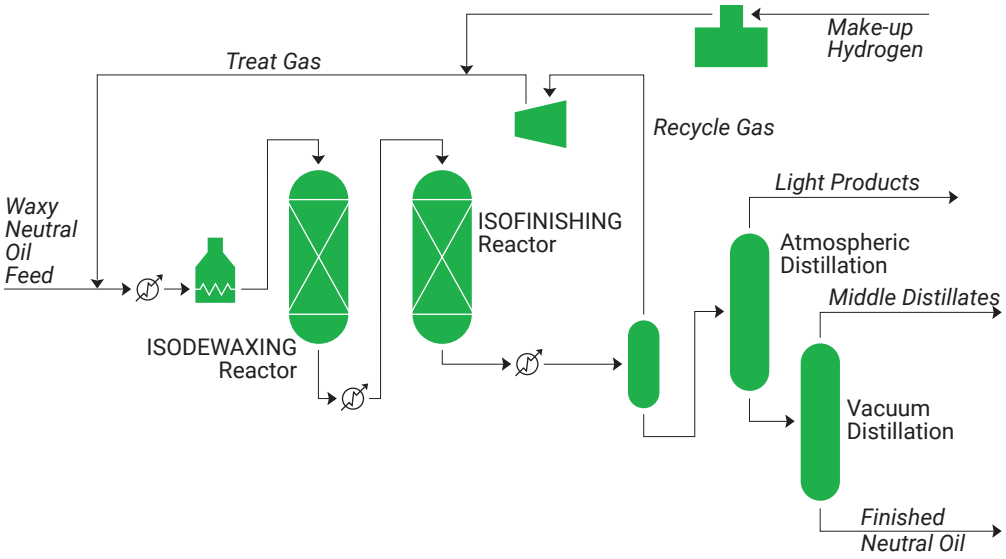
Process Experience

ISOCRACKING/ISODEWAXING Middle East VGO to make 150N with 100 VI

	Hydrocracker				
Dewax Process	Hydrocracker feed rate BDP	Hydrocracker waxy base oil yield %	Dewaxer feed rate BDP	Dewaxer yield %	Base oil yields BDP
ISODEWAXING	10,000	72	7,200	92	6,600
Solvent	10,000	63	6,300	84	5,300
Standard catalytic	10,000	52	5,200	81	4,200

Using the ISODEWAXING process to make conventional base oils allows the refiner to lower processing severity in the hydrocracker (ISOCRACKING process) and substantially increase yields.

Process Flow Diagram



Process Description

Waxy neutral oil feed from a hydrocracker/hydrotreater process step, together with treat gas, is preheated and fed to the ISODEWAXING reactor. This reactor isomerizes some of the normal paraffins (waxes) to high VI isoparaffins and lowers the pour point. Other paraffins are cracked to highly saturated light products, such as high smoke point jet and high cetane index diesel. The effluent from the ISODEWAXING reactor is then sent to the ISOFINISHING reactor. There the product undergoes deep ISOFINISHING via aromatics saturation to provide a highly stable finished neutraloil product after atmospheric and vacuum distillation.

The catalysts used in the ISODEWAXING and ISOFINISHING reactors are highly selective for dewaxing and hydrogenation at maximum finished neutral oil yield. The catalysts are most effective in low sulfur and low nitrogen environments.

As such, the ISODEWAXING/ISOFINISHING unit generally utilizes a dedicated high pressure recycle gas loop, separate from that for the upstream hydrocracker/hydrotreater should the processes be combined in an integrated unit.

Combining lube hydroprocessing technologies – including ISOCRACKING, ISODEWAXING, and ISOFINISHING – provides greater feedstock flexibility than solvent refining or other lube processing routes. The ISOCRACKING process boosts VI by converting low VI components to high VI base oil, thereby offering greater feedstock flexibility than solvent refining. Lube hydroprocessing can be integrated with existing solvent extraction lube plants to improve product quality, yield and flexibility to meet current and future base oils requirements.

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