

The ExxonMobil logo is positioned in the top right corner of the image. It features the word "Exxon" in a bold, sans-serif font, with a stylized "X" that has a diagonal slash. To its right, the word "Mobil" is written in a similar bold, sans-serif font. The background of the entire image is a close-up, high-angle shot of a laboratory tray containing several glass test tubes. A pipette is shown in the process of dispensing a small amount of clear liquid into one of the test tubes. The lighting is cool and blue-toned, creating a professional and scientific atmosphere. The text "EHC™ 50 and EHC™ 110" and "Enabling enhanced formulations" is overlaid on the left side of the image. At the bottom left, the slogan "Energy lives here™" is displayed above a decorative horizontal line of white, wavy, dotted patterns.

# EHC™ 50 and EHC™ 110

Enabling enhanced formulations

Energy lives here™

# Advanced lubricants begin with advanced base stocks

ExxonMobil Basestocks is committed to delivering an advanced product slate designed to help you formulate better. Our Group II EHC 50 and EHC 110 base stocks are part of our global Group II slate for formulation and qualification of automotive lubricants. With base oil interchange (BOI) and viscosity grade read-across (VGRA) capabilities, our EHC base stock slate offers broad blend coverage and simplified qualification testing across the globe.

EHC base stocks may also be used in industrial and marine applications where formulations benefit from increased oxidation stability and higher viscosity index (VI).



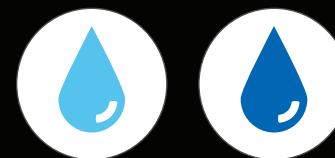
## EHC™ 50

- Group II
- 115 VI
- Excellent low-temperature performance
- Excellent volatility
- High saturates



## EHC™ 110

- Group II
- 96 VI
- Good low-temperature performance
- High saturates



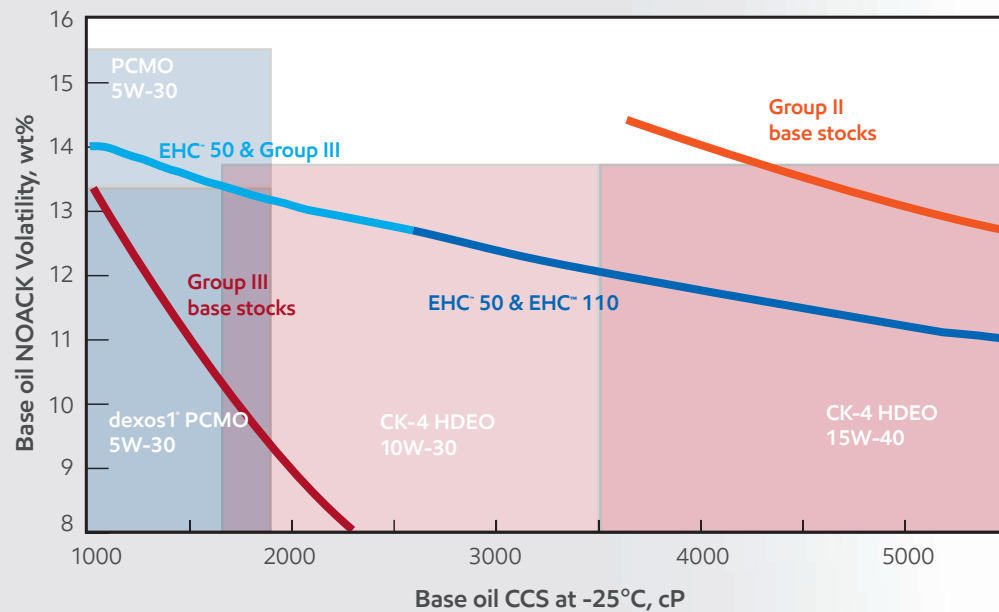
## Both

- Designed to cover most API, ACEA and industrial lubricants
- Can formulate 10W HDEO without Group III corrector stocks
- Reduces Group III required for 5W and dexos® lubricants

# Smart product design

EHC<sup>®</sup> 50 and EHC<sup>®</sup> 110 base stocks can be used together to meet the requirements of the most popular lubricants. This outstanding capability provides blenders with increased flexibility and a broader blending range, helping to reduce the need for Group III.

## Base oil CCS and volatility needs for latest major engine oils



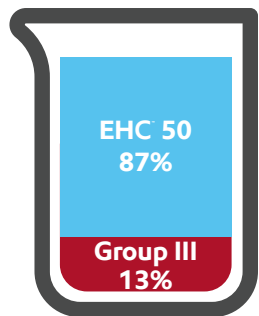
# 5W-30 formulation

## Lower your 5W-30 PCMO formulation costs

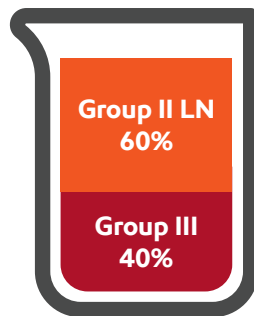
- Help to reduce the need for Group III “corrector” stocks and viscosity modifier

Formulate competitive 5W-30 PCMO with reduced Group III

Base oil composition\*



ExxonMobil base stocks



Competitor base stocks

Potential to reduce Group III\* use by up to

**68%**

and VM treat rate\* by up to 15%

### 5W-30 PCMO API SN/GF-5

Composition %	EHC	Group II/III
EHC 50	72.2	—
Group II LN (150N)	—	48.6
Group III (4 cSt)	10.4	32.6
VM	7.8	9.2
DI	9.6	9.6
Estimated properties	EHC	Group II/III
KV at 100°C, cSt	10.7	10.9
CCS (@-30°C), cP	6300	6270
NOACK Volatility, wt%	11.7	12.6
HTHS at 150°C, cP	3.2	3.3
MRV @ -35°C Apparent viscosity, cP	17700	21400

\*Dependent on additive chemistry and formulation approvals. ExxonMobil estimates with applicable additive packages. External factors, such as price and quality variation, VM diluent oil, etc. may cause deviations from these estimates; they are intended to be starting points for formulation evaluations. Lubricant blender is responsible for obtaining appropriate approvals and licensing of all formulations.

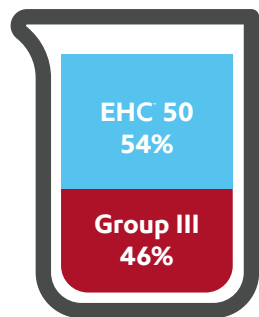
# Enabling dexos<sup>®</sup>-quality lubricants with EHC<sup>™</sup> base stocks

## EHC<sup>™</sup> base stocks enable dexos<sup>®</sup>-quality 5W-30 PCMO

- Potential to blend dexos<sup>®</sup> with EHC 50 vs full Group III
- Consistent base stock quality and supply security assured by ExxonMobil's product integrity process

Formulate dexos<sup>®</sup> 5W-30 PCMO with less Group III

Base oil composition\*



ExxonMobil base stocks



Competitor base stocks

Potential to reduce Group III\* use by up to **50%** and VM treat rate\* by up to 12%

dexos <sup>®</sup> 5W-30 PCMO		
Composition %	EHC <sup>™</sup>	Group III
EHC <sup>™</sup> 50	45.0	—
Group III LN (4 cSt)	28.2	62.5
Group III MN (6 cSt)	9.8	19.4
VM	7.8	8.9
DI	9.2	9.2
Estimated properties	EHC <sup>™</sup>	Group III
KV at 100°C, cSt	10.9	10.9
CCS (@-30°C), cP	5900	4100
NOACK Volatility, wt%	12.0	12.0
HTHS at 150°C, cP	3.1	3.0

\*Dependent on additive chemistry and formulation approvals. ExxonMobil estimates with applicable additive packages. External factors, such as price and quality variation, VM diluent oil, etc. may cause deviations from these estimates; they are intended to be starting points for formulation evaluations. Lubricant blender is responsible for obtaining appropriate approvals and licensing of all formulations.

# 10W-40 formulation

## Optimize your 10W-40 HDEO formulations

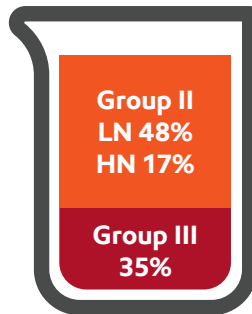
- No need for Group III "corrector" stocks and heavy neutral base stock\*
- Reduce blending complexity
- Potential to lower VM treat rate due to better CCS

Blend competitive HDEO 10W-40 without Group III\* and with superior CCS

Base oil composition\*



ExxonMobil base stocks



Competitor base stocks

Potential to reduce Group III\* use by up to

100%

### 10W-40 HDEO API CK-4

Composition %	EHC <sup>1</sup>	Group II/III
EHC <sup>1</sup> 50	76.0	—
Group II LN (150N)	—	36.7
Group II HN (500N)	0.0	12.6
Group III (4 cSt)	0.0	26.9
VM	9.8	9.6
DI	14.2	14.2
Estimated properties	EHC <sup>1</sup>	Group II/III
KV at 100°C, cSt	14.4	14.4
CCS (@-25°C), cP	5890	6740
NOACK Volatility, wt%	11.3	11.3
HTHS at 150°C, cP	4.1	4.1
MRV @-35°C Apparent viscosity, cP	23200	29200

\*Dependent on additive chemistry and formulation approvals. ExxonMobil estimates with applicable additive packages. External factors, such as price and quality variation, VM diluent oil, etc. may cause deviations from these estimates; they are intended to be starting points for formulation evaluations. Lubricant blender is responsible for obtaining appropriate approvals and licensing of all formulations.

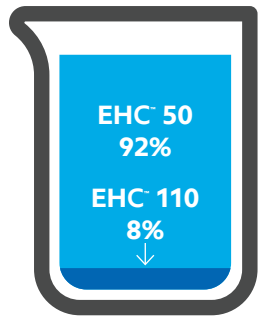
# 10W-40 formulation

## Enhance your 10W-40 HDEO API CJ-4 blends

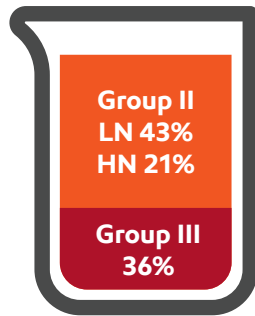
- EHC<sup>®</sup> base stocks enable competitive formulation of 10W-40 HDEO without Group III
- Minimize the need for heavy neutral Group II
- Option for VM optimization

Formulate competitive  
10W-40 HDEO  
without Group III\*

Base oil composition\*



ExxonMobil  
base stocks



Competitor  
base stocks

Potential to reduce  
Group III\* use by up to

100%

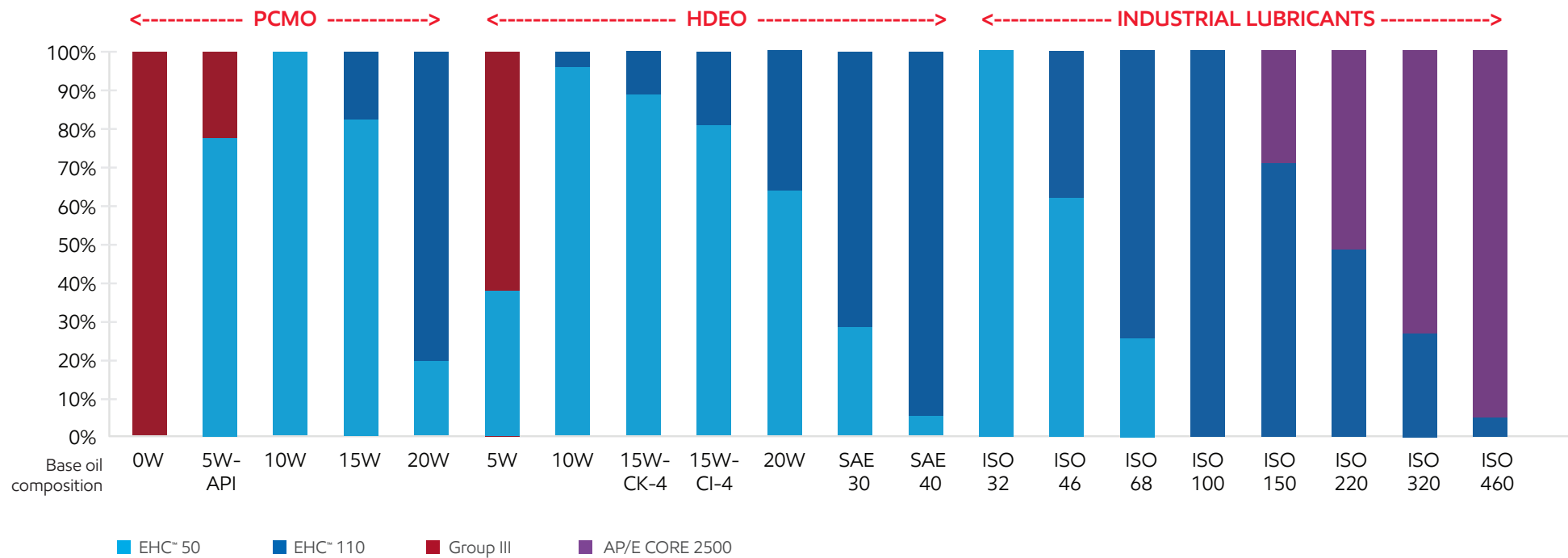
10W-40 HDEO API CJ-4		
Composition %	EHC <sup>®</sup>	Group II/III
EHC 50	72.0	—
Group II LN (150N)	—	33.4
Group II HN (500N)	6.0	16.5
Group III (4 cSt)	0.0	27.9
VM	8.6	8.8
DI	13.4	13.4
Estimated properties	EHC <sup>®</sup>	Group II/III
KV at 100°C, cSt	14.4	14.4
CCS (@-30°C), cP	6250	6700
NOACK Volatility, wt%	11.6	11.9
HTHS at 150°C, cP	4.0	4.0
MRV @-35°C Apparent viscosity, cP	24400	34700

\*Dependent on additive chemistry and formulation approvals. ExxonMobil estimates with applicable additive packages. External factors, such as price and quality variation, VM diluent oil, etc. may cause deviations from these estimates; they are intended to be starting points for formulation evaluations. Lubricant blender is responsible for obtaining appropriate approvals and licensing of all formulations.

# Optimize and simplify formulations

- Broader API engine oils and industrial lubricants coverage with limited number of base stocks
- EHC slate allows BOI and read-across, reducing development cost and increasing flexibility
- EHC base stocks support lower-cost PCMO and HDEO formulations and ease complexity by:
  - Limiting the amount of more expensive Group III required\*
  - Potential additive savings; ability to blend at reduced viscosity modifier treat levels\*
- A higher-saturates, lower pour point EHC is highly suited for hydraulic, gear and circulating oils
- EHC offers advantages when higher oxidation stability and/or lower air release is needed in industrial lubricants

## Product coverage with EHC™ slate



\*Dependent on additive chemistry and formulation approvals. ExxonMobil estimates with applicable additive packages. External factors, such as price and quality variation, VM diluent oil, etc. may cause deviations from these estimates; they are intended to be starting points for formulation evaluations. Lubricant blender is responsible for obtaining appropriate approvals and licensing of all formulations.



# Global availability of Group I & II base stocks

Through our robust global manufacturing and distribution network, we can meet your needs with long-term, reliable supply.



- Refinery
- Terminal
- Distributor

21 global locations



9 transport by marine



18 transport by truck



6 transport by rail

	Method of transportation	Group I	Group II
<b>AMERICAS</b>			
Baton Rouge, LA		■	
Houston, TX		■	■
Chicago, IL		■	
Paulsboro, NJ			■
New Orleans, LA			■
Sarnia, Canada		■	■
Altamira, Mexico		■	■
Rio de Janeiro, Brazil		■	■

	Method of transportation	Group I	Group II
<b>EUROPE, AFRICA, MIDDLE EAST</b>			
Fawley, UK		■	
Liverpool, UK		■	
Port-Jerome Gravenchon, France		■	
Rotterdam, Netherlands*			■
Augusta, Italy		■	
Vado Ligure, Italy		■	
Dubai, UAE		■	
Durban, South Africa		■	
<b>ASIA/PACIFIC</b>			
Singapore		■	■
Melbourne, Australia		■	■
Mumbai, India		■	■
Tianjin, China		■	■
Taicang, China		■	■

\*Group II at Rotterdam will be available beginning in 2019.

# Why ExxonMobil Basestocks?

At ExxonMobil, we solve through science and deliver consistent base stocks so you can blend consistent formulations. Your product depends on ours, so we take care at every step of the way with our brand and product integrity management system.

We support this consistency through six foundational pillars:



1. Quality
2. Performance
3. Representation
4. Regulatory compliance
5. Customer experience
6. Brand identity

What's the result of our rigor?

Our detailed management systems and methodical approach to doing business leads to operational excellence across our organization.



- It makes us a trusted global supplier.
- It helps us ensure brand and product integrity.
- It gives our customers a competitive advantage.
- It makes us a rock-solid business partner who keeps our promises.

# EHC Group II base stocks expected in 2019

EHC base stocks comprise a global Group II slate as defined within API/ATIEL guidelines for formulation and qualification of automotive lubricants. With base oil interchange and viscosity grade read-across capabilities, EHC base stocks offer broad coverage that enables supply chain flexibility and simplified qualification testing requirements. EHC base stocks may also be used in industrial and marine applications where formulations benefit from increased oxidation stability and higher viscosity index (VI). Our rigorous processes ensure reliable delivery of consistent quality base stocks.

**ExxonMobil**

## Key benefits

Consistent quality to help formulators produce high-performance blends that:



Meet or exceed industry requirements



Achieve exceptional oxidation stability



Meet or exceed engine oil quality requirements

Energy lives here™

## Sales specifications and availability expected in 2019

Sales specifications			EHC 45	EHC 50	EHC 65	EHC 110	EHC 120
Property	Limits	Standard method (a)					
Appearance		Visual	Clear and bright	Clear and bright	Clear and bright	Clear and bright	Clear and bright
ASTM color	Max	ASTM D1500	L0.5	0.5	L0.5	0.5	0.5
CCS viscosity -25°C mPa•sec	Max	ASTM D5293	1550				
CCS viscosity -20°C mPa•sec	Max	ASTM D5293		1500	3100		
Flash point, COC Deg C	Min	ASTM D92	204	210	214	230	255
Kinematic viscosity @ 100°C mm2/sec	Min-Max	ASTM D445	4.4-4.7	5.2-5.6	6.3-6.6	10.0-12.0	11.1-12.7
NOACK Volatility, wt%	Max	ASTM D5800	15	13.5	10		
Pour point, Deg C	Max	ASTM D97	-18	-18	-18	-15	-15
Viscosity index	Min-Max	ASTM D2270	113-119	110-119	103-109	95-110	105-115

Availability	EHC 45	EHC 50	EHC 65	EHC 110	EHC 120
Americas	■		■		■
Europe, Africa, Middle East		■			■
Asia/Pacific		■		■	

(a) In lieu of standard test method, alternate test methods may be used for the certification of a product property.  
 Note 1: Products are certified on release to meet the values specified. Actual values may deviate within the established reproducibility of the test method specified.  
 Note 2: For purpose of determining conformance with specification, observed or calculated values shall be rounded off to the nearest unit in the last significant digit used in expressing the limiting value in accordance to the ASTM E 29 method.

**Health and Safety**  
 Detailed health and safety information for this product is provided in the material safety data sheet (MSDS), available upon request through your local sales representative or from [www.ExxonMobil.com](http://www.ExxonMobil.com).


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[exxonmobil.com/basestocks](http://exxonmobil.com/basestocks)

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