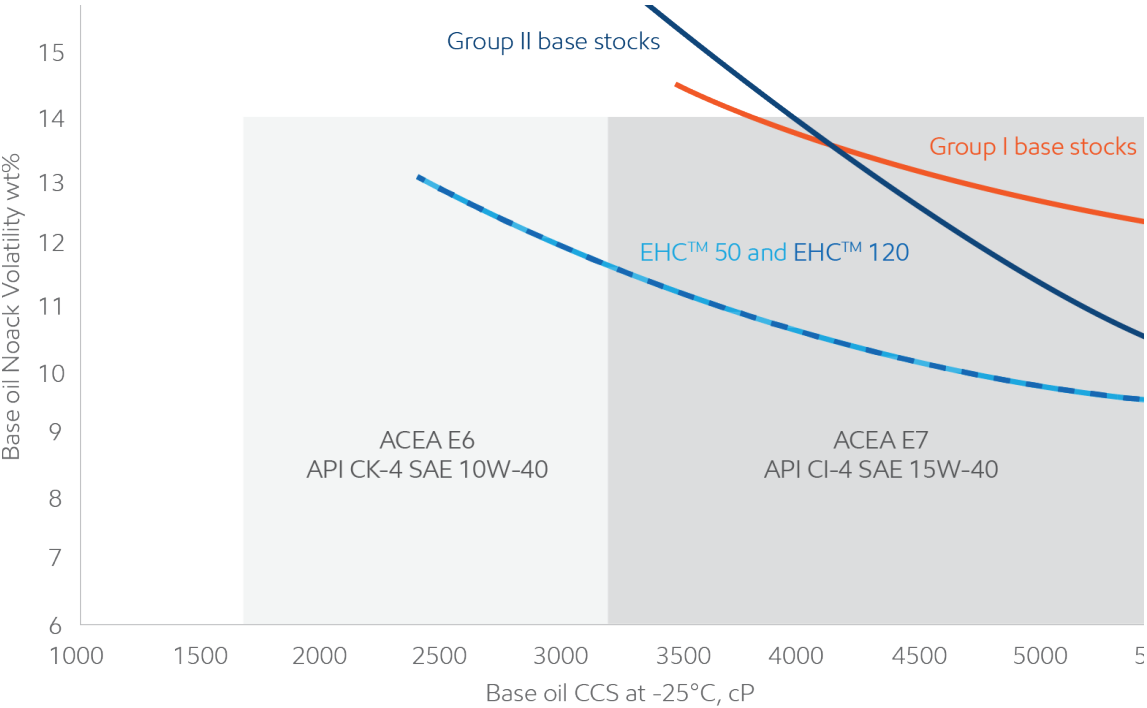


ExxonMobil EHC™ Group II/II+ base stocks offer advantages in HDEO formulations

It all begins with the design of our base stocks, which are engineered to enable high-performing lubricants.

Example
10W-XX oils

EHC™ base stocks are well designed to formulate SAE 10W-XX lubricants.



EM assesment of CCS and Noack properties of main base stocks blend currently available in Europe compared to base oil requirements for specific European engine oils.

- Very low Noack volatility and CCS can be achieved
- No addition of correcting Group III base stock needed

ExxonMobil EHC™ Group II/II+ base stocks offer advantages in HDEO formulations

Example
15W-40 oils

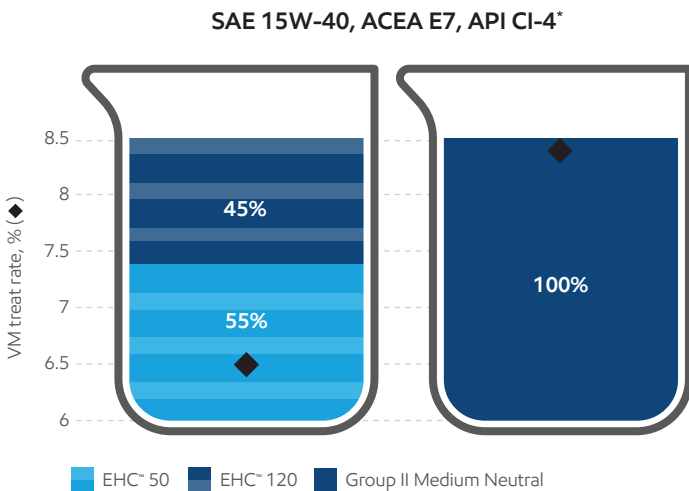
Base oil properties

	EHC™ 50/120	MN Group II
KV @ 100°C, cSt (ASTM D445)	7.54	6.24
VI	113	100
CCS @ -20°C, cP (ASTM D5293)	3429	3001
Noack volatility, % (ASTM D5800)	7.3	10.8

Base stock blends for an SAE 15W-40, ACEA E7 lubricants at equal KV100 and CCS @ -20°C.

- EHC™ base stock blend* has:
- A **32% lower** Noack volatility vs. traditional Medium Neutral (MN) Group II base stocks
 - A **13% higher** VI vs. traditional MN Group II base stocks

EHC™ differentiation in SAE 15W-40 ACEA E7 API CI-4 lubricant



- EHC™-based lubricant advantages*:
- **19% less** Viscosity Modifier (VM)
 - **27% lower** Noack volatility (7.7% vs 10.6%)

*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.

ExxonMobil EHC™ Group II/II+ base stocks offer advantages in HDEO formulations

Example
10W-40 oils

Base oil properties

	EHC™ 50/120	MN Group II/Group III
KV @ 100°C, cSt (ASTM D445)	5.6	5.5
VI	112	120
CCS @ -25°C, cP (ASTM D5293)	2740	2240
Noack volatility, % (ASTM D5800)	10.5	10.5

Base stock blends for an SAE 10W-40, ACEA E6 lubricants at equal KV100 and CCS @ -25°C.

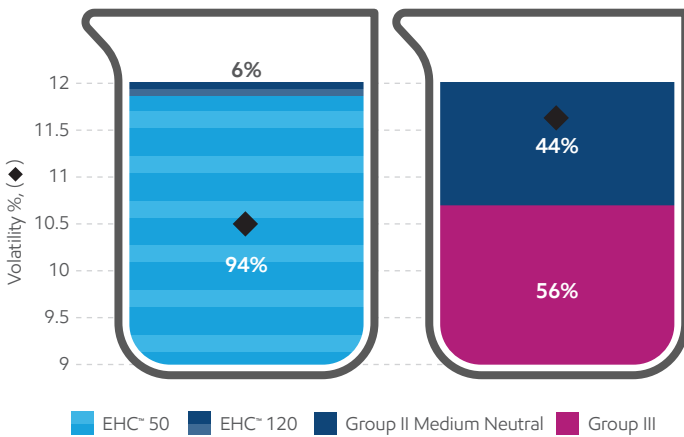
EHC™ base stock blend* has a

similar

Noack volatility vs. Group II/III blends

EHC™ differentiation in SAE 10W-40 ACEA E6 API CK-4 lubricant

SAE 10W-40, ACEA E6, API CK-4*



EHC™-based lubricant advantages*:

- **0%** Group III
- **9% lower** Noack volatility

*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.

ExxonMobil EHC™ Group II/II+ base stocks offer advantages in HDEO formulations

Example
10W-40 oils

Base oil properties

	EHC™ 50/Group III	Group III
KV @ 100°C, cSt (ASTM D445)	5.7	5.7
VI	121	134
CCS @ -25°C, cP (ASTM D5293)	2420	1846
Noack volatility, % (ASTM D5800)	9.7	9

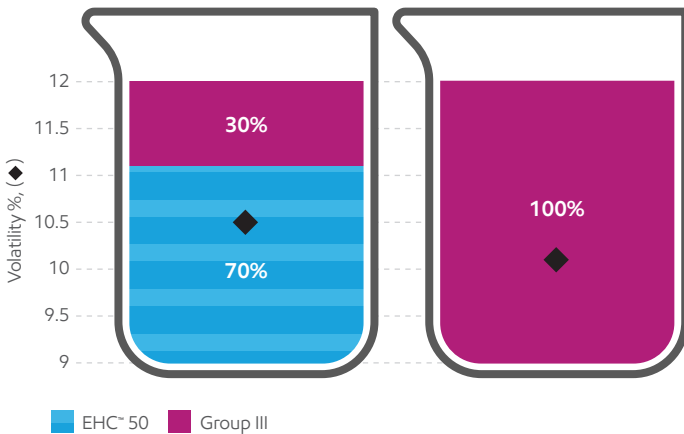
Base stock blend for an SAE 10W-40, ACEA E4 lubricant at equal KV100 and CCS @ -25°C.

EHC™ 50/Group III base stock blend* has:

- A Noack volatility close to the Group II blend

EHC™ differentiation in SAE 10W-40 ACEA E4 lubricant

SAE 10W-40, ACEA E4, API CI-4*



EHC™-based lubricant advantages*:

- **Up to 70%** potential reduction of Group III
- **Similar** Noack volatility (10.5% EHC™ vs 10.1% Group III)

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