



# Chevron Lubricants PC-11 OEM Adoption POV

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# PC-11 & Beyond: Impacts of Phase II GHG

## NA OEM Factory Fill Viscosity Grade Evolution - Potential

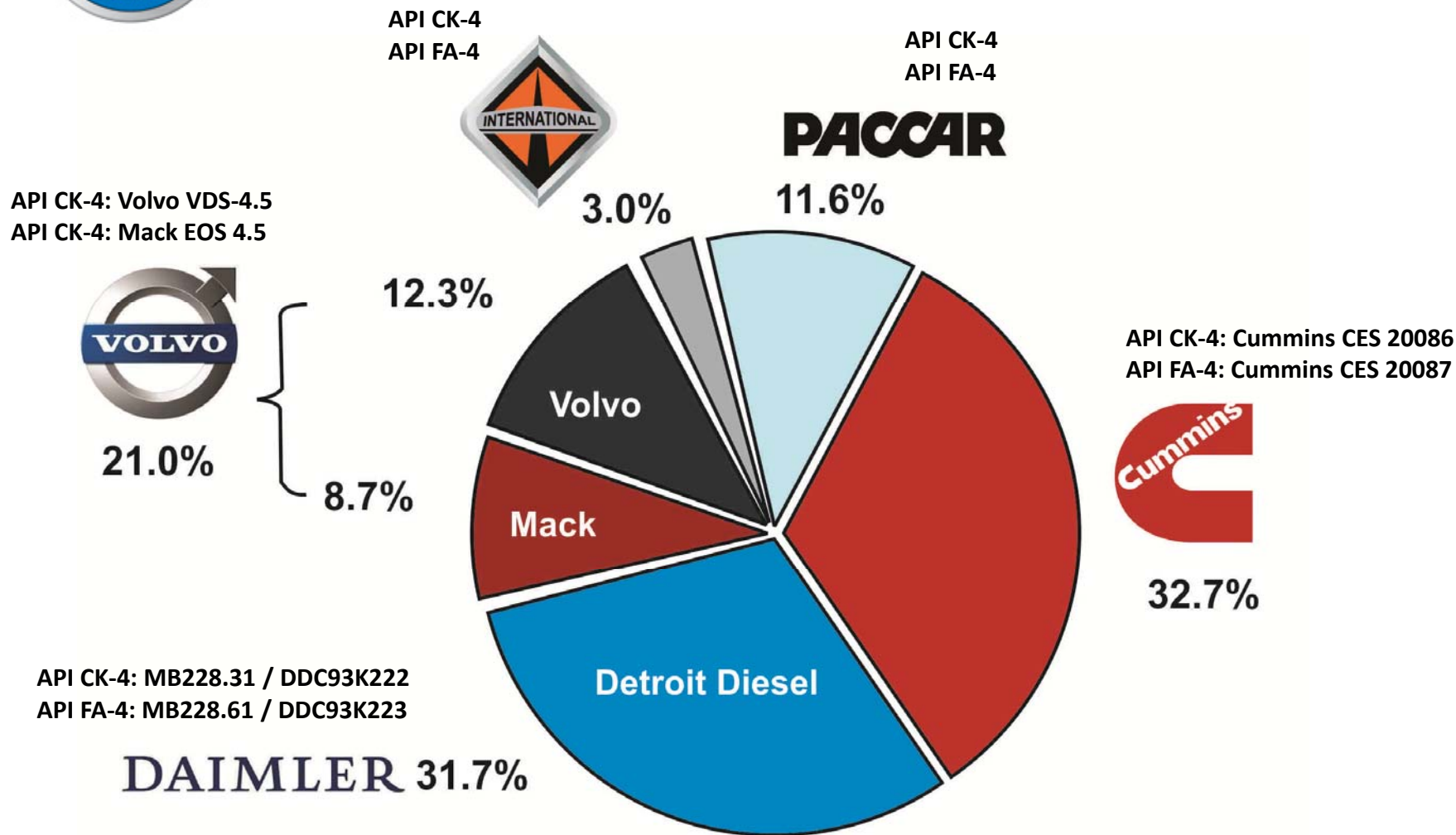


	2012 Factory Fill	2013 Factory Fill Use	2017 Factory Fill Use (Adoption Timing)	2022 Factory Fill Use Projected
<b>Cummins</b>	API CJ-4 CES 20081 SAE 15W-40	API CJ-4 CES 20081 SAE 10W-30	API CK-4 SAE 10W-30 (Jan 2017)	PC-11B SAE 5W-30/10W-30 (OEM dependent)
<b>Detroit Diesel</b>	API CJ-4 DEO 93K218 SAE 15W-40	API CJ-4 DEO 93K218 SAE 10W-30	API FA-4 & DD93K223 SAE 10W-30 (Dec 2016)	PC-11B Low HT/HS SAE 5W-30
<b>PACCAR</b>	API CJ-4 SAE 15W-40	API CJ-4 SAE 10W-30	API CK-4 SAE 10W-30 (Jan 2017)	PC-11B Low HT/HS SAE 10W-30
<b>Navistar</b>	API CJ-4 SAE 10W-30	API CJ-4 SAE 10W-30	API CK-4 SAE 10W-30 (Jan 2017)	PC-11B SAE 10W-30
<b>Volvo</b>	API CJ-4 VDS-4 SAE 10W-30	API CJ-4 VDS-4 SAE 10W-30	API CK-4 & VDS 4.5 SAE 10W-30 (Dec 2016)	PC-11B & VDS-5 SAE 5W-30
<b>Mack</b>	API CJ-4 Mack EO-O PP SAE 10W-30	API CJ-4 Mack EO-O PP SAE 10W-30	API CK-4 & EOS 4.5 SAE 10W-30 (Dec 2016)	PC-11B & VDS-5 SAE 5W-30



# NA OEM – 2015 Engine Market Share

## Projected New OEM Specifications for PC-11











































# PC-11 Product Line Impacts

## Market Intelligence Matrix – on road OEM Recommendations



- All on-road OEMs will be recommending SAE 10W-30 and FF with either CK-4 or eventually FA-4
- Cummins is really pushing for FF with FA-4 but still has concerns on Low Phos performance
- Detroit expects to start FF with FA-4 in 2017
- PACCAR is now looking to test FA-4 to determine if they adopt for MX engine in 2017/2018
- Ford will issue a new WSS OEM spec

 agree    
  neutral    
  disagree

	Detroit	Volvo -Mack	Cummins	Navistar	Paccar	Ford Diesel Pickup	GM Diesel Pickup
Support use of CK-4							
Support use of FA-4							
Still allow use of CJ-4							
No Low Phos Concerns							
New OEM Specs issued as part of PC-11							



# PC-11 Product Line Impacts

## Market Intelligence Matrix – off road OEM Recommendations



- Off-road OEMs support use of CK-4 or CJ-4 – No FA-4 allowed
- MTU and Deutz will adjust their specs along with ACEA 2018 changes
- Cat still not sure about low phos use – will monitor
- Most Off-road OEMs will not be upgrading or issuing any new OEM specs as part of CK-4 launch
- 15W-40 and 10W-30 will both be recommended viscosity grade use (5W-40/5W-30 for cold weather)



agree



neutral



disagree

	Caterpillar	John Deere	Komatsu	Hitachi	CNH	MTU	Deutz
Support of CK-4	Green	Yellow	Green	Green	Green	Green	Green
Support of FA-4	Red	Red	Red	Red	Red	Red	Red
Still allow CJ-4	Green	Green	Green	Green	Green	Green	Green
No Low Phos Concerns	Yellow	Green	Green	Green	Green	Green	Green
New OEM Specs as part of PC-11	Yellow	Red	Red	Red	Red	Red	Red



# PC-11 Product Line Impacts

PC-11 End Customer Adoption Analysis – What will help push change?



## On-Road Diesel Segments

Market Forces Encouraging Adoption of API CK-4/FA-4		
Description	Impact for Change	Customer Probability for Change
Volvo/Mack VDS 4.5/ Mack EOx	Hi	Hi
Cummins CES requiring Volvo T13	Hi	Hi
Detroit DD13 scuffing test (OEM requirement)	Hi	Hi
Extended drain capability	Med	Hi
Reduced aeration	Med	Med
Marketing – New and Improved	Med	Hi
API CK-4/FA-4 Marketing Program	Med	Hi



- Volvo VDS 4.5/Mack EO-X to include T-13
- Cummins CES 200xxa/CES 20xxb to include T-13
- DD13 Scuff Test to be introduced as part of MB228.xx specification
- Possible extended drain allowed by Volvo and Cummins
- Improved aeration and reduced cavitation in some applications
- First new specification in 10 years. Marketing and brand positioning opportunities.

## Off-Road Diesel Segments

Market Forces Against Adoption of API CK-4/FA-4		
Description	Impact for Change	Customer Probability for Change
Lack of Perceived Benefit	Med	Med
Off-Road Customer Fuel Economy benefits	Low	Low
No New Cat Spec	Med	Low
No new Off-road OEM specifications	Low	Low
Penetration of 2017 Engine for off-road	Low	Low



- Some question tangible benefit versus CJ-4
- Non-road market lags on-highway and will likely keep existing drain intervals
- No Cat ECF-4 spec despite COAT test in PC-11
- New truck turnover of approximately 6%. Slow penetration of model year 2017 engines specifying PC-11 and related OEM specifications.
- NO off-road OEM specs tied to new PC-11 formulations
- Allowed to use API CJ-4 in all equipment
- Will not allow use of API FA-4 in off-road equipment



For more information on PC-11:

Visit our Web site at

[www.PC-11Explained.com](http://www.PC-11Explained.com)

Improving Fuel Economy and Engine Durability

Getting Ready for  
**DEC 2016**

PC-11 TIMELINE [CLICK TO EXPAND](#)

New stricter emission regulations are driving changes in engine design and technology. PC-11 is a new diesel engine oil category designed to surpass the performance of API CJ-4 oils while delivering better fuel economy. This is a source to help you understand these changes and prepare for successful transition in December 2016.

WHAT IS PC-11?    PC-11 IMPACT ON DIESEL VEHICLES    CHEVRON'S VIEW

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# Chevron Lubricants

## What about CNG?

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## CNG Engines and PC-11 *What changes?*



- CNG engines currently meet very strict emissions requirements as targeted by GHG Phase 2
- PC-11 formulation changes don't impact Delo 400 NG SAE 15W-40
- Cummins has new specification for CNG engines
  - ❖ CES 20085 for higher ash products for new ISX 12 G engines
  - ❖ CES 20074 remains in place for lower ash CNG oils for Cummins 8.3G and smaller CNG engines
- Chevron developing new Delo 400 NG SAE 10W-30 product
  - ❖ Will use same Technology as Delo 400 NG SAE 15W-40
  - ❖ Synthetic Blend formulation
  - ❖ Target field testing with several fleets
  - ❖ Compare against Delo 400 NG SAE 15W-40 on drain and performance
- Support move to SAE 10W-30 across entire fleet



[www.ChevronDeloPC-11.com](http://www.ChevronDeloPC-11.com)