Upcoming OTR Specification Updates

The webinar will begin in less than 10 minutes.

Upcoming OTR Specification Updates

The webinar will begin in less than 5 minutes.





Webinar starting soon; until then...

TEST YOUR KNOWLEDGE

Government regulations often drive API specification changes

True

False









EGR stands for Extreme Gas Reduction

True

False





Webinar starting soon; until then...

TEST YOUR KNOWLEDGE

Which of the following tests was added as a new test for PC-11:

Caterpillar C13

Volvo T-13

Cummins ISB

Mack T-11





Upcoming OTR Specifications Update





Amber Fessler - NLGI CLGS; STLE CLS & OMA-I

- CITGO Senior Sector Manager
- Materials Engineer
- 13 Years of Experience in Lubricants
- STLE Certified
 - Certified Lubrication Specialist
 - Oil Monitoring Analyst I
- NLGI Certified
 - Certified Lubricating Grease Specialist



Want Resources?

User ID : cbai





Future Webinars

January 27, 2025: CITGARD Off-Road & Mystik Heavy-Duty



Steven Bowles – CLS & OMA-I

- CITGO Sr. Product Specialist
- B.S. Zoology & M.S. Environmental Science
- 20 Years of Experience in Lubricants
- 16 Years Experience in Laboratory Supervision/Analytical Chemistry



Matthew McGovern

- CITGO Direct Team Lead
- B.S. Finance
- 12 Years Experience in Lubricants, including with
 - Petro-Canada Lubricants, District Sales Manager
 - Valvoline, Territory Business Manager





PC-11 & PC-12

Selling Using PC-12







> HD Specifications Regulation Leads to Specifications

Specification Emissions Regulation Status **Particulate Emissions NOx Emissions** CO, Year Phased In (g/bhp-hr) (g/bhp-hr) **Emissions** 1988 0.60 10.7 1985 - API CE Obsolete 1990-91 0.25 6.0 -> 5.0 1990 - API CF-4 Obsolete 1994 0.10 5.0 1995 - API CG-4 Obsolete 1998 0.10 4.0 1998 - API CH-4 Active 0.10 2.0 2002 - API CI-4/CI-4 PLUS 2002 Active 2007, 2010 0.01 1.2 -> 0.2 2006 - API CJ-4 Active 2014-2018 GHG Phase 1 2016 - API CK-4 / API FA-4 Active (PC-11) GHG Phase 2 2021-2027 2027 - New API Categories Under Development Have Been Requested 2024-2031 0.005 CARB (0.05 - 0.02) (PC-12) (PC-12) 2027 0.005 EPA (0.035) GHG Phase 3 2027-2032

April 27, 2023 EPA Released GHG Phase 3 Proposal Mar 29, 2024 EPA Released GHG Phase 3 Final Rule





Green House Gas Phase 2 (GHG2) Emissions Phase-In Green House Gas Phase 3 (GHG3) on the Horizon

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030		
	Ph	ase I GHG	Р	hase II GH	IG Step 1		Phase II GH	IG Step 2	2	Phase II G	HG Step	3	Phase III GHG To Come?*	•
US-Federal														

Reduction in Fuel Consumption and GHG Emissions compared to MY 2017 Baseline	MY 2021	MY 2024	MY 2027
Combination Tractors*	13%	20%	25%
Trailers	5%	7%	9%
Heavy Duty Pickup Trucks and Vans	2.5%	10%	16%
Vocational Vehicles*	12%	20%	24%
*Separate Engine Standards (tractor, vocational)			4-5%

More complex aftertreatment systems are required



- DEF Diesel Exhaust Fluid (Urea)
- SCR Select Catalytic Reduction
- ASC Ammonia "Slip" Catalyst

More complex aftertreatment systems are required



Warranty periods and useful life periods for heavy-duty engines

	War	ranty period	ł	Aftertreatment system useful life periods			
	Miles	Years	Hours	Miles	Years	Hours	
Current	100,000	5	-	435,000	10	22,000	
MY 2027 and later	450,000	10	22,000	650,000	11	32,000	

Longer Warranties and Useful Life for Engines & Aftertreatment Systems





PC-11 API CK-4 & FA-4: Why Two API Oil Categories?



More Robust API CJ-4 Recommended by all OEMs Full backward

compatibility SAE xW-30 and xW-40 HTHSV > 3.5 mPa•s API CK-4, ACEA E Robust CJ-4 at lower viscosity
Some OEMs opted out
Not backward serviceable
SAE xW-30
HTHSV: 2.9 – 3.2 mPa•s
API FA-4, New ACEA F

API CK-4 has the same durability requirements as API FA-4 to minimize risks associated with the new lower-viscosity fuel economy grades



API CK-4



API

FA-4

API CK-4 & FA-4: Test Requirements Combination of New and Carry forward tests from API CJ-4

	Test	Performance Parameters	Fuel Sulfur
Legacy Tests	Caterpillar C13	Piston Deposits, Oil Consumption	15 ppm
	Caterpillar 1N	Aluminum Piston Deposits, Oil Consumption	500 ppm
	Cummins ISB	Valve Train Wear	15 ppm
	Cummins ISM	Valve Train Wear, Filter Plugging, Sludge	500 ppm
	Roller Follower Wear Test	Roller Follower Pin Wear	500 ppm
	Mack T-11	Soot Induced Viscosity Increase	500 ppm
	Mack T-11A	Sooted Oil Low Temperature Pumpability	500 ppm
	Mack T-12	Ring/Liner Wear parameters only	15 ppm
3	Volvo T-13	Oxidation	15 ppm
S	Caterpillar C13 Oil Aeration Test (COAT)	Oil Aeration	15 ppm

PC-11 API CK-4 and FA-4: Improving Oxidation

ASTM D8048 (Volvo T-13 Oxidation Test)

- 13L Mack MP8 diesel engine
- 360 hours steady-state test
- Oil temperatures:
 - 130°C main gallery
 - 140°C sump

API CK-4 & FA-4 Limits:

- T-13 FTIR Oxidation Peak Height: 125 max
- KV 40C % increase (300-360 hr): 75% max
- Drove more anti-oxidants into oil
- Largest increase of any API oil category!





API CK-4 and FA-4: Improving Aeration

ASTM D8047 (Caterpillar-C13 Oil Aeration Test)

- 13 L diesel engine
- 50 hours duration
- Aeration is measured real-time via a Micromotion meter that measures oil density

API CK-4 & FA-4 Limits:

- Average % aeration 40-50 hrs: 11.8% max
- Drove rebalance of additives, promoting lighter SAE viscosity grades









PC-12 – Category Proposal

22	2023		2024		2025		2026		2027	
	1H	2H	1H	2H	1H	2H	1H	2H	1H	
NDUSTRY	NCDT				Tech Demo +	Limit Setting	Mandatory W	First Allowable U		





	Chausatauistia	Test that measures	Upgraded/	Limits		
	Characteristic	parameter	changed for PC-12	PC-12a	PC-12b	
	High Temperature / High Shear Limit (Fresh Oil)	HTHS	Х	СК-4	2.6 – 3.2 cP	
	High Temperature / High Shear Limit (After Shear Oil)	HTHS	Х	СК-4	TBD	
	Mass fraction of sulphated ash	ASTM D874	Х	0.9%	max	
	Mass fraction of phosphorus	ASTM D5185/D4951	Х	0.08%	6 max	
sts	Mass fraction of sulfur	ASTM D5185/D4951	Х	0.3%	max	
ו te	Elastomer Compatibility	ASTM D7216	Х	Additional mater	ial added (HNBR)	
Bench	Used Oil Viscometrics (Low Temp)	MRV (Cummins ISB Viscosity)	х	СК-4	TBD	
	High Temperature Corrosion	HTCBT		СК-4	FA-4	
	Shear Stability	ASTM D7109	Х	СК-4	TBD	
	Volatility	NOACK		СК-4	FA-4	
	Foaming	ASTM D892		СК-4	FA-4	
	Soot / EGR Valvetrain Wear Valve Stem / Guide Wear Filter Plugging / Sludge	ISM		СК-4	FA-4	
sts	Piston Deposits, Fe and Oil Consumption	C13		СК-4	FA-4	
e te	Soot Valvetrain Wear (Sliding Wear)	ISB		СК-4	FA-4	
sine	Thermal Stability (Oxidation)	T-13	Х	Targeting FTIR Peak ≤ 80, KV40 Inc. % ≤ 50		
Eng	Oil Aeration	COAT		СК-4	FA-4	
	Soot Viscosity in EGR Engines	Cummins ISB Viscosity	х	СК-4	Targeting 12 cSt at 4.8% Soot	
	Piston / Liner Scuffing Wear (Adhesive)	DD13	X	Targeting 31	hrs to scuff	









Current Category OEM Specifications and Recommendations

Most OEMs recommend CK-4, some recommend FA-4 today

OEM	API CK-4	API FA-4
Cummins	CES 20086	CES 20087
Detroit Diesel	DFS 93K222	DFS 93K223
Mack	Mack EOS-4.5	Mack EOS-5
Volvo	Volvo VDS-4.5	Volvo VDS-5
Caterpillar	API CK-4	
Navistar	API CK-4	API FA-4
PACCAR	API CK-4	
GM (Duramax 6.6L)	API CK-4	
Ford (Power Stroke 6.7L)	WSS M2C171-F1	
Ford (Power Stroke 3.0L)		WSS M2C214-B1

Current OEM Oil Drain Intervals

	<5.0 MPG	5.0-5 MPG	.5	5.5-6.0 MPG	6.0-6.5 MPG	5	6.5-7.0 MPG	>7.0 MPG	> 7.5 MPG	
Cummins X15	25k miles	50k m	50k miles		60k miles			75k miles (up to 100k with Oil Guard)		
Detroit DD15	35k miles	45k m	iles		60k miles 75k			75k miles	'5k miles	
Detroit DD13	35k miles	40k m	iles		55k mile	5k miles		65k miles		
Navistar A26	20k miles	30k miles			50k (up to 70k with c			with oil sampling	n oil sampling)	
Mack MP7/MP8	35k miles* / 30k miles	45k miles* / 40k miles			60k miles* / 55k miles					
Volvo D11/D13	35k miles**/ 30k miles	/ 45k miles**/ 40k miles			60k mile	es**/ 55		75k miles**/ 55k miles		
	Severe / Vocational Normal / Line Haul,			/ Line Haul, >20	% Idle	Norma	20% Idle			
PACCAR MX-11/MX13	CCAR 25k miles 50k miles			S		60k miles				
* Using Genuine ** Using Volvo Pr	* Using Genuine Mack EOS-4.5 Premium Oil Severe Long Haul / Normal ** Using Volvo Premium Motor Oil VDS-5 Short Haul / Heavy Efficient Long Haul / Light / Economy									



Selling Using PC-12



Why New Information Matters

Engagement with Prospects

Building Trust and Credibility

Differentiation from Competitors

Enhancing





Sparks Curiosity







Engagement

Building Trust & Credibility

Demonstrates expertise

Shows commitment to value

Provides relevant insights



Differentiating From Competitors



Practical Tips







Sales Increase

"Give to Get" Sales Strategy

New Market Research

Personalized Insights

WILLING TO GIVE YOU A CHANCE

Questions?



Please post your questions using the Q&A function.



For technical inquiries or issues: Lubes Answer Line 800-248-4684 <u>lubeshelp@citgo.com</u>



Thank You! See you next time

