



**Kevin Ferrick**

Sr. Manager, Engine Oil Licensing and Certification System

**Global Industry Services**

1220 L Street, NW  
Washington, DC 20005-4070  
USA

Telephone 1-202-682-8233

Fax 1-202-962-4739

Email ferrick@api.org

www.api.org/eolcs

June 2, 2016

TO: API Engine Oil Licensing and Certification System (EOLCS) Licensees  
API Lubricants Group  
Other Interested Parties

SUBJECT: Technical Bulletin 1  
API 1509, *Engine Oil Licensing and Certification System*  
17<sup>th</sup> Edition, September 2012 (Addendum 1 October 2014)

API's Lubricants Committee has approved by letter ballot the following changes to the 17<sup>th</sup> Edition of API 1509 (see Attachments 1 and 2). These changes result from the committee's adoption of API Service CK-4 and API Service FA-4, new diesel engine oil service categories.

A complete revision of API 1509 is currently being prepared that will incorporate all changes to the document through CK-4 and FA-4. Of all the changes approved or under consideration, the most important are the following:

- Starting December 1, 2016, API Service CK-4 and API Service FA-4 may be licensed for use in the upper portion of the API Service Symbol "Donut."
- Oil marketers may license oils meeting API Service CK-4 as API Service CJ-4, API CI-4 with CI-4 PLUS, CI-4, and CH-4.

Marketers have a number of options to consider as they plan the introduction of the new oils:

- Marketers are free to identify qualifying oils as meeting API Service CK-4 and API Service FA-4 prior to the December 1 first licensing date but must avoid statements that imply API certification or licensing of CK-4 or FA-4 in advance of that date.
- Marketers that want to claim their products are licensed by API as meeting CK-4 or FA-4 on the first licensing date must apply for licensing of the CK-4 or FA-4 products through the on-line application system at <https://engineoil.api.org/AccountManager/WelcomeMarketer>. API will process applications as they are received, but the right to claim API licensing against the CK-4 or FA-4 standard will not be allowed until December 1, 2016.
- Marketers with approved API CK-4 or FA-4 products may not use CK-4 or FA-4 in the API Donut until December 1, 2016.

These changes are effective as of December 1, 2015, unless otherwise noted. If you have questions, please do not hesitate to contact me.

Sincerely,

### **5.X.X.X CK-4—For 2017 Heavy-Duty Diesel Engine Service**

API Service Category CK-4 describes oils for use in high-speed four-stroke cycle diesel engines designed to meet 2017 model year on-highway and Tier 4 non-road exhaust emission standards as well as for previous model year diesel engines. These oils are formulated for use in all applications with diesel fuels ranging in sulfur content up to 500 ppm (0.05% by weight). However, the use of these oils with greater than 15 ppm (0.0015% by weight) sulfur fuel may impact exhaust aftertreatment system durability and/or oil drain interval.

These oils are especially effective at sustaining emission control system durability where particulate filters and other advanced aftertreatment systems are used. API CK-4 oils are designed to provide enhanced protection against oil oxidation, viscosity loss due to shear, and oil aeration as well as protection against catalyst poisoning, particulate filter blocking, engine wear, piston deposits, degradation of low- and high-temperature properties, and soot-related viscosity increase.

Engine oils that meet the API Service Category CK-4 designation have been tested in accordance with the ACC Code of Practice and may use the API Base Oil Interchangeability Guidelines and the API Guidelines for SAE Viscosity-Grade Read Across.

API CK-4 oils exceed the performance criteria of API CJ-4, CI-4 PLUS, CI-4, and CH-4 and can effectively lubricate engines calling for those API Service Categories. When using CK-4 oil with higher than 15 ppm sulfur fuel, consult the engine manufacturer for service interval recommendations.

Marketers may license products meeting API CK-4 requirements as API CJ-4, CI-4 PLUS, CI-4, and CH-4.

### **5.X.X.X FA-4—For 2017 Heavy-Duty Diesel Engine Service**

API Service Category FA-4 describes certain XW-30 oils specifically formulated for use in select high-speed four-stroke cycle diesel engines designed to meet 2017 model year on-highway greenhouse gas (GHG) emission standards. These oils are formulated for use in on-highway applications with diesel fuel sulfur content up to 15 ppm (0.0015% by weight). Refer to individual engine manufacturer recommendations regarding compatibility with API FA-4 oils.

These oils are blended to a high temperature high shear (HTHS) viscosity range of 2.9cP–3.2cP to assist in reducing GHG emissions. These oils are especially effective at sustaining emission control system durability where particulate filters and other advanced aftertreatment systems are used. API FA-4 oils are designed to provide enhanced protection against oil oxidation, viscosity loss due to shear, and oil aeration as well as protection against catalyst poisoning, particulate filter blocking, engine wear, piston deposits, degradation of low- and high-temperature properties, and soot-related viscosity increase.

Engine oils that meet the API Service Category FA-4 designation have been tested in accordance with the ACC Code of Practice and may use the API Base Oil Interchangeability Guidelines and the API Guidelines for SAE Viscosity-Grade Read Across.

API FA-4 oils are not interchangeable or backward compatible with API CK-4, CJ-4, CI-4 PLUS, CI-4, and CH-4 oils. Refer to engine manufacturer recommendations to determine if API FA-4 oils are suitable for use. API FA-4 oils are not recommended for use with fuels having greater than 15 ppm sulfur. For fuels with sulfur contents greater the 15 ppm, refer to engine manufacturer recommendations.

**Table X-X—Requirements for API Service Category CK-4 and FA-4**

CK-4 and FA-4 Engine Tests					
Category	Test Method	Rated or Measured Parameter	Primary Performance Criteria		
			One-test	Two-test <sup>a</sup>	Three-test <sup>a</sup>
CK-4 or FA-4	D7422 (T-12)	Top ring mass Loss, mg, max	105	105	105
		Cylinder Liner Wear, $\mu\text{m}$ , max	24.0	24.0	24.0
	WK50204 (T-13)	IR peak at EOT, Abs., $\text{cm}^{-1}$	125	130	133
		Kinematic viscosity increase at 40°C, % max	75	85	90
		Avg. oil consumption, 48 h to 192 h, g/h, max	Report	Report	Report
	D7156 (T-11) <sup>b</sup>	TGA % soot at 4.0 $\text{mm}^2/\text{s}$ increase, at 100°C, min	3.5	3.4	3.3
		TGA % soot at 12.0 $\text{mm}^2/\text{s}$ increase, at 100°C, min	6.0	5.9	5.9
		TGA % soot at 15.0 $\text{mm}^2/\text{s}$ increase, at 100°C, min	6.7	6.6	6.5
	D7549 (C13)	Merit rating <sup>a</sup> , min	1000	1000	1000
	WK51937 (COAT)	Average aeration <sup>a</sup> , 40 h to 50 h, %	11.8	11.8	11.8
	D7484 (ISB)	Slider tappet mass loss, mg, average, max	100	108	112
		Cam lobe wear, $\mu\text{m}$ , average, max	55	59	61
		Crosshead mass loss, mg, average	Report	Report	Report
	D7468 (ISM)	Top ring mass Loss, mg, max	100	100	100
		Merit rating <sup>a</sup> ,	1000	1000	1000
	D6750 (1N)	Weighted demerits (WDN), max	286.2	311.7	323.0
		Top groove fill (TGF), %, max	20	23	25
		Top land heavy carbon (TLHC), %, max	3	4	5
		Oil consumption, g/kWh, (0 h – 252 h), max	0.54	0.54	0.54
		(g/MJ) (0 h – 252 h), max	(0.15)	(0.15)	(0.15)
		Piston, ring, and liner scuffing	none	none	none
	Piston ring sticking	none	none	none	
	D5966 (RFWT)	Average pin wear, mils, max	0.30	0.33	0.36
		( $\mu\text{m}$ ) max	(7.6)	(8.4)	(9.1)

CK-4 and FA-4 Bench Tests			
ASTM Bench Test	Measured Parameter	Primary Performance Criteria	
		CK-4 SAE J300 viscosity xW-30, xW-40	FA-4 SAE J300 viscosity xW-30
D4683 (High temperature/high shear) or D4171 or D5481	Viscosity at 150°C, mPa-s		
	xW-30 grades, min	3.5	2.9
	xW-30 grades, max	N/A	3.2
	xW-40 grades	Meet SAE J300	N/A
D6594 (135°C HTCBT)	Copper, mg/kg increase, max	20	20
	Lead, mg/kg increase, max	120	120
	Copper strip rating, max	3	3
D7109	Kinematic viscosity after 90 pass shearing, mm <sup>2</sup> /s at 100°C, min		
	xW-30	9.3	9.3
	0W-40	12.5	N/A
	Other xW-40	12.8	N/A
	HTHS viscosity (see above methods) at 150°C, min xW-30 grades	3.4	2.8
D5800 (NOACK)	Evaporative loss at 250°C, %, max	13	13
D892	Foaming/settling, mL, max		
	Sequence I	10/0	10/0
	Sequence II	20/0	20/0
	Sequence III	10/0	10/0
D6896 (Sooted oil MRV TP-1) (D7156 engine test requirement)	Viscosity, 180 h used oil sample from T-11/T-11a test, tested at -20°C, mPa-s, max	25000	25000
	Yield stress of 180 h used oil sample above, Pa, max	<35	<35

CK-4 and FA-4 Chemical Limits			
ASTM Bench Test	Measured Parameter	Primary Performance Criteria	
		CK-4 SAE J300 viscosity xW-30, xW-40	FA-4 SAE J300 viscosity xW-30
D874	Mass fraction sulfated ash, %, max	1.0	1.0
D4951	Mass fraction phosphorus, %, max	0.12	0.12
D4951	Mass fraction sulfur, %, max	0.4	0.4

CK-4 and FA-4 Unadjusted Specification Limits for Elastomer Compatibility			
ASTM Bench Test	Elastomer	CK-4	FA-4
D7216 (Seal compatibility)	Nitrile (NBR)		
	Volume change, %	(+5, -3)	(+5, -3)
	Hardness change, points	(+7, -5)	(+7, -5)
	Tensile strength change, %	(+10, -TMC 1006)	(+10, -TMC 1006)
	Elongation at break change, %	(+10, -TMC 1006)	(+10, -TMC 1006)
	Silicone (VMQ)		
	Volume change, %	(+TMC 1006, -3)	(+TMC 1006, -3)
	Hardness change, points	(+5, -TMC 1006)	(+5, -TMC 1006)
	Tensile strength change, %	(+10, -45)	(+10, -45)
	Elongation at break change, %	(+20, -30)	(+20, -30)
	Polyacrylate (ACM)		
	Volume change, %	(+5, -3)	(+5, -3)
	Hardness change, points	(+8, -5)	(+8, -5)
	Tensile strength change, %	(+18, -15)	(+18, -15)
	Elongation at break change, %	(+10, -35)	(+10, -35)
	Fluoroelastomer (FKM)		
	Volume change, %	(+5, -2)	(+5, -2)
	Hardness change, points	(+7, -5)	(+7, -5)
	Tensile strength change, %	(+10, -TMC 1006)	(+10, -TMC 1006)
	Elongation at break change, %	(+10, -TMC 1006)	(+10, -TMC 1006)
Vamac G			
Volume change, %	(+TMC 1006, -3)	(+TMC 1006, -3)	
Hardness change, points	(+5, -TMC 1006)	(+5, -TMC 1006)	
Tensile strength change, %	(+10, -TMC 1006)	(+10, -TMC 1006)	
Elongation at break change, %	(+10, -TMC 1006)	(+10, -TMC 1006)	

Notes:

1. These are the *unadjusted specification limits* for elastomer compatibility. Candidate oils shall, however, conform to the adjusted specification limits described in ASTM D4485 Annex A4.
2. TMC 1006 is the designation for the reference oil used in ASTM D7216. This designation represents the original blend or subsequent approved re-blends of TMC 1006.

<sup>a</sup>See ASTM D4485 Annex A6 for additional information.

<sup>b</sup>MRV requirement listed as a bench test.