

How much Additive do you need?

I am a firm believer that you do not need additives, just buy the right oil. For classic cars, especially those with flat tappets, diesel rated CI-4/CI-4Plus (not CJ-4) is excellent. For those who want to mix their own, either due to necessity, or predilection, you can use after market oil additives. This should raise two red flags. First, what additive – have you seen all those bottles in the auto store? The second, is one bottle enough, or too much? The answer to these two questions is what this article investigates.

Preparation:

1. You will need buy one thing before you apply the below. You should to the housewares department in your favorite store. Buy a nice clear measuring cup marked in ounces. This you give to your loving cook. You then liberate the old one from the kitchen. You will use this.
2. Next step is to decide on what you “need” to improve. For the purposes of this illustration, “improving” the level of Zinc will be the example in this paper. A concentration of Zinc of 0.12%wt is indicated in several SAE papers for automobiles with flat tappet engines.

The Calculation:

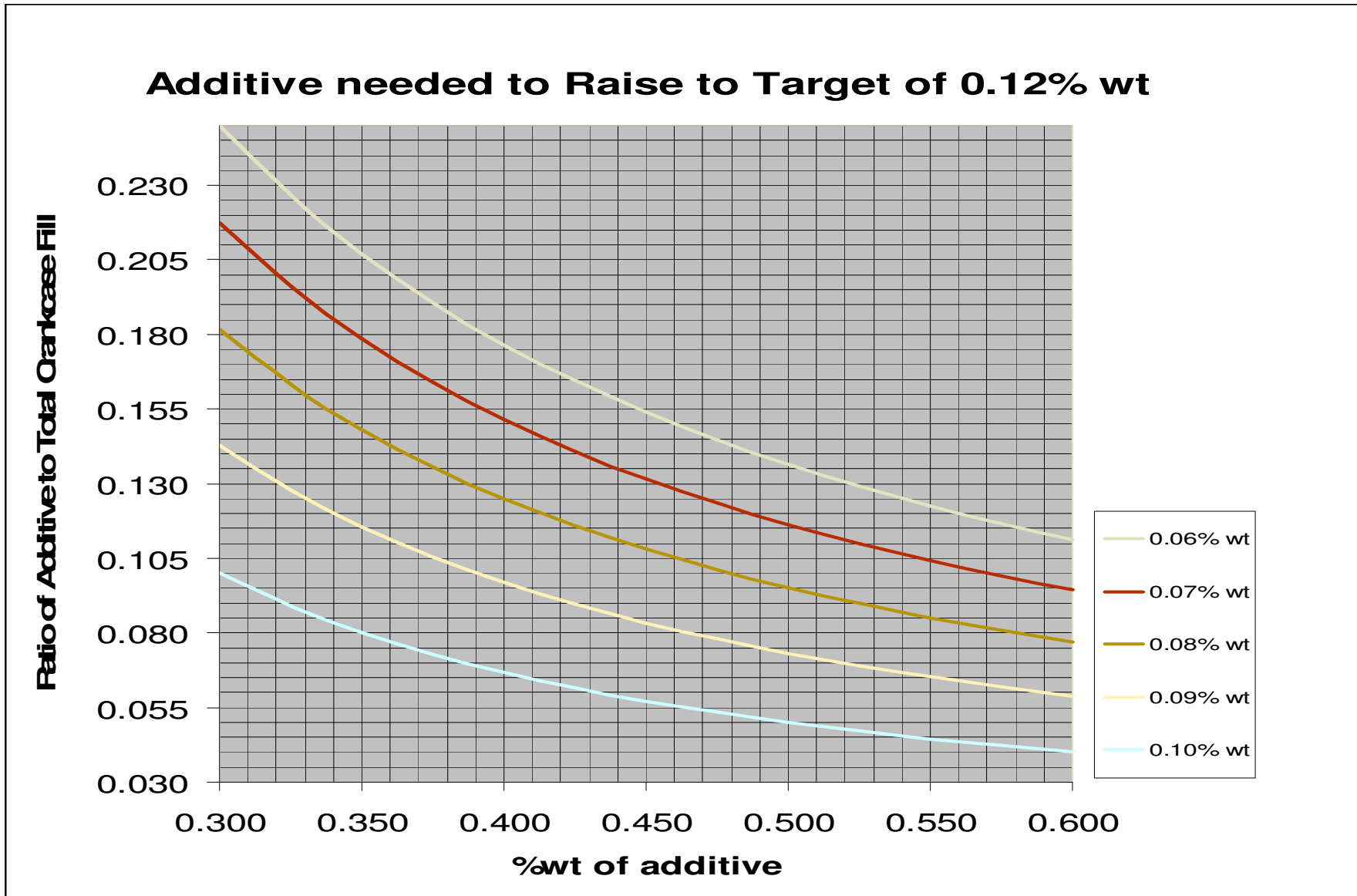
You will need the following information:

1. The Zinc level of your chosen oil, in % wt (note 1234 ppm == .1234%), either from product data sheets (PDS) or virgin oil analysis (VOA). Some are compiled in Table 2 below.
2. The Zinc level of your chosen additive, in %wt, some are compiled in Table 1 below.
3. Using the graph below, find the curve that is closest to the zinc %wt of your oil
4. find where it intercepts the zinc %wt of the additive (x-axis)
5. follow this intercept point over to the y-axis. This is portion of your crankcase + filter fill that needs to be in additive.

An example (NO products endorsed, just an example):

1. From table 2, Valvoline MaxLife Zinc = 0.0830 % wt, from table 1 CD2 75,000 Plus Oil Zinc = 0.4007 %wt
2. Using the chart, this translates to 0.125 portion of additive to total fill
3. To get total additive you need, multiply your crankcase + filter capacity by the portion, assuming 4.5 quarts, then additive oz = $32 \times 4.5 \times 0.125 = 18$ oz.
4. Use that measuring cup you liberated from the kitchen to measure the amount of additive needed! Pour into the engine fill port, then top off with your oil

CAUTION:
You MUST read the full article, instructions and especially the example
if you expect for these tables to help you



Graph 1 - Ratio of additive to Total Crankcase Fill

Last update: 13 Sept 2007

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 data collected from various public domain sources, including Manufacturer Product Data Sheets, corrections with URL references appreciated.

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This is an attempt to be comprehensive. I will post any additive that you send *full details* to the e-mail above, including source AND date of the data. Thank you!

	BG MOA (motor oil additive)	CD2 75,000 Plus Oil Treatment For High Mileage Vehicles	CD2 Engine Additive	CD2 Street Legal High Performanc e Oil Boost (SLOB)	Crane Super Lube Break-In Concentrat e	GM Engine Oil Supplemen t ,Item #:1052367	Prolong	Schaeffer's Moly EP Oil Treatment	STP 4- Cylinder Oil Treatment (Red bottle)	Tufoil Analysis	Valvoline MaxLife Engine protector (MLEP)	Valvoline Synpower Oil Treatment (VSOT)
data source	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA
Total Base Number	32.8	16.2					6.7				8	16.1
Total Acid Number											0.09	
Zinc	0.1700	0.4007	0.0001	0.4898	14.5600	0.6290	0.0011	0.0006	0.1959	0.0356	0.0625	0.0110
Phosphorus	0.1500	0.3642	0.0003	0.4921	69.3500	0.6144		0.0104	0.1814	0.2286	0.0567	0.0100
Molybdenum	0.0139		0.0000	0.0000	0.0018	0.0002		0.0023	0.0000	0.2556	0.0489	0.0418
Calcium	1.1090	0.8678	0.1080	0.4279		0.2583	0.1000		0.1371	0.0216	0.0240	0.1081
Magnesium	0.0055	0.0280	0.0001	0.0013		0.0877	0.0011		0.0005	0.0133	0.0057	0.0002
Boron		0.0068			0.0014						0.0040	0.0010
Sodium		0.0275	0.0000	0.0005		0.0978	0.0010		0.0000	0.0159		
Notes: (a blank field means "no reported data")	average of 2 lab's		No sure what this stuff is for.	Discontinued?	Zinc/ Phosphorous appear very large	discontinued, may be the same as: AC Delco Part 10-106 12371532 E.O.S. Assembly Lubricant				Warning: contains PTFE, use only after researching PTFE in engine oils.		Recently re-formulated

Table 1 After market Additives

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Sampling of VOA/PDS available, I only add as I am "curious" enough about a specific product to look it up. I will add any product you send *full details* to my e-mail above.
 You should check out this link: <http://www.bobistheoilguy.com/voalibrary.html>

	Racing	High Mileage			CI-4					CJ-4	
	Mobil 1 Racing 0w-30	Mobile High Mileage 10w-30	Super Tech High Mileage (all viscosities)	Valvoline MaxLife (all viscosities)	Citgo Mystic JT-8 15w40	Citgo Mystic JT-8 5w50	Mobil Delvac 1300	NAPA Universal Fleet Plus 15w-40	Rotella T 15w40	Rotella T 15W40	Valvoline 15w40 Premium Blue
API	SM?	SM	SM	SM	CI-4	CI-4	CI-4	CI-4	CI-4	CJ-4	CJ-4
data source		VOA		PDS	VOA			VOA			
Total Base Number				8.0000				10.3000			
Total Acid Number											
Sulfated Ash			0.8290	0.8000							
Noack % off @ 2500C				<15.0							
(below in wt %)											
Zinc	0.1602	0.1032	0.0320	0.0830	0.1224	0.0799	0.1230	0.1501	0.1174	0.1208	0.1291
Phosphorus	0.1588	0.0921	0.0760	0.0760	0.1113	0.0700	0.1126	0.1449	0.1067	0.0989	0.1019
Molybdenum	0.0073	0.0088		0.0255	0.0044		0.0038	0.0110	0.0000	0.0001	0.0044
Calcium	0.2846	0.3003	0.5668	0.3078	0.3104	0.2003	0.2185	0.3562	0.3246	0.3065	0.1182
Magnesium	0.0015	0.0017			.0280		0.0505	0.0010	0.0010	0.0010	0.0939
Boron		0.0276	0.0014		.0041			0.0146			
sodium	0.0006	0.0008			.0005		0.0004		0.0002	0.0001	0.0003
Notes: (a blank field means "no reported data")				VOAs a little lower	Average of 2 VOAs			Great Specs on a Cheap AND Available Oil			

Table 2 - sample Engine Oils