



Service Letter

SL07-479/HRR  
June 2007

**Cylinder Lubrication  
New ACC Guidelines  
All MC/MC-C and ME/ME-C type engines  
Mk 6 and higher, with Alpha ACC System  
Action Code: WHEN CONVENIENT**

Dear Sirs

Since our last Service Letter SL05-455 concerning Cylinder Lubrication, the default feed rate sulphur proportional factor has been in the range of 0.34 to 0.26 g/kWh x S%, with an absolute minimum at 0.70 - 0.60 g/kWh.

However, many engines have followed the lowest level in the range, and evaluations of the results regarding wear, scuffing resistance and TBO show that this dosage is superior to higher levels. Therefore, we now recommend a fixed schedule for navigating from the upper level to the lower level in the range, within a 2,000-hour period.

Consequently, the recommended basic feed rate after running-in is 0.26 g/kWh x S%, with the absolute lower limit at 0.60 g/kWh.

### **Specific Cylinder Oil Dosages**

Alpha ACC is the default lubrication mode for modern MAN B&W two-stroke engines, i.e. lube oil is dosed at a feed rate proportional to the engine load and proportional to the sulphur content in the fuel oil. This ensures that the alkali additives in the cylinder oil are applied proportionally with the amount of sulphur entering into the combustion chamber. The build up of a safe oil film is ensured at any time by the lower limit of 0.60 g/kWh.

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## Running-in

During the first running-in, we recommend a relatively high fixed dosage: 1.5 g/kWh for the first 250 hours succeeded by 1.2 g/kWh for another 250 hours. After these 500 hours of initial running-in, where ample oil is used for flushing away wear particles from the sliding surfaces, ACC running with the factor  $0.34 \text{ g/kWh} \times S\%$  should be introduced.

The next 2,000 hours should be used for a gradual reduction towards the basic setting, i.e. the ACC factor  $0.26 \text{ g/kWh} \times S\%$ , see the feed rate chart below.

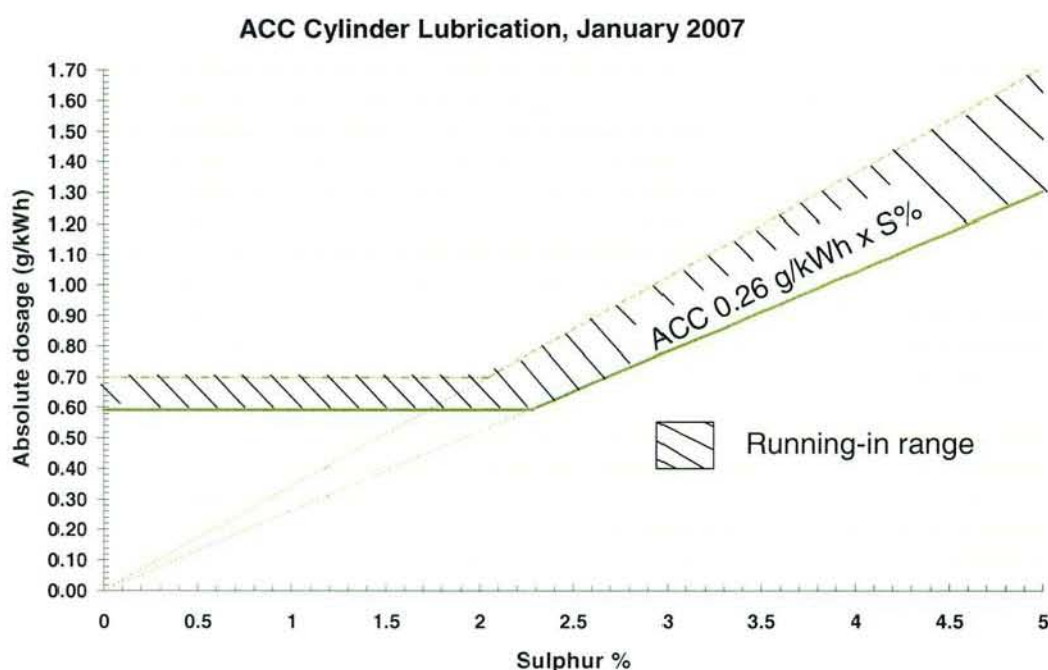


Fig. 1: ACC Cylinder Lubrication, January 2007

Regulating from the upper ACC factor  $0.34 \text{ g/kWh} \times S\%$  to the basic setting at  $0.26 \text{ g/kWh} \times S\%$  should take place stepwise over a 2,000-hour period. The size of the steps may depend on the evaluation of the actual lubricating and deposit condition appearing from scavenge port inspections.

## Average Cylinder Oil Consumption

Due to the sulphur dependency, the average Cylinder Oil Consumption depends on the sulphur content in fuel bunkers. According to DNV, worldwide deliveries in 2006 have been recorded as shown in Fig. 2 below.

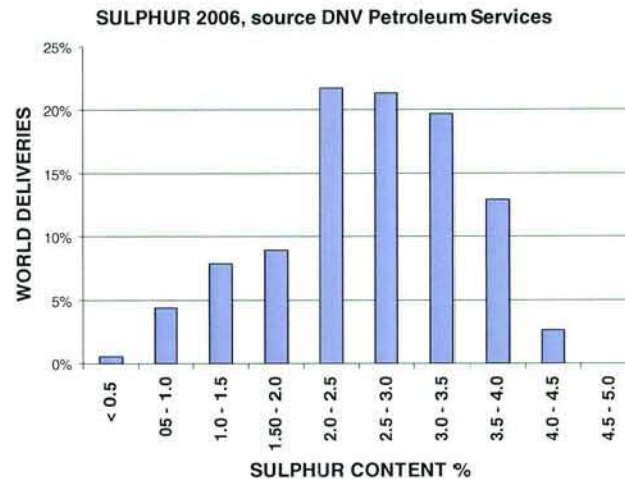


Fig. 2: Sulphur content 2006

About 40% of all fuel bunkers have a sulphur content below 2.3%, and consequently call for the minimum dosage of 0.60 g/kWh. About 60% of all fuel bunkers call for the sulphur dependent lube control, i.e.  $0.26 \text{ g/kWh} \times S\%$ . On average, this results in a yearly absolute Cylinder Oil Dosage of 0.70 g/kWh.

### Operating on low sulphur fuels

At sulphur levels below 2.2%, the minimum dosages at 0.6 g/kWh should be maintained. Consequently, when using a normal BN70 cylinder oil, there will be a surplus of alkali additives. Unused alkali additives have a negative influence on the cylinder condition due to accumulation on the piston top land and due to lack of refreshment of the liner surface by corrosion. This negative influence is naturally time based and becomes more and more severe the lower the sulphur content gets. As a rule of thumb, we recommend to change to a lower BN cylinder oil when operating on sulphur levels below 1.5% for more than 1 to 2 weeks.

Questions or comments regarding this SL should be directed to our Operation Dept. LEO.

Yours faithfully  
MAN Diesel A/S



Carl-Erik Egeberg



Stig B. Jakobsen

Encl.

<b>Guiding Cylinder Oil Feed Rates</b> S/L/K-MC/MC-C/ME/ME-C, Mk 6 and higher, with Alpha ACC lubrication system and coated piston rings.		
	Standard BN 70 cylinder oil	BN 40 cylinder oil
Basic setting	0.26 g/kWh x S%	0.45 g/kWh x S%
Minimum feed rate	0.60 g/kWh	
Maximum feed rate during normal service	1.7 g/kWh	
Part-load control	Proportional to indicated engine load	
Running-in new or reconditioned liners and new piston rings	Feed rate:	First 5 hours: 1.7 g/kWh From 5 to 250 hours: 1.5 g/kWh From 250 to 500 hours: 1.2 g/kWh From 500 to 2500 h: Stepwise reduction from 0.34 to 0.26 g/kWh x S%
	Engine load:	Stepwise increase to max. load over 5 hours
Running-in new rings in already run-in and well running liners:	No load restrictions	
Manoeuvring and load change situations.	During starting, manoeuvring and load changes, the feed rate should be increased by means of the "LCD" by 25% and kept at this level for ½ hour after the load has stabilised.	
Lubrication of cylinders that show abnormal conditions:	Frequent scavenge port inspections of piston rings and cylinder liners are very important for maintaining a safe cylinder condition. If irregularities are observed, adjustments of the lube oil rate should be considered. In case of scuffing, sticking piston rings or high liner temperature fluctuations, the feed rate should be raised to 1.2 g/kWh and the P-max and Mep reduced. As soon as the situation is stabilised, the lubrication and the pressures should be normalised.	

Adjusting Alpha Lub. using ACC, BN40 Cylinder Oil								
ACC Factor g/kWh x S%:							g/kWh	HMI setting
0.45	0.47	0.51	0.52	0.54	0.58	0.60		
Sulphur Content %:								
0	0	0	0	0	0	0	0.60	56
1.4	1.3	1.2	1.2	1.1	1.1	1.0	0.60	56
1.5	1.4	1.3	1.3	1.2	1.2	1.1	0.65	60
1.6	1.5	1.4	1.4	1.3	1.3	1.2	0.71	66
1.7	1.6	1.5	1.5	1.4	1.4	1.3	0.77	71
1.8	1.8	1.7	1.6	1.5	1.5	1.4	0.83	77
2.0	1.9	1.8	1.7	1.6	1.6	1.5	0.89	82
2.1	2.0	1.9	1.8	1.7	1.7	1.6	0.95	88
2.2	2.1	2.0	1.9	1.8	1.8	1.7	1.01	93
2.4	2.3	2.1	2.0	2.0	1.9	1.8	1.07	98
2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.13	104
2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.19	109
2.8	2.6	2.5	2.4	2.3	2.2	2.1	1.25	115
2.9	2.8	2.6	2.5	2.4	2.3	2.2	1.31	120
3.0	2.9	2.7	2.6	2.5	2.4	2.3	1.37	126
3.2	3.0	2.9	2.7	2.6	2.5	2.4	1.43	131
3.3	3.1	3.0	2.8	2.7	2.6	2.5	1.49	137
3.4	3.3	3.1	3.0	2.8	2.7	2.6	1.55	142
3.6	3.4	3.2	3.1	2.9	2.8	2.7	1.61	148
3.7	3.5	3.3	3.2	3.0	2.9	2.8	1.67	153
3.8	3.6	3.4	3.3	3.1	3.0	2.9	1.70	156

Adjusting Alpha Lub. using ACC, BN 70 Cylinder Oil								
ACC factor g/kWh x S%							g/kWh	HMI setting
0.26	0.27	0.29	0.30	0.31	0.33	0.34		
Sulphur content %								
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.60	56
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.60	56
1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.60	56
1.1	1.1	1.1	1.1	1.1	1.1	1.1	0.60	56
1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.60	56
1.4	1.4	1.3	1.3	1.3	1.3	1.3	0.60	56
1.6	1.6	1.4	1.4	1.4	1.4	1.4	0.60	56
1.8	1.8	1.6	1.6	1.5	1.5	1.5	0.60	56
2.0	2.0	1.8	1.8	1.6	1.6	1.6	0.60	56
2.2	2.2	2.0	1.9	1.8	1.7	1.7	0.60	56
2.4	2.3	2.1	2.0	2.0	1.9	1.8	0.60	56
2.5	2.4	2.3	2.2	2.1	2.0	1.9	0.65	59
2.6	2.5	2.4	2.3	2.2	2.1	2.0	0.68	63
2.8	2.6	2.5	2.4	2.3	2.2	2.1	0.71	66
2.9	2.8	2.6	2.5	2.4	2.3	2.2	0.75	69
3.0	2.9	2.7	2.6	2.5	2.4	2.3	0.78	72
3.2	3.0	2.9	2.7	2.6	2.5	2.4	0.82	75
3.3	3.1	3.0	2.8	2.7	2.6	2.5	0.85	78
3.4	3.3	3.1	3.0	2.8	2.7	2.6	0.88	81
3.6	3.4	3.2	3.1	2.9	2.8	2.7	0.92	84
3.7	3.5	3.3	3.2	3.0	2.9	2.8	0.95	88
3.8	3.6	3.5	3.3	3.2	3.0	2.9	0.99	91
3.9	3.8	3.6	3.4	3.3	3.1	3.0	1.02	94
4.1	3.9	3.7	3.5	3.4	3.2	3.1	1.05	97
4.2	4.0	3.8	3.6	3.5	3.3	3.2	1.10	100
4.3	4.1	3.9	3.8	3.6	3.4	3.3	1.12	103
4.5	4.3	4.0	3.9	3.7	3.5	3.4	1.16	106
	4.4	4.2	4.0	3.8	3.6	3.5	1.19	109
	4.5	4.3	4.1	3.9	3.8	3.6	1.22	113
		4.4	4.2	4.0	3.9	3.7	1.26	116
		4.5	4.3	4.1	4.0	3.8	1.29	119
			4.4	4.2	4.1	3.9	1.33	122
			4.5	4.3	4.2	4.0	1.36	125
				4.5	4.3	4.1	1.39	128
					4.4	4.2	1.43	131
					4.5	4.3	1.46	134
						4.4	1.50	138
						4.5	1.53	141



## ACC Running-in Schedule

