

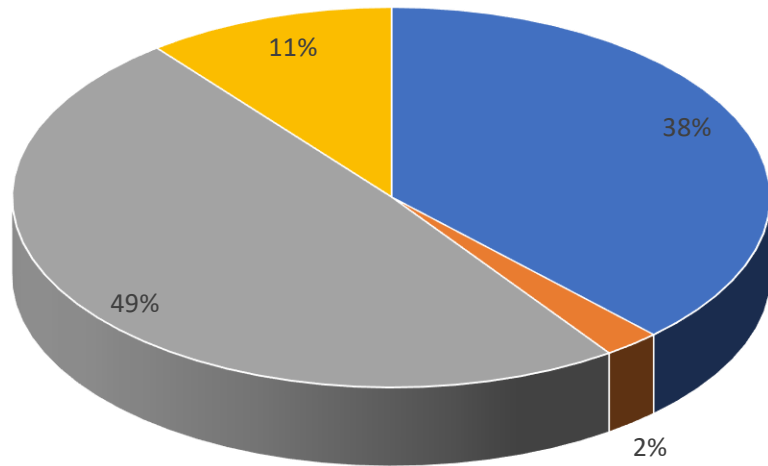


The fuels of today leading into tomorrow **STATUS OF THE VLSFO's**

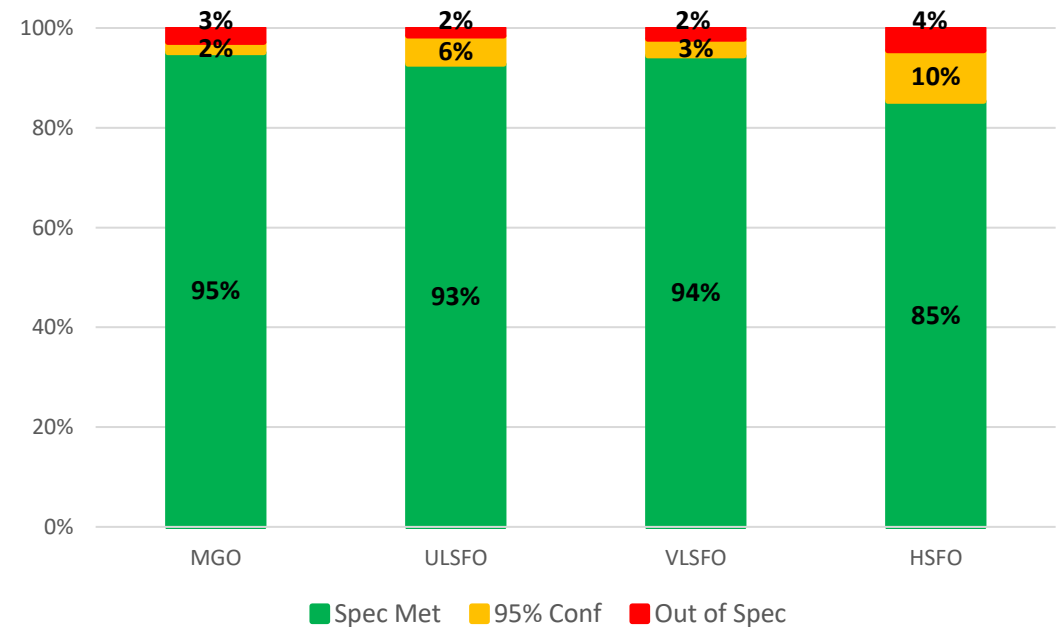
CIMAC Tech Talks

Verifuel - Understanding Marine Fuel

SAMPLE DISTRIBUTION 2021



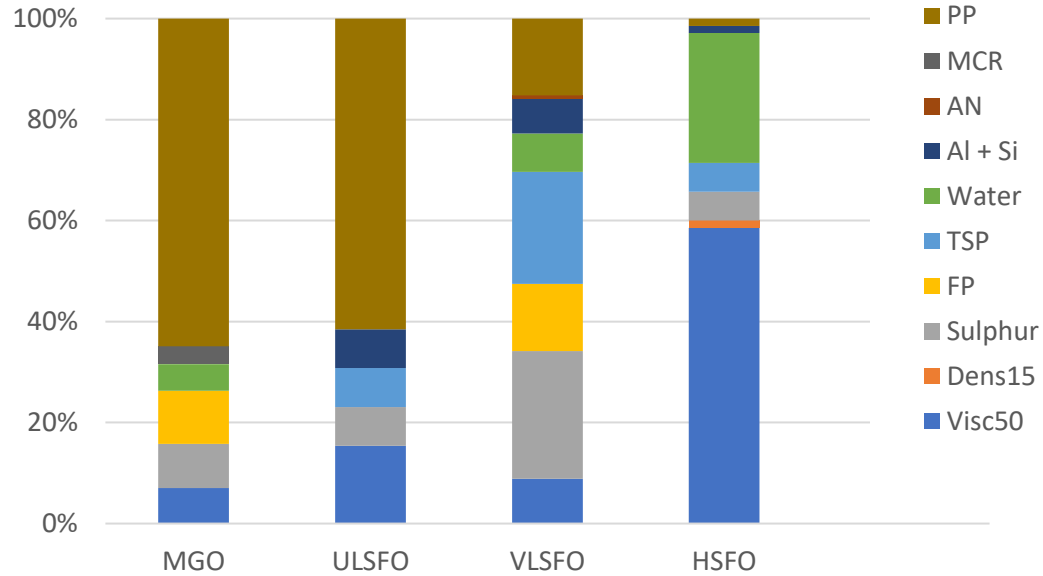
■ MGO ■ ULSFO ■ VLSFO ■ HSFO



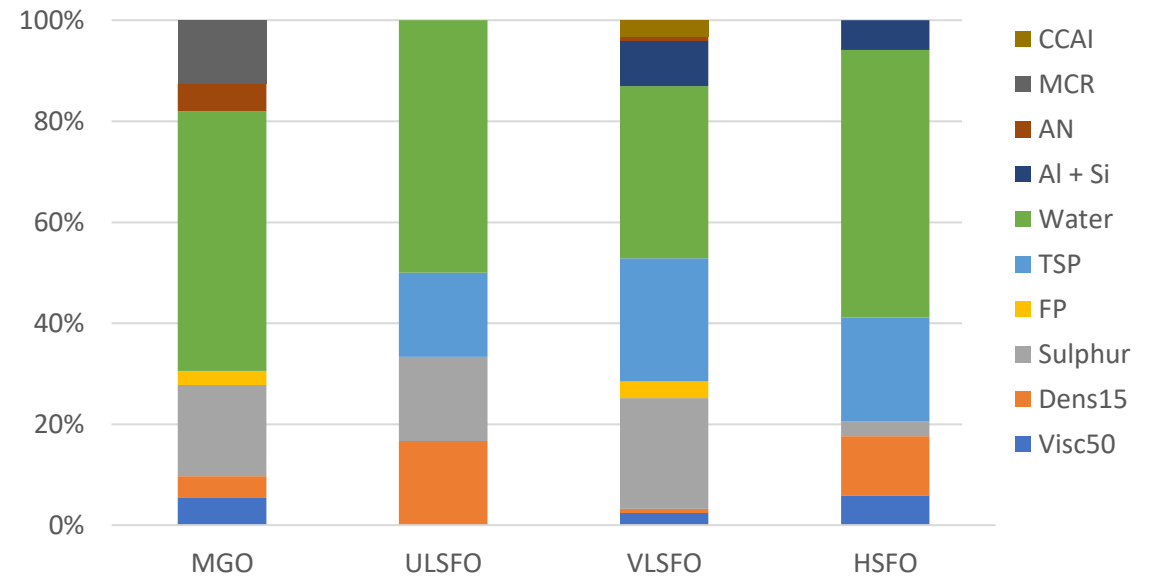
SAMPLES EXCEEDING SPEC LIMITS 2021



95 % confidence interval



Out of Specification



Parameter	VLSFO			HS HFO	LS MGO
	Average	Min	Max	Average	Average
Visc@50°C (cSt)	117.9	3.781	645.4	300.1	3.610
Dens@15°C (kg/m ³)	938.8	851.8	1024.4	977.3	855.0
Sulphur (% m/m)	0.46	0.13	3.24	2.68	0.07
Sediments (% m/m)	0.03	<0.01	Unfilterable	0.04	
MCR (% m/m)	5.89	<0.10	17.92	13.04	
Al+Si (mg/kg)	17	<1	176	18	
Ash (% m/m)	0.020	<0.010	0.097	0.042	
WAT (°C)	36	11	51		
Pour Point (°C)	24%*	<-42	33	4%*	18% / 3%**
CFPP (°C)					16% / 6%***

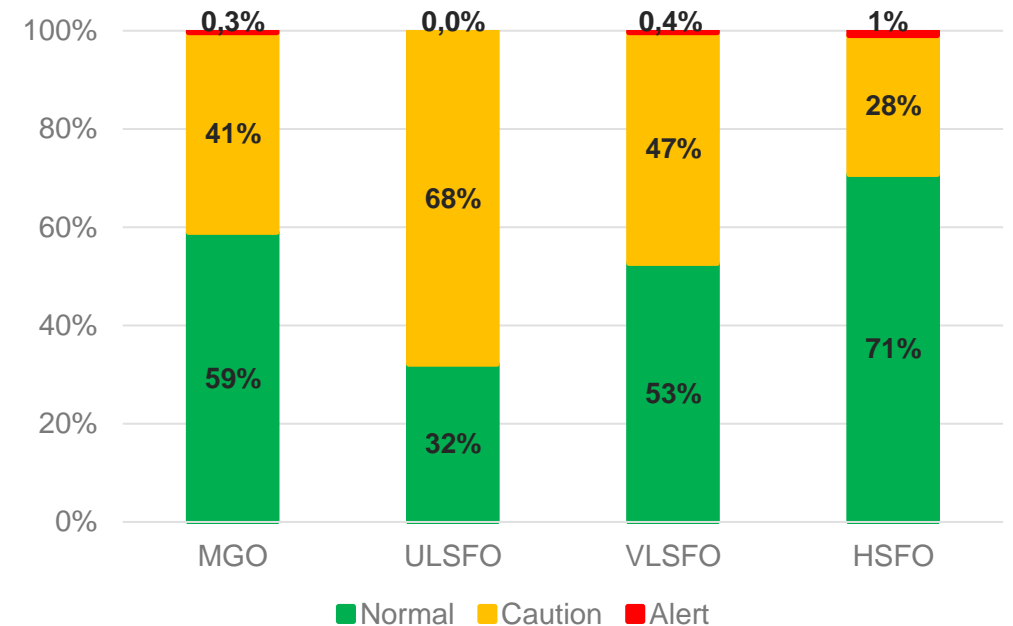
*** Number of samples with 6 °C ≤ CFPP / 12 °C ≤ PP

OPERATIONAL REPORTS 2021

For the VLSFOs:

- Caution:
 - Pour Point (above 21 °C)
 - Cat fines
 - Sediment levels

- Alert:
 - A few samples with very high cat fines (up to 176 ppm)
 - High sediment levels



VLSFO 2021 OPERATIONAL ISSUES



Of the fuel related operational issues:

- 75% are about filter clogging and separator sludging
 - Instability at delivery
 - Compatibility due to onboard mixing – even low mixing ratios

Recommendations:

- Keep fuels segregated
- Reduce settling and service tanks levels as much as possible before changing over
- Manage temperature carefully
 - Avoid overheating fuels
 - Be cautious of thermal oil heating



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