

## CIMAC India Web-Seminar on Oct 29, 2020 Denmark

## How to deal with the global sulphur cap 2020

Kjeld Aabo Director New technologies Sales and Promotion Two stroke Marine Member of WG ISO 8217 & Chairman CIMAC Fuels



## WG7 - Most Important Current Activities

- 36 members
  - 19 on waiting list
- Represented stakeholders
  - Refiners, Suppliers, OEMs, Ship Operators, Fuel Testing Labs, Classification Societies and others
- Co-operation with
  - All CIMAC WGs in case of common topics
  - ISO8217 fuels group (very close relationship)
- Recent and upcoming meetings
  - No 79: Sep 2018, Philadelphia, US
  - No 80: Mar 2019, Lisbon
  - No 81: Oct 2019, Oslo
  - No 82: Sep 2020, Virtual
  - No 82: Mar 2021, Copenhagen
  - No 83: Autumn 2021, Japan





## WG7 - Most Important Current Activities

#### Latest Publications

- Guideline: General guidance in marine fuel handling in connection to stability and compatibility (Nov 2019)
- Contributed to the IMO Joint Industry Project guidance document on "The supply and use of 0.50% sulphur marine fuels" (Aug 2019)
- Statement on 2018 Fuel incidents (Nov 2018)
- Guideline providing answers to FAQ from ISO 8217:2017 (Mar 2017)
- Guideline on the Interpretation of Marine Fuel Analysis Test Results (Feb 2016)

#### Subgroups:

High priority SGs	Low priority SGs
SG 1: CFR (Certified Flow Rate)	SG1-2: Separators
SG7: VLSFO – operational experience	SG3: pH/Corrositivity
SG8: Fuel data review	SG6: Ignition and combustion
	SG10: Alternative fuels



This policitation is for guidance and gives an overview regarding the assessment of marine fuel stability and compatibility and how to mitigate the associated risk. The publication and its contrest have been provided for informational purposes only. CINAC makes no representations or warranties express or implied, regarding the accuracy, adequoy, reasonableness or completeness of the information, assumptions or analysis contained herein or in any supplemental materials, and CIMAC accepts no liability in connection therewith.

The first edition of this CIMAC Guideline was approved by the members of the CIMAC WG7 'Fuels' in November 2019.



## WG7 representation by sector and country



- Refiner / Supplier / Trader
- OEM, Engines
- Fuel Testing Lab
- OEM, Other
- Ship Operator
- Other
- Fuel Additive Supplier
- Classification Society





## CIMAC WG7 Fuels and ISO 8217 committee

- Participant overlap between groups
- WG7 and ISO 8217 support each other
- Rational use of resources avoid duplication of work

CIMAC WG7 Fuels	ISO 8217
Recommendation	Standard
Short lead time	Long lead time
High flexibility	Limited flexibility

## What Fuel will be used in 2020 and beyond?



## **Compliant fuel**

MC/ME/-C engine Single Fuel: 0.10%S fuel, 0.50%S fuel



ME-GI/ME-LGI engine Dual Fuel: LNG, Ethane, LPG, MeOH



## High sulphur fuel

MC/ME/-C engine 0 – 5%S fuels: HFO/MDO + Scrubber





	Supplier A	Supplier B	Supplier C	Supplier D	Supplier E	Supplier F	Supplier G	Supplier H	Supplier I
Density (kg/m3 @ 15 C)	895-915	910	857	868	932	845	868	928	870-930
Viscosity (cSt @ 40 or 50 C)	40-75 (40ºC)	65 (50ºC)	17.6 (50ºC)	8.8	22.6 (50ºC)	8.8	8.5 (50ºC)	40C: 45-65. 50C 30-40	8-25 (50ºC)
Sulphur (% m/m)	0.1	0.095	0.08	0.05	0.1	0.03	0.09	0.1	<0.1
Pour Point (C)	15-30	20	<-12	-12	30	21	27	20-25	18-21
Flash Point (C)	>70	60	>200	72	90	>70	>70	70	60-80
Water (% v/v)	0.05	0.1	<0.2	0.004	<0.05	0.01	0.05	0.2	0.05-0.1
Acid Number (mg KOH/g)	<0.1	2.5	0.3	0.27	0.06	0.04		2.5	0.1-0.2
Al+Si (ppm m/m)	<0,3	17	<15	?	34	<1	<3	10-20	12-15
Lubricity (µm)	<320	520	-	410	-	326	-	-	-
CCAI	795-810	860	762	-	-	765	789	790-800	790-810

## 2020 Fuels What may / will happen in 2020?



Key parameters for 0.50% Marine Fuel Oil blending will be:

Stability (Total Sediment)

Paraffinic vs Cracked blend components

Pour Point

- ULSFO /VLSFO close to PP limits

#### Acidity

Sweet crude sources with high AN (e.g. DOBA)

#### Viscosity

- No minimum limit in ISO 8217, Table 2

#### CCAI

Larger difference between viscosity and density







- List of observations PRELIMINARY
- Sporadic cases of scuffing and high wear



## 2020 Fuel switch

HFO to VLSFO





Update: 2020-09-02



- List of observations PRELIMINARY
- If all our recommendations are followed = No problems (Refer to MUN2019-09-11)
- Several cases of scuffing and high wear
- **Cat fines** from cleaning of the tanks
- No cermet on the piston rings
- Lubrication feed rate too low

#### **Fuel system**

- Stuck high pressure fuel pumps
- Gasification of low viscosity fuel

#### Cold flow properties of the fuel

- Temperature control

#### Incompatibility between fuels









#### List of observations - PRELIMINARY

- Sporadic cases of scuffing and high wear
- Cat fines from cleaning of the tanks. (Refer to SL2019-674)
  - Dissolving of the old sludge in tanks -> if too much, it cannot be removed in the separators.
  - Fuel additives are very effective in cleaning, but they reduce the cleaning efficiency of the separator -> the cat fines from the remains in the tank go directly to the engine.







#### List of observations - PRELIMINARY

Sporadic cases of scuffing and high wear 

#### No cermet on the piston rings. (Refer to SL2019-685)

- Cermet coating must be measured and the wear must be recorded.
- Once 100 µm is reached, the rings should be \_ replaced.

Cermet-coating thickness action table				
Above 100 µm	No action			
100-50 µm	Plan the overhaul of the piston ring pack			
50-20 μm	Overhaul at first opportunity			











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#### List of observations - PRELIMINARY

#### Sporadic cases of scuffing and high wear

#### No cermet on the piston rings. (Refer to SL2019-685)

- Cermet coating is recommended on all piston rings for operation on low-S fuel.
- Contact between liner surface to cast iron piston ring is more sensitive to seizure and scuffing than liner to cermet.





## Cat fines



Cat fines cause wear in the engines



#### Cat fines in fuel bunker samples from 2010



## Overview of damages Found in two-stroke engines and small four-stroke Gensets



## Combustion test – Lab test

FIA test IP 541: Constant volume combustion chamber method





To computer

Exhaust

## Latest Publications about the coming fuels 2020







Joint Industry Guidance

The supply and use of 0.50%-sulphur marine fuel Joint Industry Project

Concawe

#### CIMAC WG 7

**ISO 8217 PAS** 



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## Summary: 0.50% S fuels

What to consider – for the ship?







## Lube Oils

**Cylinder oil** SAE50 BN = 15-100

**System oil** SAE30 BN = 5-6

#### Key properties for cylinder lube oil:

- Lubricate, decrease friction
- Neutralize sufficiently
- Provide a gas-seal between rings and liner
- Keep parts clean:
  - Avoid coke formation (thermal stability of the base oil)
  - Remove coke, additives, impurities and wear particles from liner and piston ring area





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# Thank you

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