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DEVELOPMENT OF A SAFETY REGULATORY FRAMEWORK TO SUPPORT THE REDUCTION OF GHG EMISSIONS FROM SHIPS USING NEW TECHNOLOGIES AND ALTERNATIVE FUELS

Additional information on alternative fuels

Submitted by IACS

SUMMARY

Executive summary:	This document provides additional information on some alternative fuels and proposes a generic format for representing the physical properties for each fuel.
Strategic direction, if applicable:	3
Output:	3.8
Action to be taken:	Paragraph 13
Related documents:	MSC 108/20, MSC.108/WP.8 and CCC 10/4/6

Introduction

1 MSC 108 invited relevant proposals in order to further update annexes 1 and 2 to document MSC 108/WP.8, especially in those cases where "no input" was deemed to be available. This document presents information for such cases to help reduce instances of "no input".

Discussion

Fuels for which "no input" is available

2 IACS notes that the following fuels in the list as described in annexes 1 to 3 of document MSC 108/WP.8 have "no input" for certain fields:

.1 Hydrothermal liquefaction (HTL) fuels;

.2 Pyrolysis fuel;

.3 Hydrotreated vegetable oil (HVO);

.4 Fischer-Tropsch (FT) diesel;

.5 Dimethyl ether (DME); and

.6 Ethane.

Characterization of physical properties of fuels

3 Additionally, IACS notes that the physical properties are recorded (where available) for each fuel. However, this information is textual in nature and is not standardized in a particular format. Therefore, it is proposed that the information be recorded in the following tabular format for each fuel so as to capture the same more objectively, which may make it convenient for future comparison.

Property	**Magnitude**
Density (kg/m^3)	
Boiling point at 1 bar (^{o}C)	
Storage temperature (^{o}C)	
Storage pressure (bar)	
Lower heating value (LHV) (MJ/kg)	
Flashpoint (^{o}C)	
Auto-Ignition temperature (^{o}C)	
LFL (lower flammability limit) (for gas fuel)	
UFL (upper flammability limit) (for gas fuel)	
Cetane number	
Octane number	
Special requirements for storage (if any)	
Additional notes	

Hydrothermal liquefaction (HTL) fuels

4 The following additional information is provided for HTL fuels. This may be placed appropriately so as to reduce the "no input" case:

.1 the water content, iodine, and sulphur content of the fuel needs to be clarified as these can affect the fuel performance;

.2 the fuel is very acidic and hence special materials should be selected so that it does not corrode the tanks; and

.3 if blended with conventional fuels, literature[1] reports that blends above 10% may not work properly. In any case, guidance is needed on the maximum quantity to be blended.

5 No standard was identified providing specification of HTL fuel for use in maritime. This is identified as a gap or roadblock.

[1] Rizzo, A.M, Chiaramonti, D. (2022). "Blending of Hydrothermal Liquefaction Biocrude with Residual Marine Fuel: An Experimental Assessment". *Energies*, Vol. 15(2), 450 https://doi.org/10.3390/en15020450

Pyrolysis fuels

6 The following additional information is provided for pyrolysis fuels. This may be placed appropriately so as to reduce the "no input" case:

.1 cannot be used in the form of blends with conventional marine diesels;

.2 high viscosity, difficult to auto-ignite or does not auto-ignite; if used, it may be more suitable for low-speed engines;

.3 prone to oxidation and hence storage life may be comparatively reduced; and

.4 low pH value (i.e. it is acidic); hence the fuel tank and supply system component materials need to be specially selected (e.g. stainless steel or coated with appropriate paints).

7 No standard was identified providing a specification of pyrolysis fuel for use in maritime. This is identified as a gap or a roadblock.

Methanol

8 Methanol has been gaining popularity as a marine fuel. The following information regarding standards for methanol may be considered for updating the relevant fields for methanol:

.1 the ISO standard referred to within the existing guidance documents (AWI) is now upgraded to FDIS. i.e. it is ISO/FDIS 6583; and

.2 the following guidelines may be relevant as regards bunkering of methanol:

.1 CWA D4.4 – Methanol Bunkering Process (European Commission); and

.2 ISO/CD 22120 – Specification for bunkering of methanol-fuelled vessels (under development).

Hydrotreated vegetable oil (HVO)

9 The following additional information is provided for HVO. This may be placed appropriately so as to reduce the "no input" case:

.1 lower kinematic viscosity of HVO below the specification can affect the operation of the fuel supply system and performance;

.2 this fuel has lower lubricity as compared to conventional marine diesels; additives may be used to improve the lubricity;

.3 no gaps/roadblocks are identified for this fuel (provided that the flashpoint is above 60°C); and

.4 the energy content of the fuel should be estimated using ASTM D240 (rather than ISO 8217).

Fischer-Tropsch (FT) diesels

10 The following additional information is provided for FT diesels. This may be placed appropriately so as to reduce the "no input" case:

.1 lack of a fuel specification in marine can be considered to be a gap or roadblock.

Dimethyl ether

11 The following additional information is provided for dimethyl ether. This may be placed appropriately so as to reduce the "no input" case:

.1 relatively low viscosity and lack of lubrication;

.2 notwithstanding the above, this is generally considered to be a drop-in fuel;

.3 it will be supplied to engine in gaseous form; and

.4 it is also reported[2] that marine engine technology has the capability to use dimethyl ether as fuel.

Ethane

12 IACS notes the agreement by CCC 10 of the draft amendments to the IGC Code for approval by MSC 109 and adoption by MSC 110, including amendments to chapter 16 to have ethane among the hydrocarbon fuels that may be utilized in machinery spaces of Category A. This decision was based on the information supplied by Germany in their document CCC 10/4/6 which stated that existing regulations in the IGC Code for LNG and LPG are sufficient to cover the use of ethane as fuel and, thus, no new regulations are necessary. Information is available to report that ethane is already being used as fuel on some ships which also carry it as cargo.[3]

Action requested of the Committee

13 The Committee is invited to consider the information provided in this document and take action, as appropriate.

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[2] https://www.man-es.com/company/press-releases/press-details/2018/09/03/man-energy-solutions-unveils-me-lgip-dual-fuel-lpg-engine

[3] https://www.wartsila.com/insights/article/worlds-first-ethane-powered-marine-vessels