

FOR THE BEST PROFESSIONALS

Alternative Fuels

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What alternative fuels?

LNG ? Or is there more?

Alternative fuels

- LNG
- Hydrogen
- Methanol
- Ammonia



LNG

- More and more commonly used
- Meets Tier III
- Seen as a transition fuel
- Cryogenic storage
- Flammable
- Available in more harbours and bunker facillities



Hydrogen

- Meets Tier III
- Very clean fuel
- Storage at 700 bar gas or
- Storage at -253 degrees liquid
- Availability problem
- Low energy density per unit of volume
- In future mainly practical for small ships that have frequent access to bunkering stations
- Potential long term solution



Methanol

- Already in use (Stena Germanica)
- Meets Tier III
- Mixed with diesel (95%-5%)
- No cryogenic storage
- Needs 60% more bunker volume due to lower energy density
- Flammable (11 degrees) and Toxic
- Good alternative for the future



Ammonia

- Available
- Meet Tier III
- Very clean zero carbon
- Flammable and toxic
- Cryogenic storage 33 degrees
- Needs research and development
- Good alternative for the future





Why alternative fuels ?

Marpol Annex VI regulation 13 en 14



The Environmental Protection Agency (EPA) is an independent executive agency of the United States federal government tasked with environmental protection

matters.

Note: Because NOx emission standards differ depending on engine speed, the minimum-to-maximum range is shown





Installation onboard

Example LNG as fuel







Interface Ship/Shore or Ship /Ship

During bunkering operations / Hazards during bunkering

Flammable

- Low-flashpoint fuels
- Static electricity
- Ignition sources
- Zone I around bunker station





Cryogenic hazards

- Extreme low temperatures
- LNG -162 degrees
- Hydrogen 253 degrees centigrade
- All hoses flanges and piping Are frozen





Cryogenic burns







0.00



Poisonous/Toxic

- Depending on the type of fuel
- Mainly Ammonia and Methanol
- Breathing protection in bunkering zone
- See also SDS





Suffocating

- During spill in gas cloud LNG
- Lack of oxygen







Regulations

To prevent accidents, spills and casualties

IGF Code

- International code of safety for ships using gases or other low-flashpoint fuels
- This Code gives the regulations for the design and equipment of ships using gases or other low flash point fuels



IGF CODE

INTERNATIONAL CODE OF SAFETY FOR SHIPS USING GASES OR OTHER LOW-FLASHPOINT FUELS

2016 EDITION





- LNG bunker checklist
- To be checked and signed by both parties
- Bunker ship /Truck and receiving ship.
- The bunker procedure mandatory on board each ship shall be observed.





LNG Bunker Checklist Ship to Ship

PART A: Planning Stage Checklist

This part of the checklist should be completed in the planning stage of an LNG bunker operation. It is a recommended guideline for the, in advance, exchange of information necessary for the preparation of the actual operation.

Planned date and time:	
Port and Berth:	
LNG receiving ship:	
LNG bunker vessel:	

	Check	Ship	Bunker Vessel	Terminal	Code	Remarks
1	Competent authorities have granted permission for LNG transfer operations for the specific location and time.				Ρ	
2	The terminal has granted permission for LNG transfer operations for the specific location and				P	





LNG Bunker Checklist Truck to Ship

PART A: Planning Stage Checklist

This part of the checklist should be completed in the planning stage of an LNG bunker operation. It is a recommended guideline for the, in advance, exchange of information necessary for the preparation of the actual operation.

Planned date and time:	
Designated LNG bunker location:	
LNG receiving ship:	
LNG supplying bunker truck:	

	Check	Ship	LNG Truck	Terminal	Code	Remarks
1	Competent authorities have granted permission for LNG transfer operations for the specific location and time.				Р	
2	The terminal has granted permission for LNG transfer operations for the specific location and time.				Р	



Local rules and regulations

Local Regulations

For safety reasons various Port Bye-Laws apply in the ports of Rotterdam, Vlaardingen, Schiedam, Dordrecht, Papendrecht and Zwijndrecht. The Port Bye-Laws specify the 'house rules' of the ports. The same rules apply for the Amsterdam port region.

Local rules and regulations shall be observed during bunkering



- Mandatory courses to be followed by crew and officers on board ships under the IGF code
- Accredited by the local Authorities
- Basic IGF training
- Advanced IGF training



Page 45/46 2017 edition	Page 219-231 2017 edition	
Regulation V/3		
Paragraph 5	Section A – V/3, Table A – V/3 – 1	 Basic Training for Ships Subject to the IGF Code
Paragraph 8	Section A $-$ V/3, Table A $-$ V/3 $-$ 2	 Advanced Training for Ships Subject to the IGF Code



ATEX/ Hazardous zones

- Most alternative fuels are highly volatile and or in gas form
- Each ship carrying these fuels have a zoning drawing identifying the Zones 0,1 and 2
- This either conform Atex OR the Zones mentioned in the IGF code.
- Crew members need to know how to behave in these Zones and what the hazards are in these Zones







PPE

- Suitable PPE s should be available during bunkering
- Antistatic clothing and footwear should be present
- Clothing especially gloves should be suitable for low temperatures (LNG -162)
- Full facial masks
- Personal detection









Conclusion

How does the future looks like

The nearby future

- LNG will be developed more and the most used alternative fuel in the nearby future
- Followed by Methanol and later Ammonia.
- Hydrogen is promissing, but needs more research especially on storage and bunker facilities.





End of presentation Thanks for your attention Questions ??

