

# SUMMETH

Sustainable Marine Methanol

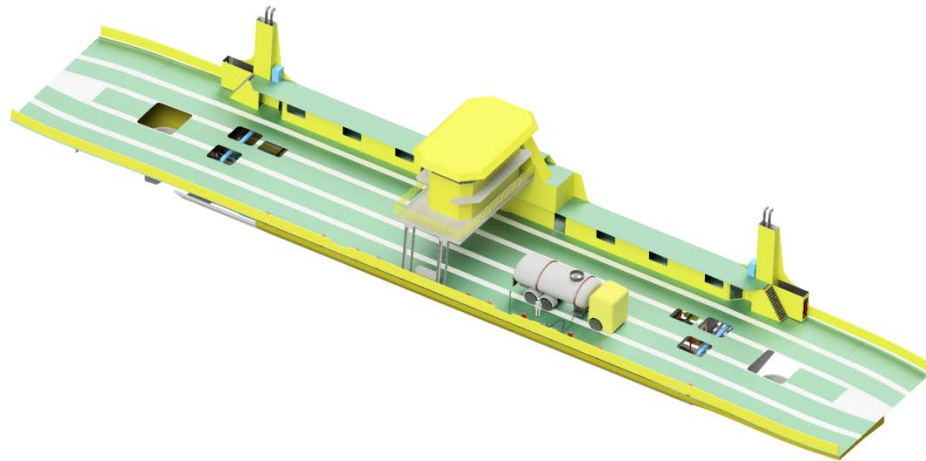


How to convert at road ferry  
to methanol operation

Joakim Bomanson  
2017-12-06

# ADJUSTMENTS AND SAFETY MEASURES

- Design considerations
- Hazards
- Regulations
- Safe design



# MATERIAL COMPATIBILITY

Gasket, sealing material compatibility?



Metal compatibility, corrosive and aggressive towards some metals

	Nitrile	EPDM	Neoprene	Silicone	Butyl	Polyacrylate	Hypalon	Viton	Fluorosilicone	Kalrez	PTFE
Diesel Oil	1	4	3	4	4	1	3	1	1	1	
Gasoline	1	4	4	4	4	4	4	1	1	1	
Ethanol	3	1	1	2	1	4	1	3	1	1	
Methanol	4	1	1	1	1	4	1	4	1	1	1

# HAZARDS — SAFETY SHEET

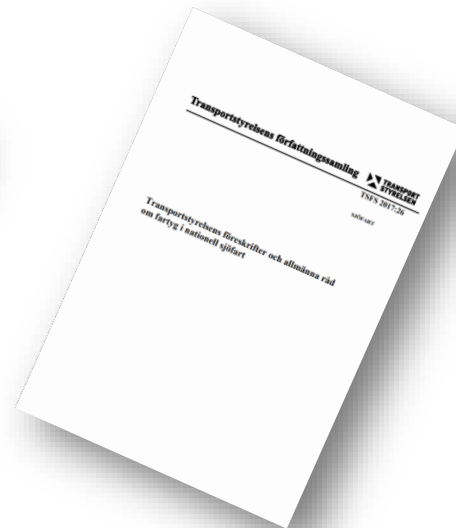
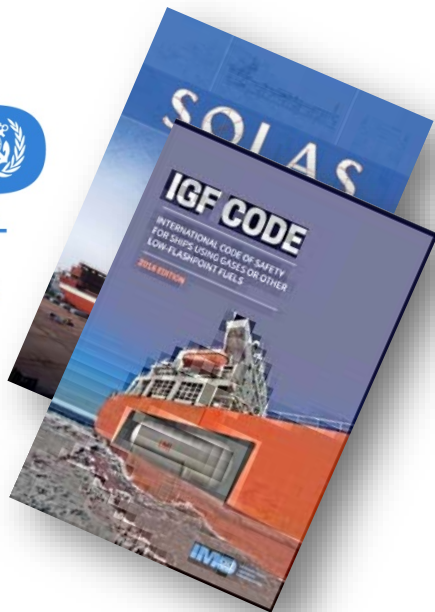
	METHANOL
Hazard pictograms (CPL)	
Signal word: (CPL)	Danger
Hazard statements (CPL)	<p>H225 Highly flammable liquid and vapour.  H301 Toxic if swallowed.  H311 Toxic in contact with skin.  H331 Toxic if inhaled.  H370 Causes damage to organs.</p>
Precautionary statements (CLP)	<p>P210 - Keep away from heat. - No smoking  P280 - Wear protective gloves, protective clothing, eye protection, face protection  P304+P340 - IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing  P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower  P301+P310 - IF SWALLOWED: Immediately call a POISON CENTRE or doctor  P403+P235 - Store in a well-ventilated place. Keep cool</p>

2017-12-06

# SAFE DESIGN

- Fuel system
  - Fuel tank
  - Fuel pumps and filters
  - Piping
  - Bunkering system
  - Methanol tank inertion
- Vapour detection
- Fire detection and suppression

# REGULATIONS

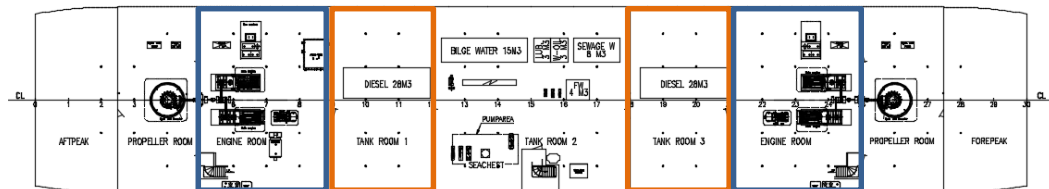
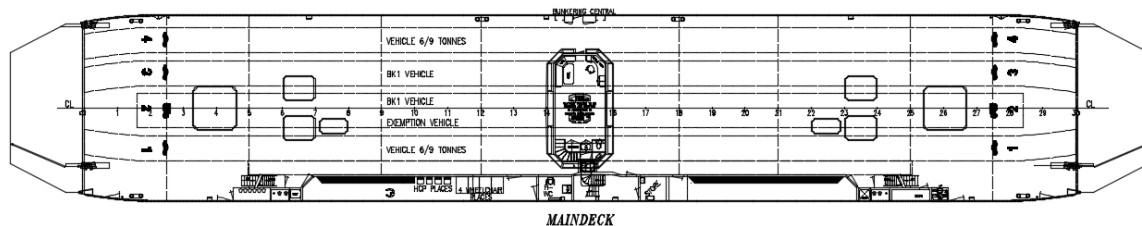
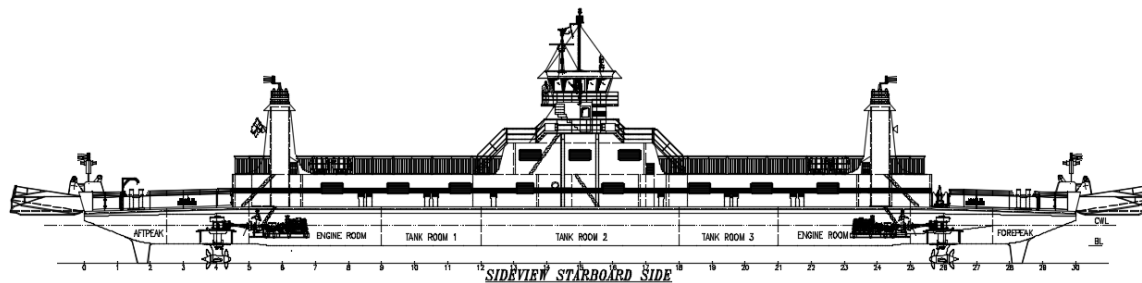


**SWEDISH  
TRANSPORT  
AGENCY**



**ScandiNAOS AB  
SUMMETH**

# ON BOARD ARRANGEMENTS

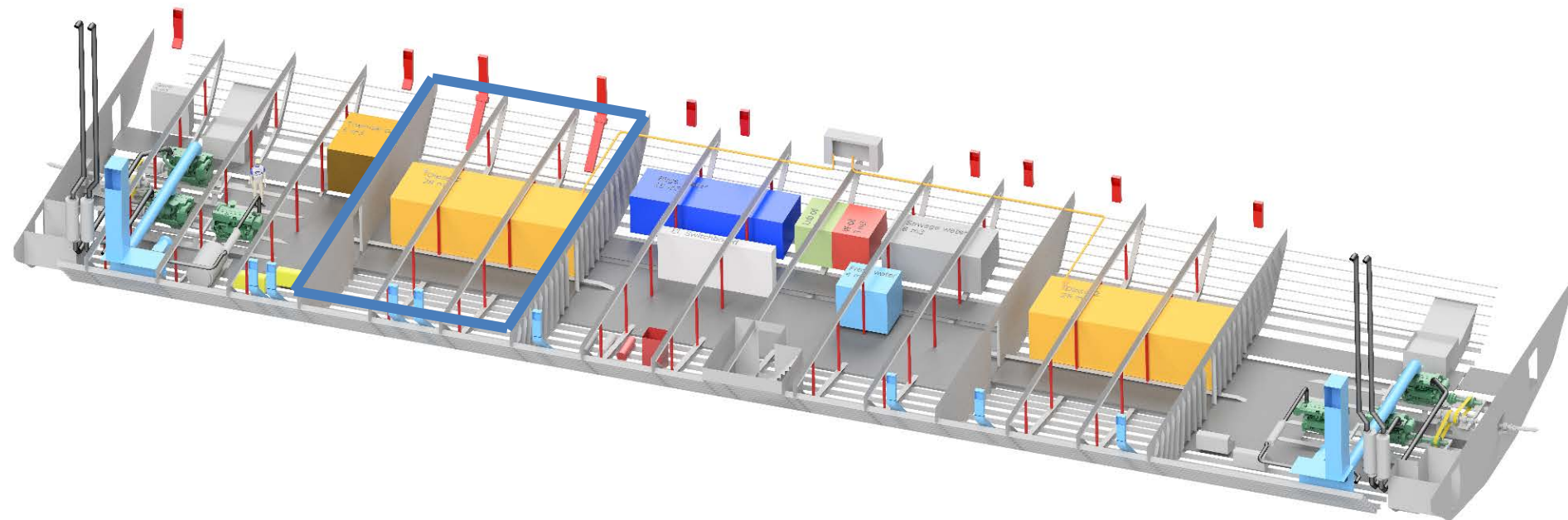


PLAN BRIDGE MAINDECK - How to convert at road ferry to methanol operation -  
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## Jupiter

Year built:	2007
Yard:	Työvene OY, Nystad, Finland
LOA	86.20 m
Breath	15 m
DispCWL	856 ton
Speed	10.0 kn
Passengers	397 pcs
Cars:	60 pcs
Main engines	4x Volvo Penta D12D-C MH

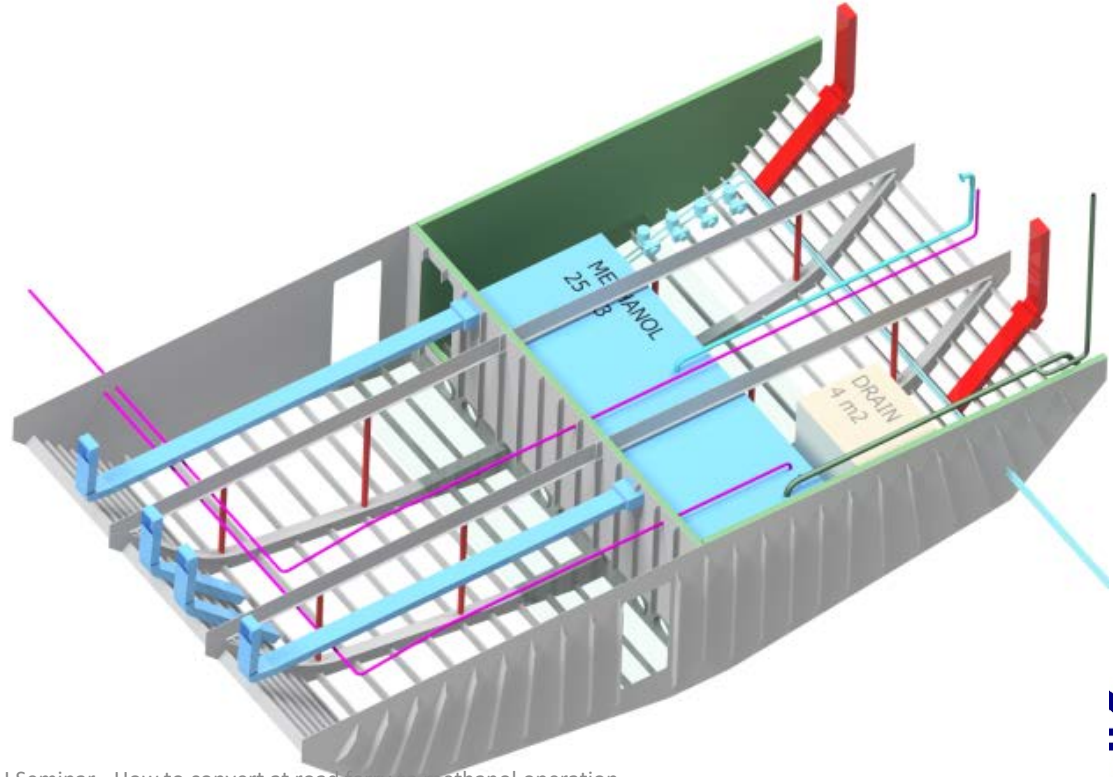
# ON BOARD ARRANGEMENTS





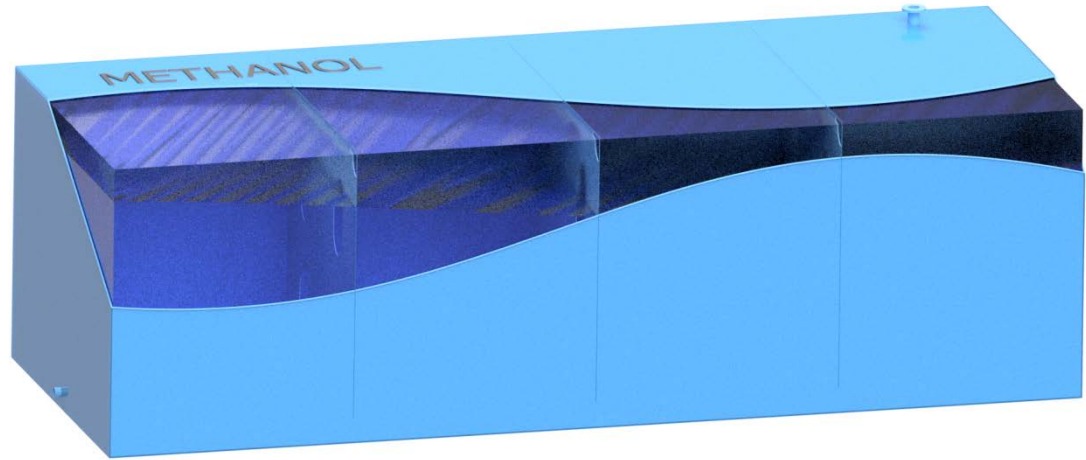
# METHANOL TANK ROOM

- Separate compartment for methanol
- Secondary barrier
- Forced ventilation

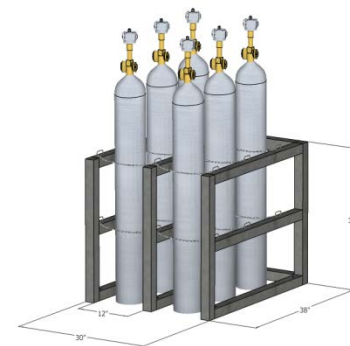
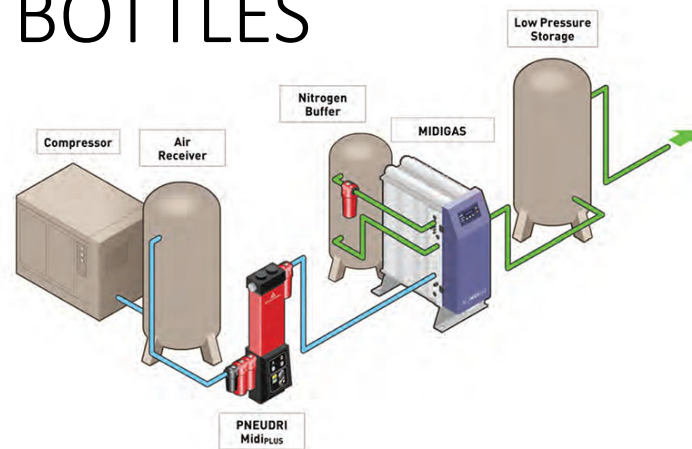
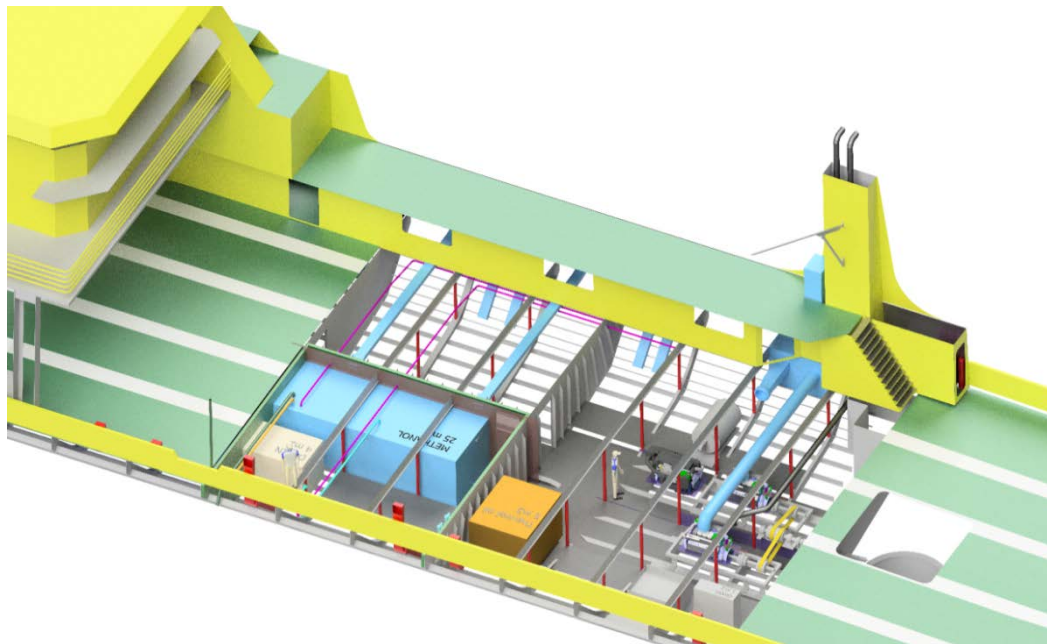


# METHANOL TANK

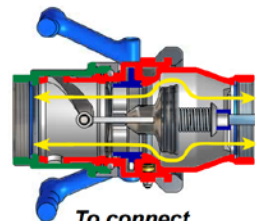
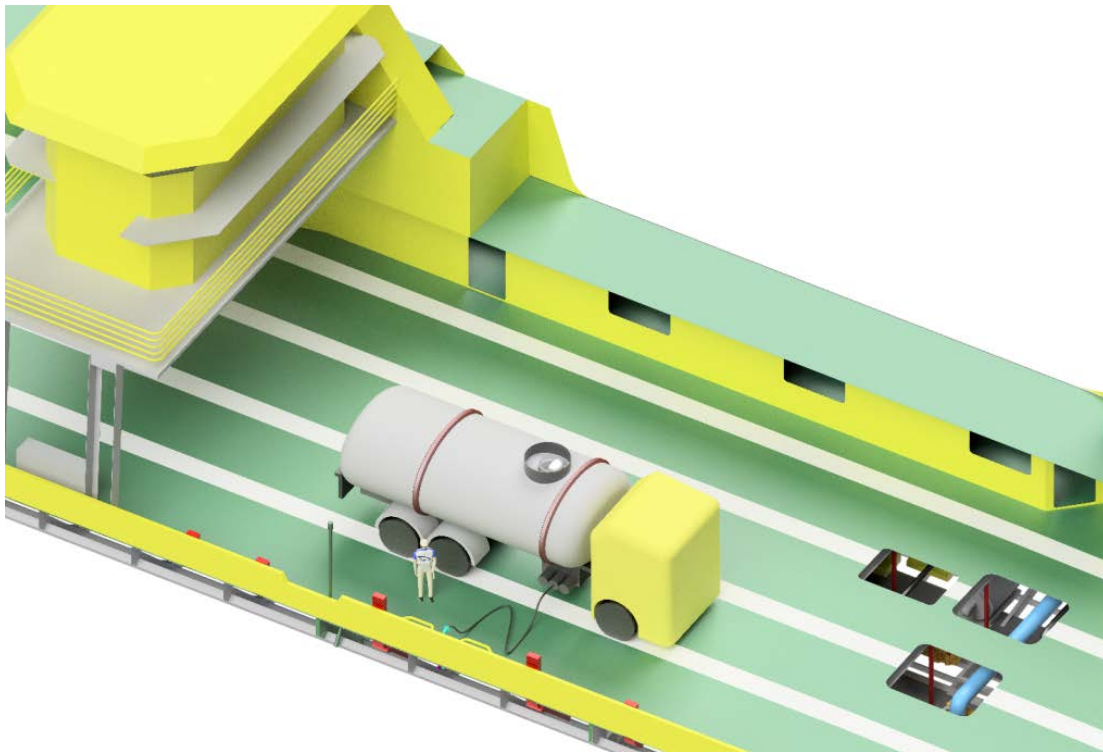
- Remote operated fuel valves
- Inerted with nitrogen
  - 150 mbar overpressure
- P/V valve



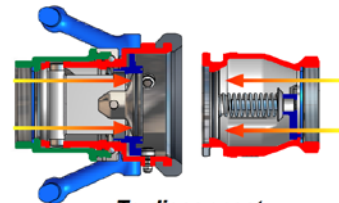
# NITROGEN – GENERATOR OR BOTTLES



# BUNKERING



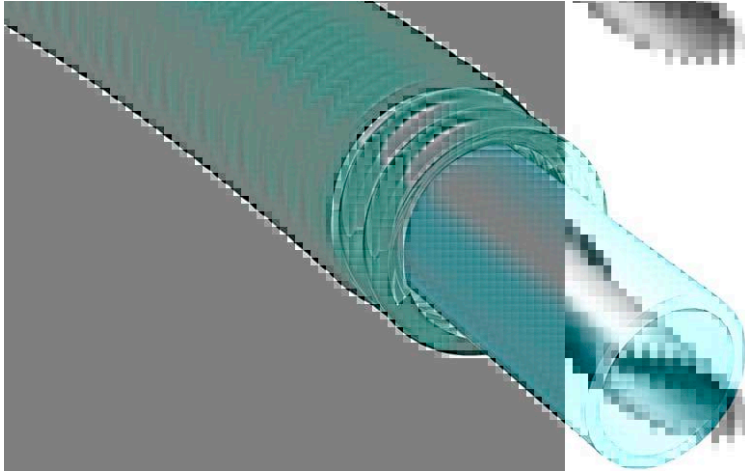
**To connect**  
Push and turn - it's coupled  
- full flow



**To disconnect**  
Turn and pull - it's released  
- no spillage

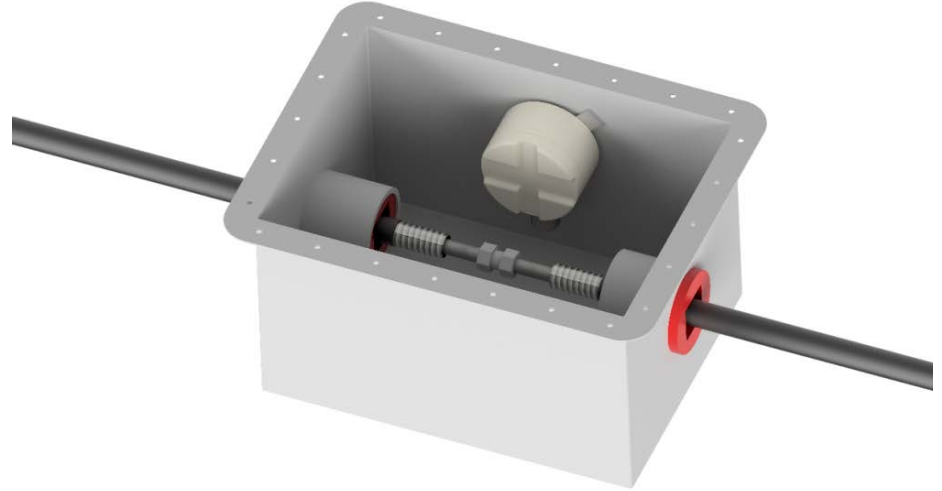
- No passengers
- At port
- Conventional method

# FUEL DISTRIBUTION



- Double walled - secondary barrier
- No ventilation
- Special arrangement for joints
  - leak detection

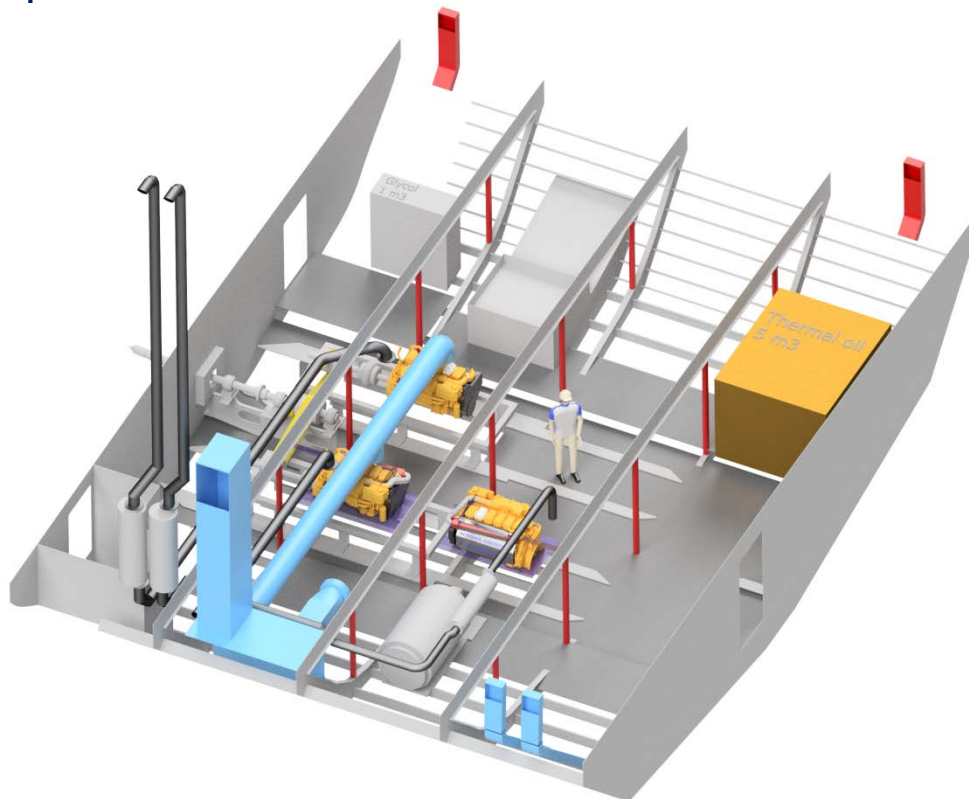
2017-12-06 low points



SUMMETH Seminar - How to convert at road ferry to methanol operation -  
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# ENGINE ROOM



- Leak detection
- Fire detection and suppression
- SI engines, low fuel pressure

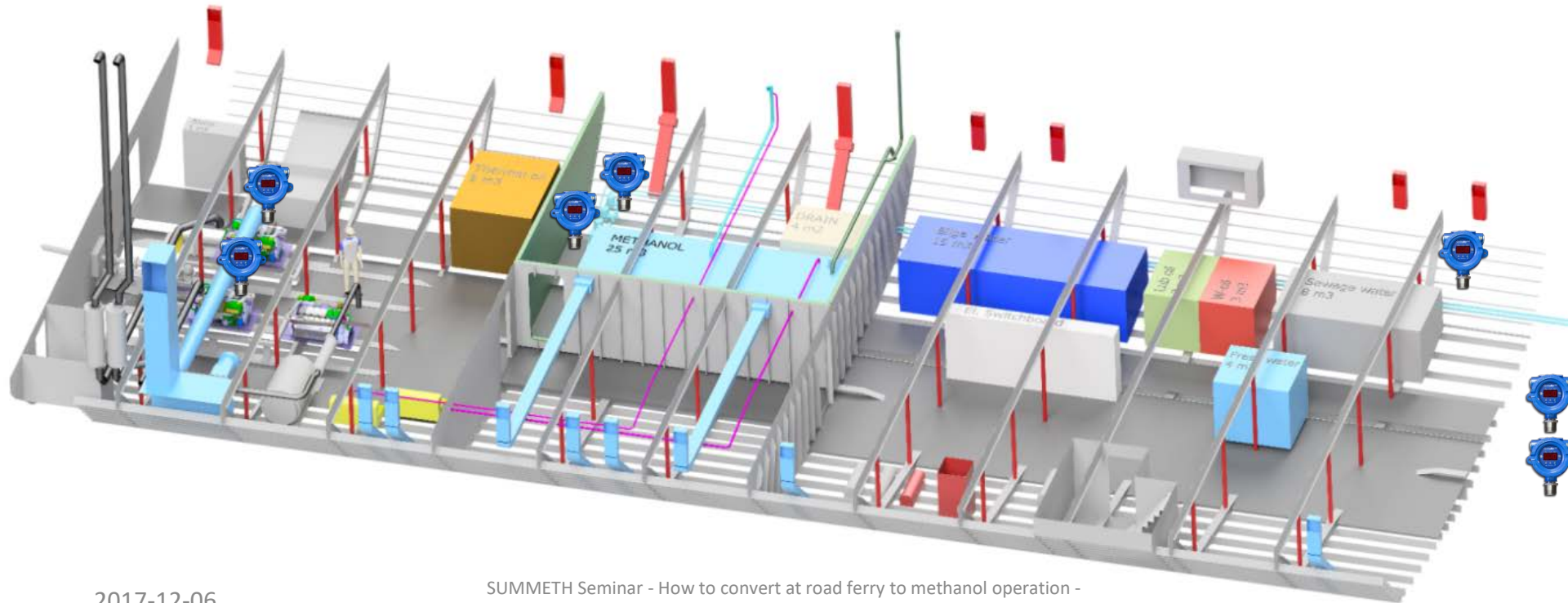
# VAPOUR DETECTION



- Alarm at 15 %LEL (9 000 ppm)
- Secondary alarm at 30 % LEL
- Easy to detect methanol



# VAPOUR DETECTION



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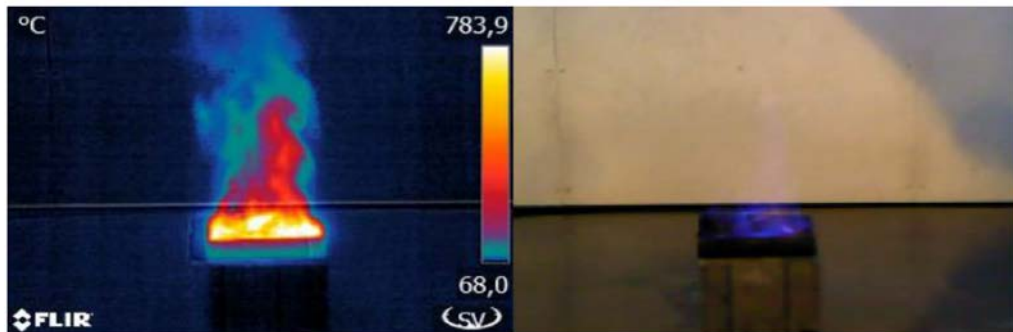
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**SUMMETH**

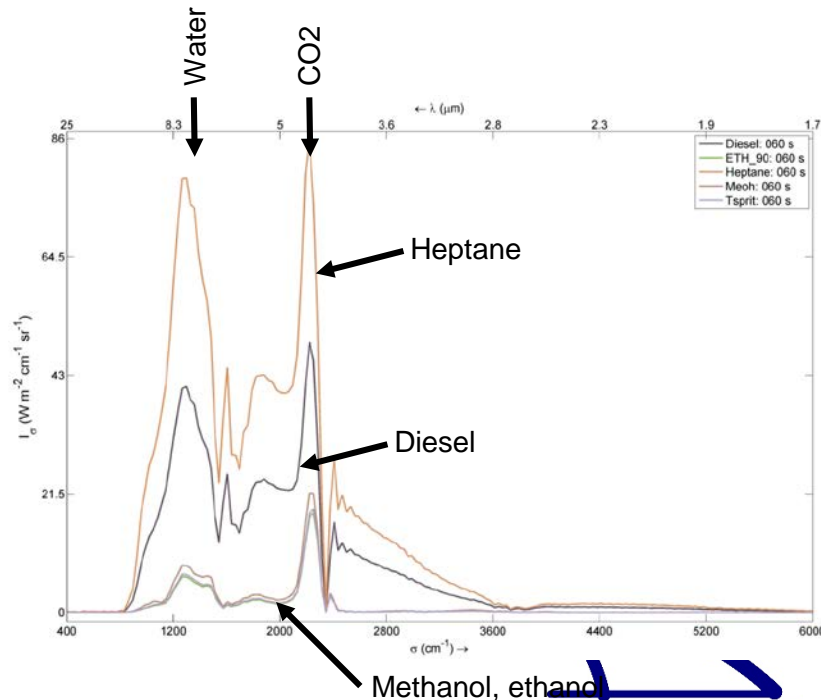


# FIRE DETECTION

- No smoke from burning methanol



- Flame detectors in visual spectrum does not work
- Triple band IR detectors tested for ethanol are suitable



# FIRE SUPPRESSION

Table 1. Minimum extinguishing concentrations for different agents applied on methanol

MEC for fuel:	Diesel	Heptane	Methanol	Relation	Meth +20%	Meth +100%
Extinguishant	[vol%]	[vol%]	[vol%]	(Meth/Hept)	[vol%]*	[vol%] <sup>†</sup>
Carbon Dioxide	21-23	19.6	27.5	1.40	33.0	55
Nitrogen	no					
Argon	2					
Ar	2					
Inergen	3					
Halon 1301	1					
FM 200	6.7	5.8	10.0	1.72	12.0	20
NOVEC 1230	4.5	5.9	8.5	1.44	10.2	17

CO2 for:

Diesel 40 % design concentration

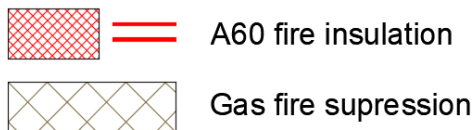
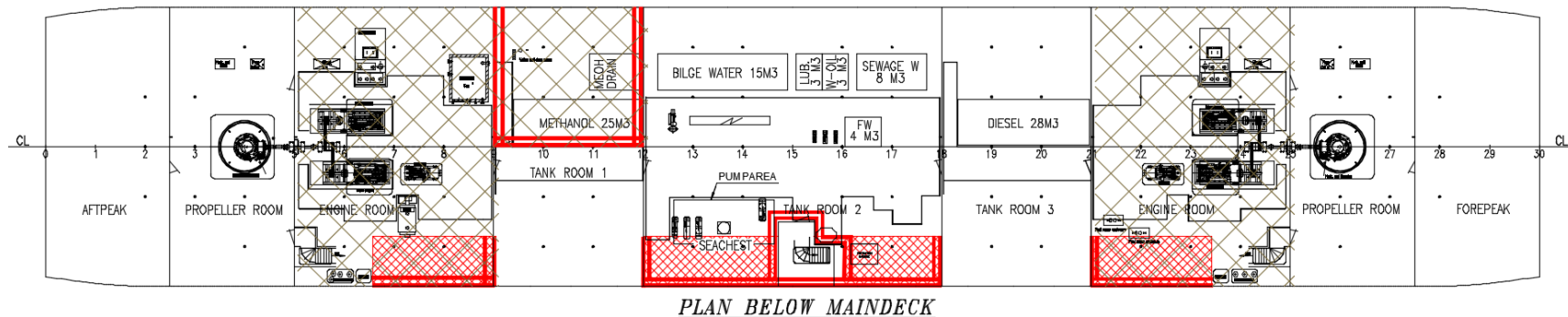
Meoh 55 % design concentration

\* Recommendable minimum design concentration *with* full scale performance verification.

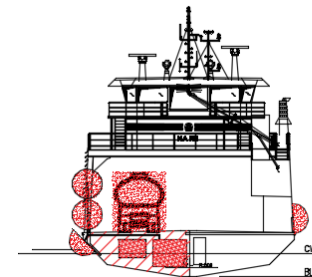
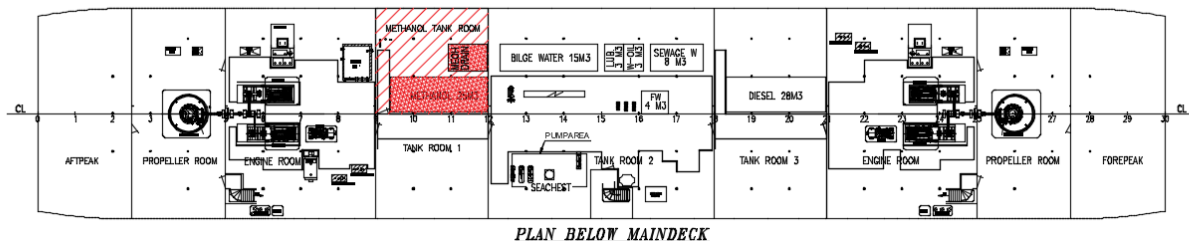
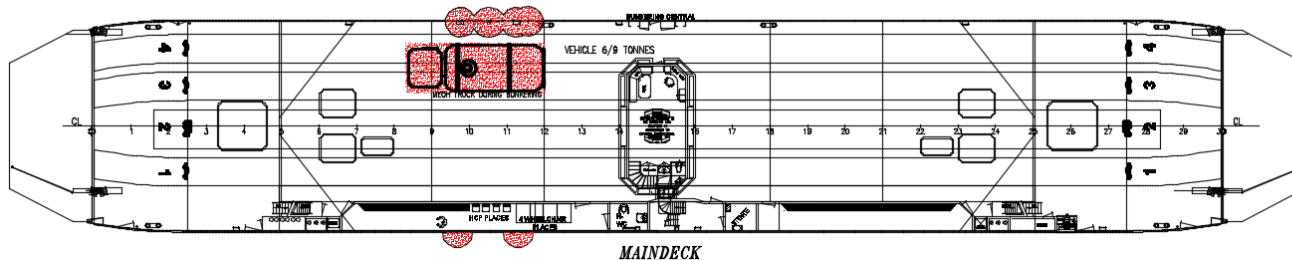
<sup>†</sup> Recommendable minimum design concentration *without* full scale performance verification.

- Gas total flooding
- Conventional hand held extinguishers
- Foam canons on deck already suitable for alcohols (E85)

# FIRE SUPPRESSION



# HAZARDOUS AREA PLAN



#11



HAZARDOUS AREA ZONE 0

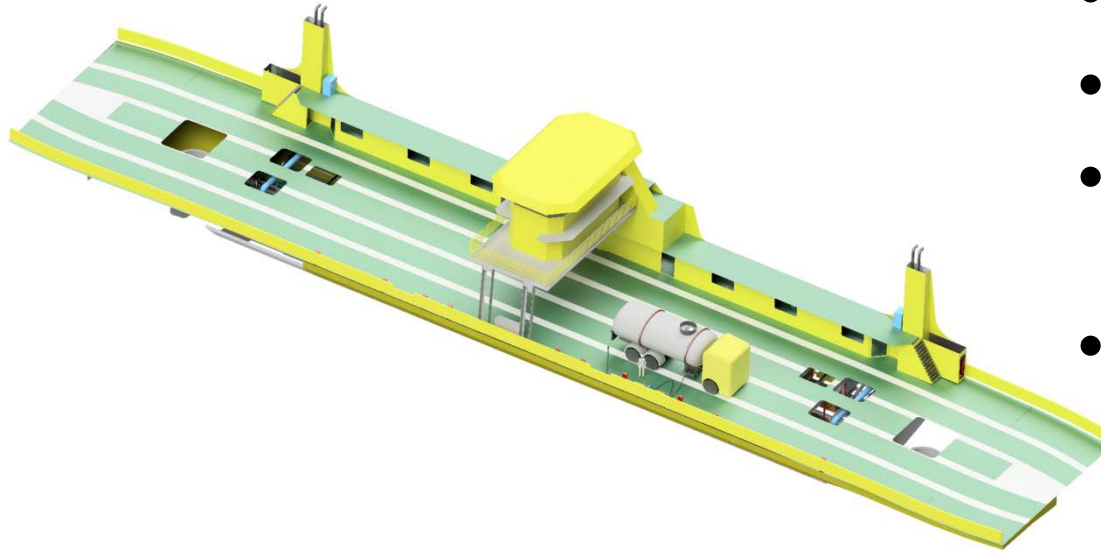


HAZARDOUS AREA ZONE 1



HAZARDOUS AREA ZONE 2

# CONVERSION

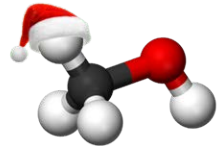


- Safe design
- Approved in principle
- Methanol consumption 20 m<sup>3</sup>/week
- Conversion cost\* ~2 MSEK

# SUMMETH

Sustainable Marine Methanol

*Suomi  
Finland*  
**100**



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