Seminar - roundtable
THE POSSIBILITIES OF LNG

LNG fuelled vessels

MarTech LNG, Risavika, 18th of September 2013

Sales Director Jevgenij Petrov, Fiskerstrand BLRT AS

FISKERSTRAND
BLRT AS

LNG facts

Liquefied Natural Gas

- About 90% Methane
- Odourless, colourless, non-toxic, non-corrosive
- Not explosive, not flammable
  - When vaporized to NG it will burn with an air mixture between 5-15%
- Tank storage temperature -163˚C, pressure 6-9 bar
- Hazards: Flammability, Freezing, Asphyxia

LNG versus MDO

- ÷ Higher installation costs
- ÷ More space needed

- + Approx. 20-30% lower bunker price
- + Reduced maintenance costs, approx. 20%
- + Reduced lub.oil costs, approx. 50%
- + 100% SOx reduction
- + 100% Particulate reduction
- + 80-90% NOx reduction
- + 31% CO_2 reduction (compared to SCR alt.)
- + Meets requirements in IMO TIER III (2016)

Det norske Veritas

Two alternative configurations for class notation «GAS FUELLED»:

- Inherently gas safe machinery space
- ESD protected machinery space

INHERENTLY GAS SAFE MACHINERY SPACE

- Machinery space considered gas safe under all conditions
- The gas fuel pipes shall be installed within a pressurized or ventilated pipe or duct
- Engine/gas system shutdown upon abnormal conditions

INHERENTLY GAS SAFE MACHINERY SPACE

Advantages:

- Normal equipment can be arranged in the engine room
- Normal ventilation
- Less steel

Disadvantages:

- Few engine alternatives on the market (higher price)

ESD PROTECTED MACHINERY SPACE

ESD = Emergency Shutdown System

- Machinery space considered non-hazardouz under normal conditions, but hazardous upon abnormal condition.
- Gas detector system arranged to automatically shutdown the gas supply system, and disconnect all non-ex equipment.
- High ventilation grade, 30 air exchanges/hour.

ESD PROTECTED MACHINERY SPACE

Advantages:

- Single gas piping accepted in the engine room.
- Multiple engine alternatives.

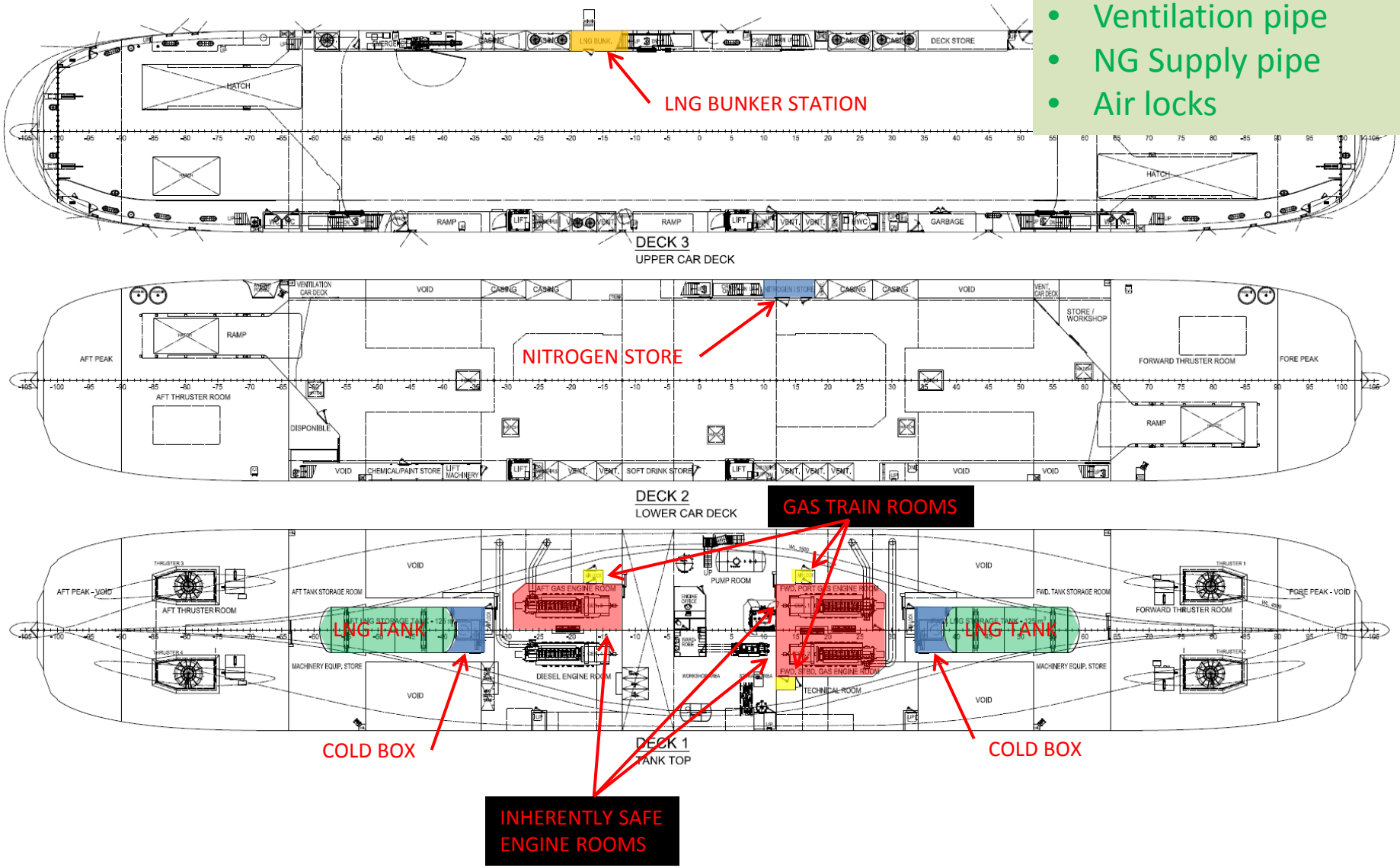
Disadvantages:

- Non-ex equipment to be installed in separate room
- Explosion calculated structure -> more steel -> blast panels
- Engine room access
- Ventilation

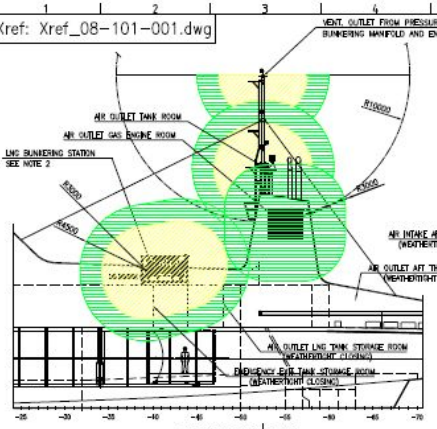
LNG EQUIPMENT ON BOARD

OTHER ARRANGEMENTS:

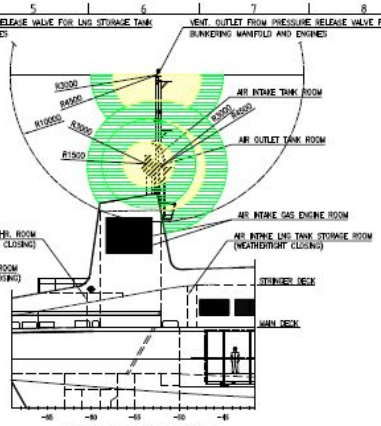
- Bunkering pipe
- Ventilation pipe
- NG Supply pipe
- Air locks



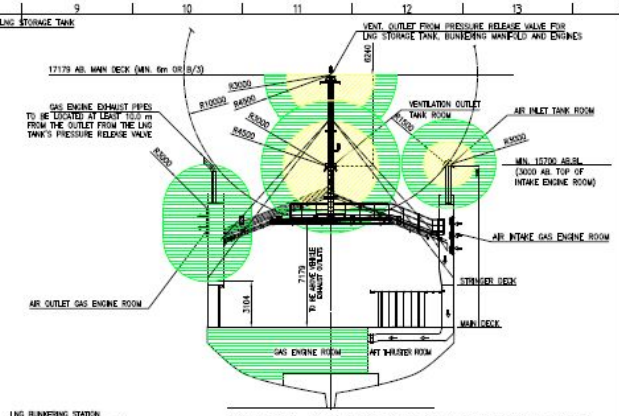
Xref: Xref_08-101-001.dwg



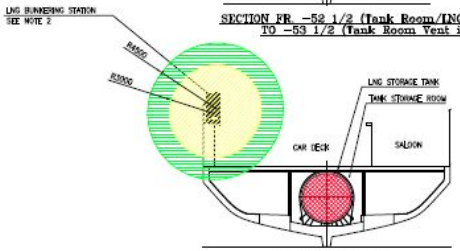
PROFILE PORT SIDE



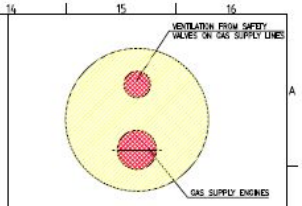
PROFILE STARBOARD SIDE



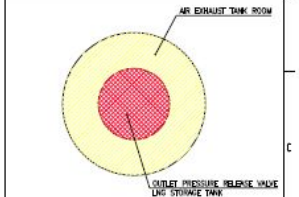
SECTION FR. -52 1/2 (Tank Room/LNG Tank Vent outlet)
TO -53 1/2 (Tank Room Vent inlet)



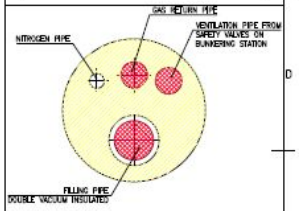
SECTION FR. -36



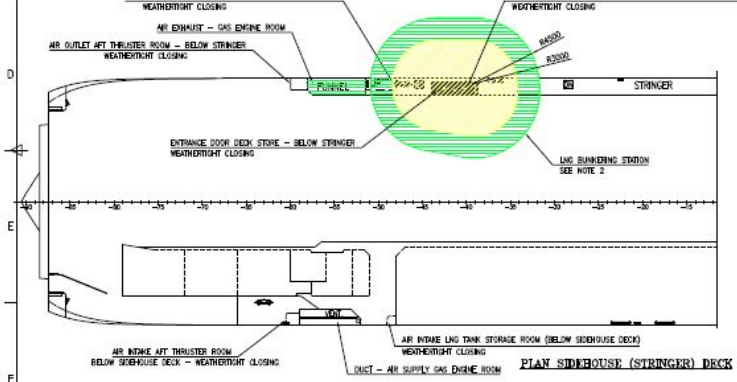
DETAIL 3 – GAS SUPPLY TO ENGINES



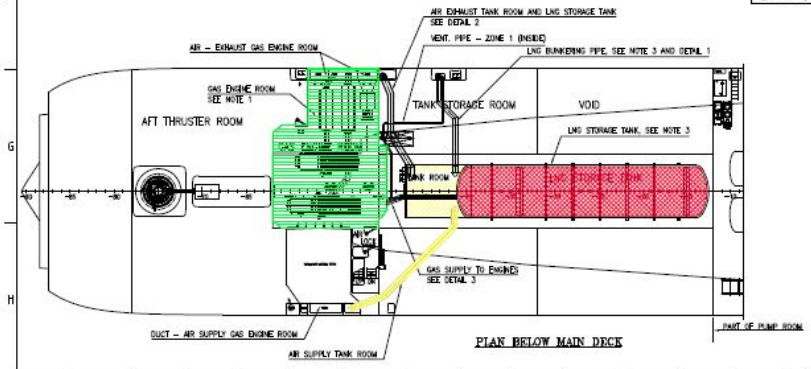
DETAIL 2 – EXHAUST VENTILATION PIPE



DETAIL 1 – LNG BUNKERING PIPE
SEE NOTE 3



PLAN SIDEHOUSE (STRINGER) DECK



PLAN BELOW MAIN DECK

NOTE 1

The gas engine room to be ESD protected according to DNV rules. The gas engine room is then considered as non hazardous area during normal operation but changes to zone 1 at gas detection.
The vessel shall also fullfill NMD's rules, and therefore equipment and outfitting in the gas engine room shall also meet zone 2 classification according to rules.

NOTE 3

The bunkering lines will be inerted when the bunkering operation is completed. After the lines are inerted, they will not be gas dangerous. I.e. the bunkering lines will not be gas dangerous in normal operation.

NOTE 2

The hazardous zones 1 and 2 around the LNG bunkering station are only considered as hazardous during bunkering at quay. The bunkering lines will be inerted when the bunkering operation is completed. After the lines are inerted, the bunkering station will not be considered as a hazardous area. The vessel will be bunkered from the shipside with flexible hoses connected to the bunkering station. Hazardous zones around LNG bunkering station is shown from the connection flanges for bunkering hoses.

Following measures to be taken before LNG bunkering can be started: It shall be ensured that the "LNG TANK STORAGE ROOM" is empty from personnel. During bunkering, no one can enter the "LNG TANK STORAGE ROOM" – the IMS WT sliding door on tank top, # –35, shall be closed and marked with sign: "NO ACCESS DURING LNG BUNKERING" It must be given special attention to alarm/indication for opening of this door during bunkering (alarm included in IAS).
Ventilation exhaust from "LNG TANK STORAGE ROOM", pos. 58 in ventilation arrangement, on main deck PS # –40, shall be closed shut. The closing cover shall be marked with "TO BE KEPT CLOSED DURING LNG BUNKERING"
The emergency exit door from "LNG TANK STORAGE ROOM", pos 231 in door plan, on main deck PS # –40, shall be closed and locked off. This door shall be marked with sign: "NO ACCESS DURING LNG BUNKERING"
If a situation occurs during refueling, which requires access to the "LNG TANK STORAGE ROOM", then the bunkering operation shall be interrupted immediately, and the LNG bunker station and –pipeline shall be purged with nitrogen before the room can be accessed.

CLASS
DNV +1A1, CAR FERRY B, GAS FUEL(ED), E4, EO (POS)

FLAG
NORWEGIAN
JOBB Operation: area 2.

REFERENCE DRAWINGS:

08-511-000	FIRE INTEGRITY PLAN
08-574-102	VENTILATION DUCTS AND LOUVRES, AFT ENGINE ROOM
08-600-100	ARRANGEMENT IN GAS ENGINE ROOM & THRUSTER ROOM AFT.
08-707-110	ARRANGEMENT OF LNG BUNKERING STATION
08-707-130	ARRANGEMENT IN TANK STORAGE ROOM

HAZARDOUS AREAS acc. to DNV Rules Pt.6 Ch.13 Sec.1 B109

LEGEND	ZONE AREA	DESCRIPTION
	0	Area in which an explosive gas atmosphere or a flammable gas with a flash point below 60°C is present continuously or is present for long periods
	1	Area in which an explosive gas atmosphere or a flammable gas with a flash point below 60°C is likely to occur in normal operation
	2	Area in which an explosive gas atmosphere or a flammable gas with a flash point below 60°C is not likely to occur in normal operation and, if it does occur, is likely to do so only infrequently and will exist for a short period only.

REV.NO.	REVISION	DATE	APPR.
C	Revised acc. to DnV comments, gas store around bunker station	29.11.10	FV/TB
B	Revised acc. to new gas mast, Kuwait aft, different adjustments on arr.	19.10.10	FV/TB
A	Issued for approval	26.08.09	HJS

FISKERSTRAND BLRT AS
Postboks 1, N-5001 Bergen

TITLE: GAS DANGEROUS SPACES AND ZONES

SCALE: 1:150
DRAWN HKD 20.05.09
CK'D AH 17.08.09
APPR.

MULTI MARITIME AS
P.O.Box 90, N-6601 FINSE
Phone 47 57623000
Telefax 47 57623401
E-mail: info@multi-maritime.no

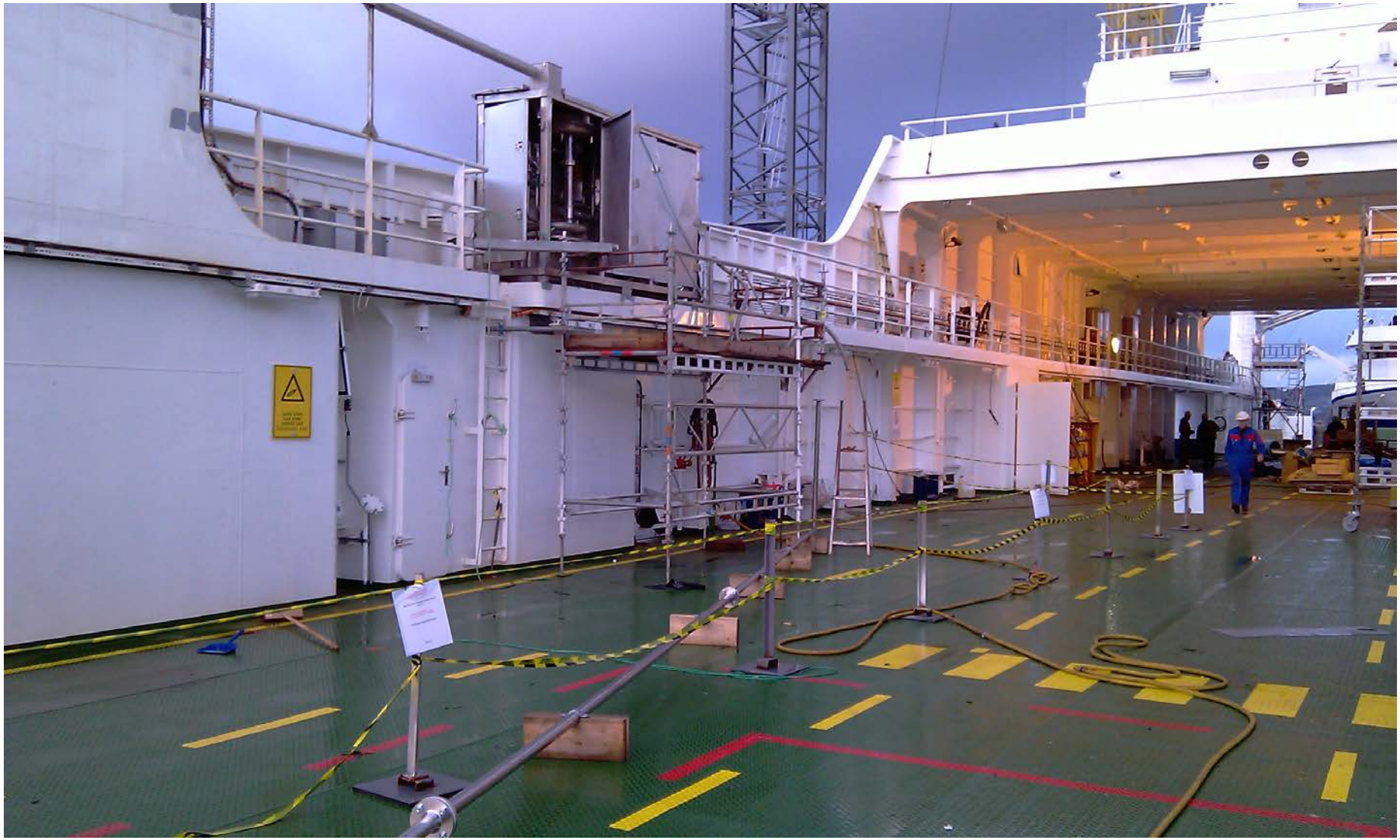
PROJECT NO. 270/B
YARD NO. 08
SPI 102
FILE NAME / DRAWING NO. 08-102-106
REV.NO. B

FV Project No.: 70
WST Project No.: 045

UNIFIED LOGO
CLASSIFICATION
MARITIME AUTH.
Approved

LNG TANK

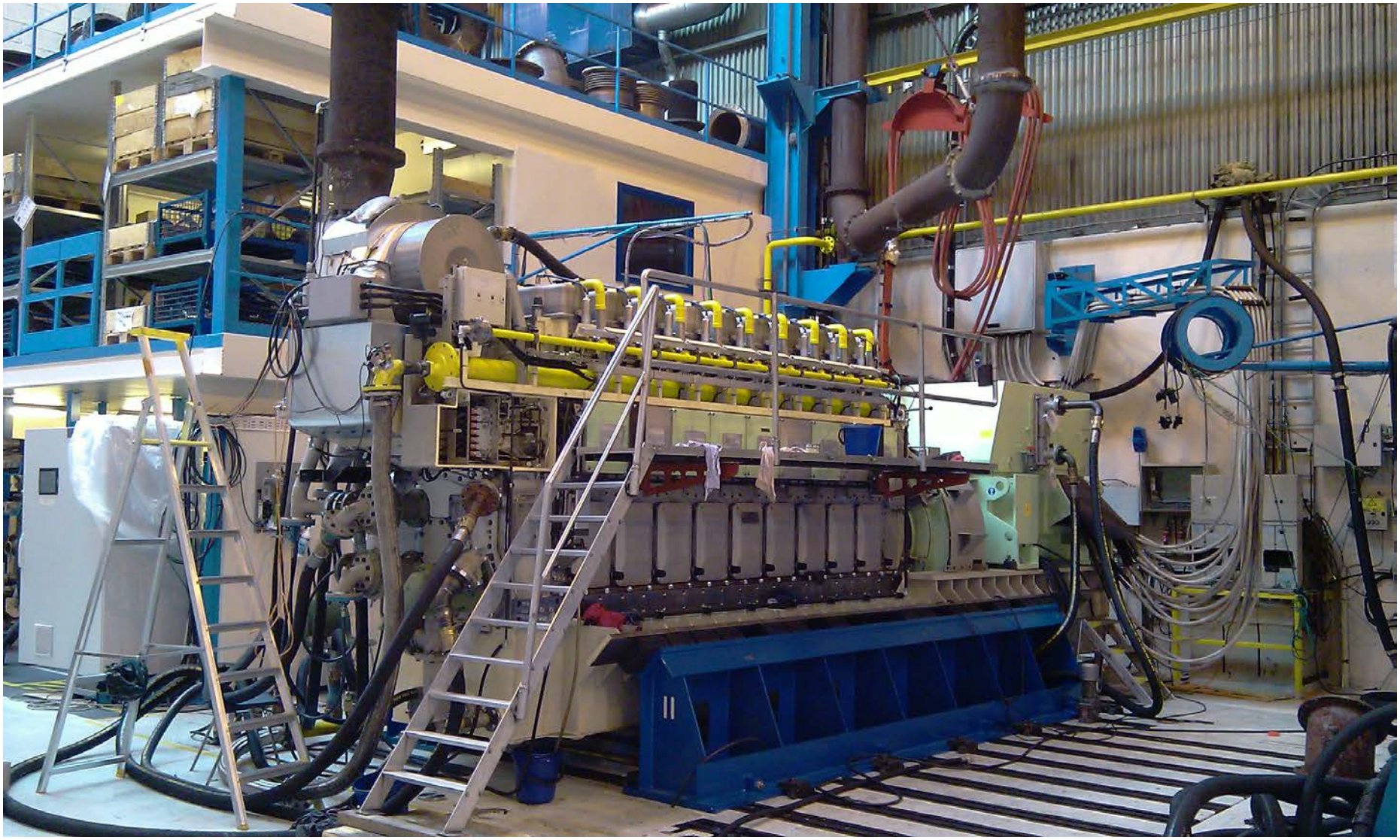
LNG BUNKER STATION



LNG Bunkering operation

SAFETY PRECAUTIONS:

- Bunkering from shore to avoid consequence of spill
- Hazardous area
- Approved bunkering procedure
- Trained crew



FISKERSTRAND BLRT AS

Newbuilding - gas ferry

- Gas aggregates, 1 x 864 kWe - 1 x 646 kWe
- Low operation costs
- High fjord crossing frequency
- Max speed 16 knots

M/F "Selbjørnsfjord" for FosenNamsos Sjø, Norway – Design MM 105 FE LNG

Car/Passenger Ferries - 120 PCU - 250 PAX - Gas Electrical Propulsion Systems

FISKERSTRAND BLRT AS

Newbuilding - the world`s largest sailing gas ferry

M/F "Boknafjord" for Fjord1, Norway - Design MM 120 FD LNG

Car/Passenger Ferry – 242 PCU – 600 PAX – Gas Electrical Propulsion Systems

FISKERSTRAND BLRT AS

Newbuilding – Concept development

- Multi Maritime AS won the concept development contract in December 2009
- The 12th LNG – powered ferry for Fjord1
- Operate on the two largest ferry links in Norway
- Annually 5 million passengers, 60 000 port calls

Compared to existing ferries:

- Increased capacity by 30 more cars
- More fuel efficient
- Less power (~ 2 500 kW) with the same service speed
- More environmental friendly
- Less fuel and ab. 50% reduced methane emission
- Max speed 23 knots
- Less noise and maintenance costs

FISKERSTRAND BLRT AS

Conversion project – LNG gas bunkering

M/F FJALIR - 1974

- from ferry to a LNG bunker vessel

M/V SEAGAS - 2013

- Pilot project / prototype
- Conversion to the world`s first dedicated LNG bunker vessel
- Hull and engine/propulsion system kept
- Not need shore gas terminal for the operating vessel
- Short turnaround in terminal

FISKERSTRAND BLRT AS

Innovation concept - gas transport

- Flexible and purposed built LNG shuttle barge
- Less building and operation costs *(less crew and no propulsion systems)*
- One tug can operate several LNG gas barges
- Can be used as bunkering station

Length	:72,30 m
LNG tank capacity	: Approx. 2000m^3 (variable)
Towing speed	: Approx. 10 knots

FISKERSTRAND
BLRT AS

Thank you for your attention!