


1 2 3 4 5 6 7 8

A
B
C
D
E
F

A
B
C
D
E
F

Quantity PER ENGINE		SEQ NO	Material ID	Material Name	Dimension, Occ	Standard or Drawing	Basic Material Material Standard	Weight GR./NET
1	004	107.246.880.500	CONCEPT GUIDANCE Fuel Oil Treatment	107.246.880		0,001		
1	003	107.428.377.500	DISTILLATE FUELS CONCEPT GUIDANCE	107.428.377		0,001		
1	002	107.341.454.500	INSTRUCTION FOR FLUSHING	107.341.454		0,001		
1	001	PAAD328800	FUEL OIL SYSTEM HFO&MDO&MGO	DAAD116928		0,001		

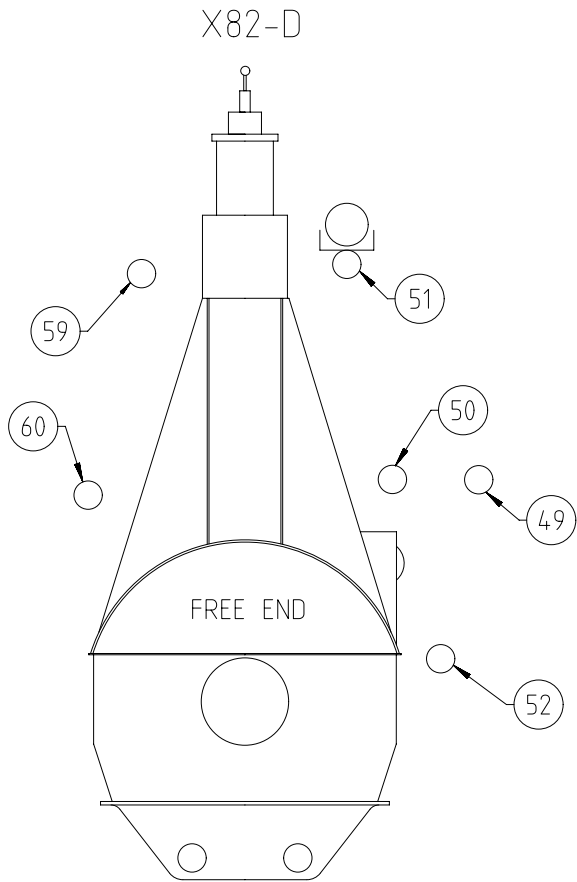
MaterialID	Free space for lic.							Q-Code XXXXXX	Main Drw. H			
	Standard ISO; JIS											
Modif.	<input type="checkbox"/>	Number	Drawn date	<input type="checkbox"/>	Number	Drawn date	<input type="checkbox"/>	Number	Drawn date	<input type="checkbox"/>	Number	Drawn date

	Product W6-9X82-D	FUEL OIL SYSTEM Brennstoffsystem
	Units mm kg NX 	Basic Material

SURFACE PROTECTION SEE GROUP 0344	Made	29.05.2019 dki021 DH.Kim	Scale	-	Size	A3	Page	1/1	Material ID	
TOLERANCING PRINCIPLE ISO8015	Chkd	10.07.2019 wwa008 Wang	Design Group	9723	Drawing ID	DAAD116940		Rev.	-	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	11.07.2019 mhu019 Hug								

Approved
DIM - DIMENSIONAL DRAWING - Confidential

SPECIFICATION which must be met



60

OUTLET - Heating medium for fuel oil trace heating
- Connected to condensate manifold or thermal oil return.

49

INLET - Fuel oil
Fuel oil quality at engine inlet: according to specification in Marine Installation Manual (MIM)
Pressure at engine inlet: stopped engine: 10 bar
running engine: 7-10 bar
Volume flow: according to GTD
Viscosity:
- Viscosity for HFO: 10-20 cSt (recommendation: 13-17 cSt)
- Viscosity MDO/MGO : 2-20 cSt
Filtration:
- At least one filter unit close to the engine inlet.
- One filter unit with max. 10 micron (absolute, sphere passing mesh) in the fuel system (either in feed- or booster circuit).
- Bypass filter in parallel to the main fuel oil filter with max. 25 micron (absolute, sphere passing mesh).
Fuel change-over:
- Max. temperature gradient during fuel change-over: 2 °C/min
- Fuel amount on engine side: Mentioned in the table on page 2.
- Fuel amount on system side: According to project specific system layout.

50

OUTLET - Fuel oil return
- Normal operation condition: Returning to mixing unit.
- Fuel oil change over while engine not in service: Returning to service tank.

51

OUTLET - Fuel leakage rail-unit (dirty)
- Dirty fuel: Fuel leakage from rail-unit, not for re-use
- Free flow by gravity to sludge oil tank or appropriate tank.
- Pipe insulated and heated up (50-95 °C).

52

OUTLET - Fuel leakage fuel pump and injection control (clean)
- Clean fuel:
Normal leakage from fuel pump and injection control side.
Normal leakage from pilot fuel pump unit.
Additional leakage in emergency situation (e.g. high pressure pipe damage).
- Free flow by gravity to FO overflow tank or appropriate tank.
- Pipe insulated and heated up (50-95 °C).

59

INLET - Heating medium for fuel oil trace heating
- Connected to steam or thermal oil supply.

1	008	PAAD328723	MIXING UNIT	DAAD116880	0,001	
QTY	SEQ NO	Material ID	Material Name	Standard or Drawing	Basic Material Material Standard	Weight GR./NET
Free space for ILC				Q-Code	Main Drw.	
				XXXXX		
				Standard		
				ISO; JIS		
Modif.	Number	Drawn date	Number	Drawn date	Number	Drawn date
WINGD Winterthur Gas & Diesel		Product	FUEL OIL SYSTEM HFO&MDO&MGO Brennstoffsystem			
Units	mm kg	NX	Basic Material	Net Weight 0,001		
SURFACE PROTECTION SEE GROUP 034.4	Made	29.05.2019	dk1021 DH.Kim	Scale	-	
TOLERANCING PRINCIPLE ISO8015	Chkd	10.07.2019	wwa008 Wang	Design Group		
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	11.07.2019	mhu019 Hug	9723	Page	1/2
				Material ID	PAAD328800	Rev.
				Drawing ID	DAAD116928	

SYSTEM PROPOSAL - Main fuel oil supply and fuel oil treatment

Pos. ENGINE COMPONENTS *3)

EC01	Fuel rail unit
EC02	Fuel supply unit

Possible tank arrangements:

Option 1)
HFO: 1 settling tank, 1 service tank
LSHFO: 1 settling tank, 1 service tank
MDO: 1 settling tank, 1 service tank

Option 2)
HFO: 2 settling tanks, 1 service tank
LSHFO: 2 settling tanks, 1 service tank
MDO: 1 settling tank, 1 service tank

Option 3)
HFO & LSHFO combined: 2 settling tanks
HFO: 1 service tank
LSHFO: 1 service tank
MDO: 1 settling tank, 1 service tank

Table 1 Fuel content on engine side

Cylinder	Volume
6	115 l
7	115 l
8	115 l
9	160 l

Pos. ENGINE CONNECTIONS *2)

(49)	INLET - Fuel oil
(50)	OUTLET - Fuel oil return
(51)	OUTLET - Fuel leakage rail-unit (dirty)
(52)	OUTLET - Fuel leakage fuel pump and injection control (clean)
(59)	INLET - Heating medium for fuel oil trace heating
(60)	OUTLET - Heating medium for fuel oil trace heating

Number of cylinders

	6	7	8	9
Main engine X82-D (R1 rated)	power (kW)	33000	38500	44000
	speed (rpm)	84		

Proposal for dimensioning *4)

Mixing unit	capacity	(l)	acc. to separate drawing (system component 008)
Heavy fuel oil settling tank	capacity	(m³)	50 57 65 73
Heavy fuel oil service tank	capacity	(m³)	50 57 65 73
Marine diesel oil service tank	capacity	(m³)	50 57 65 73
Nominal pipe diameter	A DN	80	80 100 100
	B DN	50	65 65 65 65
	C DN	65	65 80 80
	D DN	100	100 100 125
	E DN	80	100 100 100

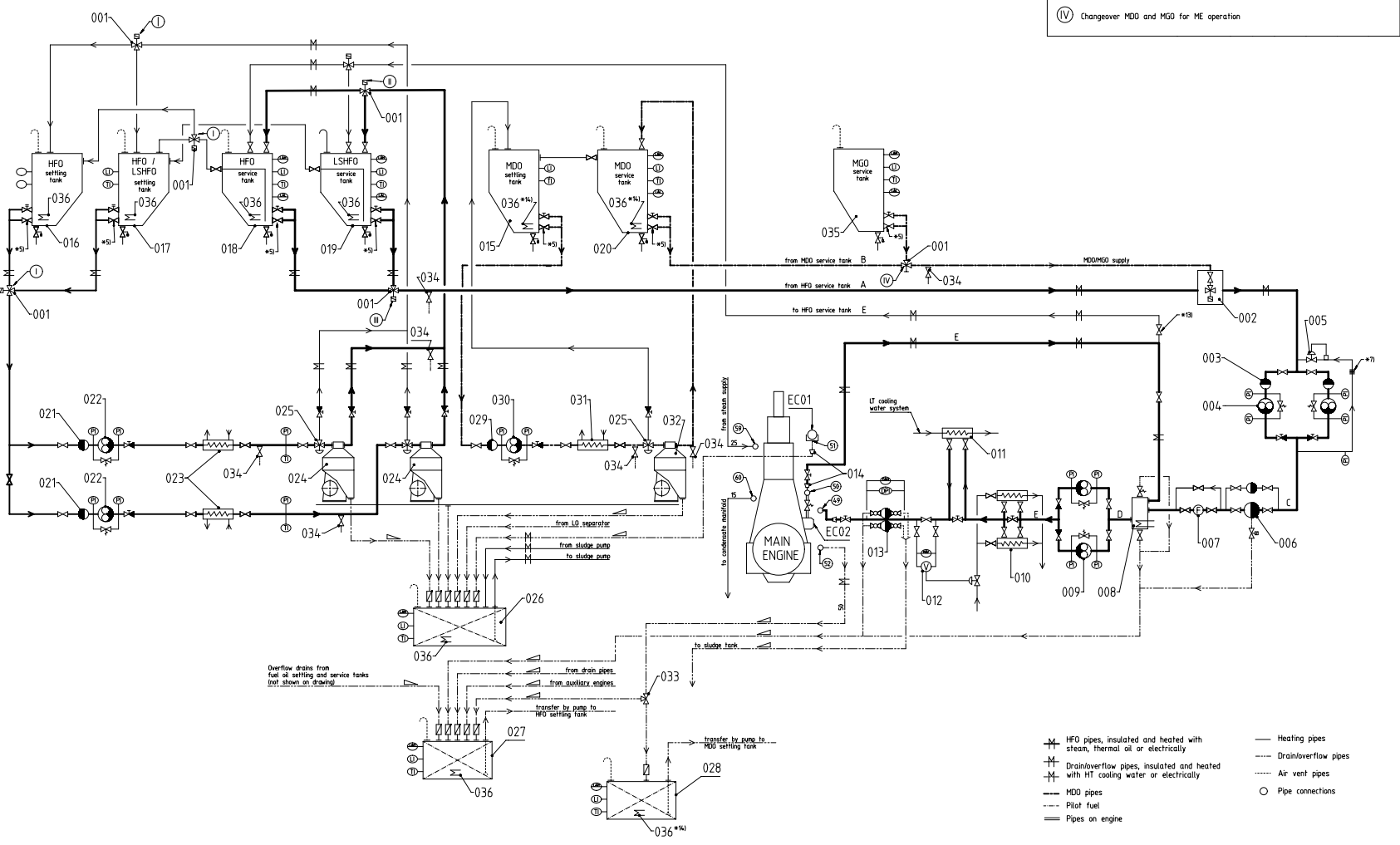
- I Both valves to be interconnected
- II Changeover LSHFO and HFO for fuel treatment
- III Changeover LSHFO and HFO for ME operation
- IV Changeover MDO and MGO for ME operation

Pos. SYSTEM COMPONENTS *1)

001	Three-way valve, manually or remotely operated
002	Automatic fuel change-over unit
003	Suction strainer (mesh size acc. to pump suppliers requirement)
004	Low pressure feed pump
005	Pressure regulating valve
006	Automatic self-cleaning filter, 10 micron, heated (trace heating acceptable)
007	Flowmeter
008	Mixing unit, heated and insulated (according to separate drawing as linked on page 1)
009	High pressure booster pump
010	Fuel oil endheater
011	Fuel oil cooler (cooling by LT water)
012	Viscometer
013	Fuel oil filter, 25 micron, heated (trace heating acceptable)
014	Transition Piece (adapter) *10)
015	MDO settling tank, heated and insulated
016	HFO settling tank, heated and insulated
017	LSHFO settling tank, heated and insulated
018	HFO service tank, heated and insulated
019	LSHFO service tank, heated and insulated
020	MDO service tank
021	Suction strainer (mesh size acc. to pump suppliers requirement)
022	HFO/LSHFO separator supply pump, with safety valve
023	HFO/LSHFO pre-heater
024	Self-cleaning HFO/LSHFO separator *6)
025	Three-way valve, diaphragm operated
026	Sludge tank
027	Fuel oil drain tank *12)
028	MDO/MGO clean leakage tank *11) *12)
029	Suction strainer (mesh size acc. to pump suppliers requirement)
030	MDO separator supply pump, with safety valve
031	MDO pre-heater
032	Self-cleaning MDO separator *6)
033	Three-way valve for switching between fuel drain tank and MDO/MGO clean leakage tank *9)
034	Fuel sampling cock *8)
035	MGO service tank
036	Heating coil

- Remarks
- All heaters to be fitted with thermometers, relief valves, drains and drip trays. Not shown on drawing.
 - Steam traces on main engine are laid out for 7 bar saturated steam.
 - Air vent and drain pipes must be fully functional at all inclination angles of the ship at which the engine must be operational.
 - Overflow and drain pipes for fuel oil tanks are not shown.

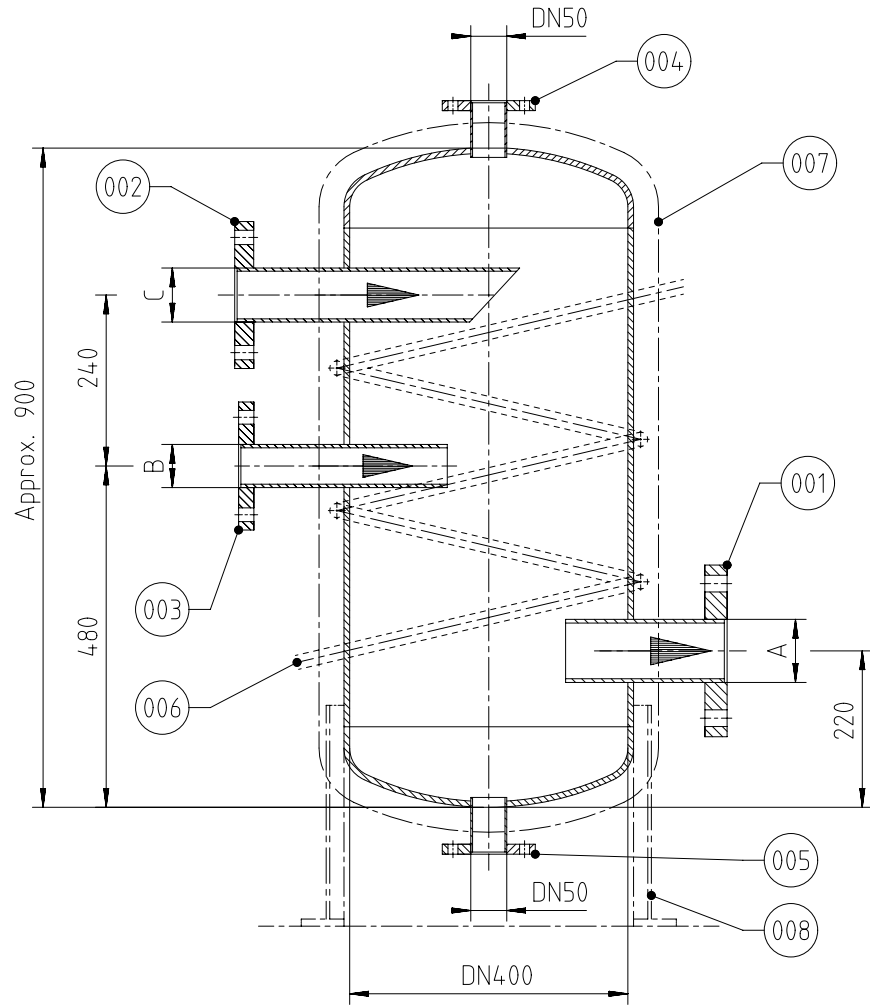
- *1) To be delivered by external suppliers and to be installed by the shipyard.
- *2) Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connections.
- *3) To be delivered by the engine manufacturer, i.e. already equipped on engine side.
- *4) All capacities and the given diameters are valid for the mentioned engine rating and serve just as an example. The given tank capacities are based on 8 h settling tank change-over intervals. To make the layout for the project specific, rating please refer to design group 9730 "Fluid velocities and flow rates, recommended values for pipe size of diesel plants". Rating specific flow rates are provided by GTD.
- *5) Valve to be kept closed during normal engine operation. For draining only.
- *6) Separator capacity related to viscosity; layout according to certified flow rate (CFR) recommended.
- *7) The return line must be fully exposed to air without any insulation and equipped with cooling ribs or other type of radiative cooler.
- *8) Recommended position for fuel oil sampling to check fuel oil quality.
- *9) Just to be applied if in addition to the fuel drain tank a separate tank for collection of clean MDO/MGO is installed to enable the switching between the different tanks depending on the fuel in use.
- *10) Installed as required (check with "Pipe Connection Plan").
- *11) The leakage rate of MDO/MGO is significantly higher than the leakage rate of HFO. Therefore, during long-term operation on MDO/MGO the collection of clean MDO/MGO in a separate leakage tank is highly recommended.
- *12) The tank inlet only to be equipped with a swing check valve to avoid inadmissible backpressure.
- *13) Close during normal engine operation.
- *14) A heating coil in the MDO tank is required when DBB is used. Target heating temperature: 40 °C



- HFO pipes, insulated and heated with steam, thermal oil or electrically
- Heating pipes
- Drain/overflow pipes, insulated and heated with HT cooling water or electrically
- Drain/overflow pipes
- MDO pipes
- Air vent pipes
- Pilot fuel
- Pipes on engine
- Pipe connections

		FUEL OIL SYSTEM HFO/MDO/MGO Brennstoffsystem	
Date: 22.05.2019 Drawn: [Name] Checked: [Name]	Scale: 1:1 Sheet: 1/2 Design Group: 9728 Order No.: DAAD16928	Date: 22.05.2019 Drawn: [Name] Checked: [Name]	Scale: 1:1 Sheet: 2/2 Design Group: 9728 Order No.: DAAD16928

X82-D/DF



No. of Cyl.	A	B	C
	DN	DN	DN
6	100	65	65
7	100	65	80
8	100	80	80
9	125	80	80

Capacity: 100 l
 Design pressure: 10 bar
 Service temperature: 150 °C

Pos.	Description
001	Outlet
002	Inlet, return line
003	Inlet, from feed pump
004	Outlet safety valve
005	Drain
006	Heating coil
007	Insulation
008	Mounting brackets *1)

Remarks;

- Configuration and dimensioning of the mixing unit have to comply with the relevant classification society/rules.
- *1) Mounting brackets for fixation on floor plate. The mixing unit must not be fitted unsupported under any circumstances.

Free space for lic.	Q-Code XXXXXX						Main Drw.
	Standard ISO; JIS						
Modif.	○	○	○	○	○	○	
	Number	Drawn date	Number	Drawn date	Number	Drawn date	
		Product 6-9X82-D 6-9X82DF		MIXING UNIT TO FUEL OIL SYSTEM			
Units	mm kg	NX	Basic Material		Net Weight 0,001		
SURFACE PROTECTION SEE GROUP 0344		Made	28.05.2019 dki021 DH.Kim		Scale	-	
TOLERANCING PRINCIPLE ISO8015		Chkd	10.07.2019 wwa008 Wang		Design Group	9723	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	11.07.2019 mhu019 Hug		Size	A3	
				Page	1/1		
				Material ID	PAAD328723		
				Drawing ID	DAAD116880		
				Rev.	-		

WinGD X82-2.0 – Fuel Oil System (DG9723)

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2019-07-12	DRAWING SET	First web upload

DISCLAIMER

© Copyright by Winterthur Gas & Diesel Ltd.

All rights reserved. No part of this document may be reproduced or copied in any form or by any means (electronic, mechanical, graphic, photocopying, recording, taping or other information retrieval systems) without the prior written permission of the copyright owner.

THIS PUBLICATION IS DESIGNED TO PROVIDE AN ACCURATE AND AUTHORITATIVE INFORMATION WITH REGARD TO THE SUBJECT-MATTER COVERED AS WAS AVAILABLE AT THE TIME OF PRINTING. HOWEVER, THE PUBLICATION DEALS WITH COMPLICATED TECHNICAL MATTERS SUITED ONLY FOR SPECIALISTS IN THE AREA, AND THE DESIGN OF THE SUBJECT-PRODUCTS IS SUBJECT TO REGULAR IMPROVEMENTS, MODIFICATIONS AND CHANGES. CONSEQUENTLY, THE PUBLISHER AND COPYRIGHT OWNER OF THIS PUBLICATION CAN NOT ACCEPT ANY RESPONSIBILITY OR LIABILITY FOR ANY EVENTUAL ERRORS OR OMISSIONS IN THIS BOOKLET OR FOR DISCREPANCIES ARISING FROM THE FEATURES OF ANY ACTUAL ITEM IN THE RESPECTIVE PRODUCT BEING DIFFERENT FROM THOSE SHOWN IN THIS PUBLICATION. THE PUBLISHER AND COPYRIGHT OWNER SHALL UNDER NO CIRCUMSTANCES BE HELD LIABLE FOR ANY FINANCIAL CONSEQUENTIAL DAMAGES OR OTHER LOSS, OR ANY OTHER DAMAGE OR INJURY, SUFFERED BY ANY PARTY MAKING USE OF THIS PUBLICATION OR THE INFORMATION CONTAINED HEREIN.