


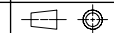
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FUEL TYPE	EXECUTIONS		
	HFO & MDO & MGO	X	
	MDO & MGO only		X
	MGO only with ≤ 0.1 % sulphur		X

Net Weight			0,001	0,001	0,001	Quantity PER ENGINE	SEQ NO	Material ID	Material Name	Dimension, Occ	Standard or Drawing	Basic Material Material Standard	Weight GR./NET
0,001	0,001	0,001											
1	1	1	006	107.246.880.500	CONCEPT GUIDANCE Fuel Oil Treatment	107.246.880		0,001					
1	1	1	005	107.428.377.500	DISTILLATE FUELS CONCEPT GUIDANCE	107.428.377		0,001					
1	1	1	004	107.341.454.500	INSTRUCTION FOR FLUSHING	107.341.454		0,001					
-	-	1	003	PAAD279937	FUEL OIL SYSTEM MGO only, int. pilot fuel supply	DAAD094617		0,001					
-	1	-	002	PAAD276380	FUEL OIL SYSTEM MDO&MGO only, int. pilot fuel supply	DAAD092985		0,001					
1	-	-	001	PAAD254068	FUEL OIL SYSTEM HFO&MDO&MGO, ext. pilot fuel supply	DAAD087390		0,001					

PAAD25271	PAAD279956	PAAD279955	Free space for lic.									Q-Code XXXXX	Main Drw.
												Standard ISO; JIS	H
Modif.	A	EAAD088733	22.12.2017	B	EAAD090104	03.12.2018							
Material ID		Number	Drawn date		Number	Drawn date		Number	Drawn date		Number	Drawn date	

	Product W5-8X52DF	FUEL OIL SYSTEM			
	Brennstoffsystem				
Units	mm kg	NX		Basic Material	Net Weight

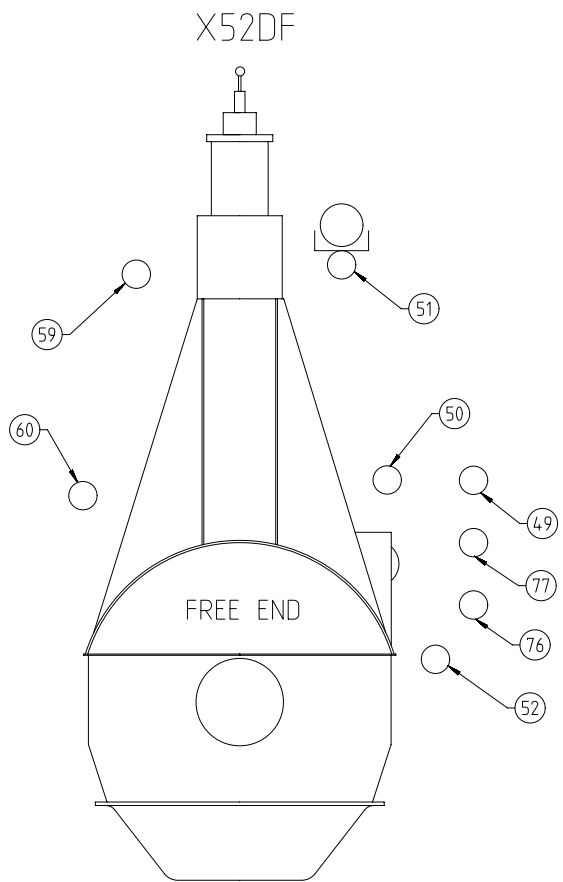
SURFACE PROTECTION SEE GROUP 0344	Made	02.03.2017	dk1021	DH.Kim	Scale	-	Size	A3	Page	1/1	Material ID	DAAD087882	Rev.	B
TOLERANCING PRINCIPLE ISO8015	Chkd	28.07.2017	wwa008	Wang	Design Group	9723	Drawing ID							
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	28.07.2017	mhu019	Hug										

UID - DIMENSIONAL DRAWING - Confidential

SPECIFICATIONS which must be met

(76)	<p>INLET - Pilot fuel oil</p> <p>Fuel oil quality at engine inlet: MDO or MGO</p> <p>Pressure at engine inlet: 7.0 - 8.0 bar</p> <p>Volume flow: according to GTD</p> <p>Viscosity: - Viscosity MDO/MGO: 2-17 cSt</p> <p>Filtration: - One filter unit with max. 10 micron (absolute, sphere passing mesh) close to engine inlet.</p>
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(77)	<p>OUTLET - Pilot fuel oil</p> <p>- Normal operation condition: Returning to pilot fuel feed pump</p> <p>- Back pressure at engine outlet: max. 1.5 bar(g)</p>
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(49)	<p>INLET - Fuel oil</p> <p>(E) Fuel oil quality at engine inlet: according to specification in Marine Installation Manual (MIM)</p> <p>Pressure at engine inlet: stopped engine: 10 bar running engine: 7-10 bar</p> <p>Volume flow: according to GTD</p> <p>Viscosity: - Viscosity for HFO: 10-20 cSt (recommendation: 13-17 cSt) - Viscosity MDO/MGO: 2-20 cSt</p> <p>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)</p> <p>Fuel change-over: - Max. temperature gradient during fuel change-over: 2 °C/min - Fuel amount on engine side: mentioned in table 1 on page 2. - Fuel amount on system side: According to project specific system layout.</p>
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(50)	<p>OUTLET - Fuel return</p> <p>(E) - Normal operation condition: Returning to mixing unit. - Fuel oil change over while engine not in service: returning to service tank.</p>
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(51)	<p>OUTLET - Drain rail-unit (dirty)</p> <p>(E) - Dirty fuel: Mixed drain (LO,FO) 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)</p>
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(52)	<p>OUTLET - Fuel return, pressureless (clean)</p> <p>(E) - This pressureless fuel return consists of the following 2 types of clean fuel, namely: <u>'Normal drainage'</u> Expected (design) fuel return from the fuel pump and injection control side during normal operation. <u>'Leakage'</u> Unexpected fuel return from an emergency situation only (e.g. high pressure pipe damage).</p> <p>- Clean fuel must be collected in a drain tank (or appropriate tank) by gravity free flow - Piping must be insulated and heated (50-95°C)</p>
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(59)	<p>INLET - Heating medium for fuel oil trace heating</p> <p>- Connected to steam or thermal oil supply</p>
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(60)	<p>OUTLET - Heating medium for fuel oil trace heating</p> <p>- Connected to condensate manifold or thermal oil return</p>
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1	001	PAAD222763	MIXING UNIT	DAAD0769%		0,001									
QTY	SEQ NO	Material ID	Material Name	Dimension, Occ	Standard or Drawing	Basic Material Material Standard	Weight GR./NET								
Free space for file						Q-Code XXXXXX Standard ISO; JIS	Main Drw.								
Modif.	B	EAAD090092	11.01.2019	C	EAAD090483	08.04.2019	D	EAAD090034	08.07.2019	E	EAAD091789	03.12.2019			
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date					
			Product 5-8X52DF	FUEL OIL SYSTEM HFO&MDO&MGO, ext. pilot FO supply Brennstoffsystem											
Units	mm kg	NX	Basic Material		Net Weight 0,001										
SURFACE PROTECTION SEE GROUP 0344			Made	20.03.2017	dk1021	DH.Kim	Scale	-	Size	A2	Page	1/3	Material ID	PAAD254068	
TOLERANCING PRINCIPLE ISO8015			Chkd	28.07.2017	wwa008	Wang	Design Group					Drawing ID	DAAD087390	Rev.	E
GENERAL TOLERANCES ACCORDING TO ISO2768-mK			Appd	28.07.2017	mhu019	Hug	9723								

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

Pos.	ENGINE CONNECTIONS *2) (E)
(49)	INLET - Fuel oil
(50)	OUTLET - Fuel return
(51)	OUTLET - Drain rail-unit (dirty)
(52)	OUTLET - Fuel return, pressureless (clean)
(53)	INLET - Heating medium for fuel oil trace heating
(60)	OUTLET - Heating medium for fuel oil trace heating

Number of cylinders		5	6	7	8
Main engine X52DF (R1 rated)	power (kW)	7450	8940	10430	11920
	speed (rpm)	105			

Proposal for dimensioning *4)

Mixing unit	volume (l)	acc. to separate drawing			
HFO settling tank	volume (m³)	12	14	16	16
HFO service tank	volume (m³)	12	14	16	16
MDO/MGO service tank	volume (m³)	12	14	16	16
MDO/MGO drain tank *11)	volume (m³)	1.2	1.4	1.6	1.6

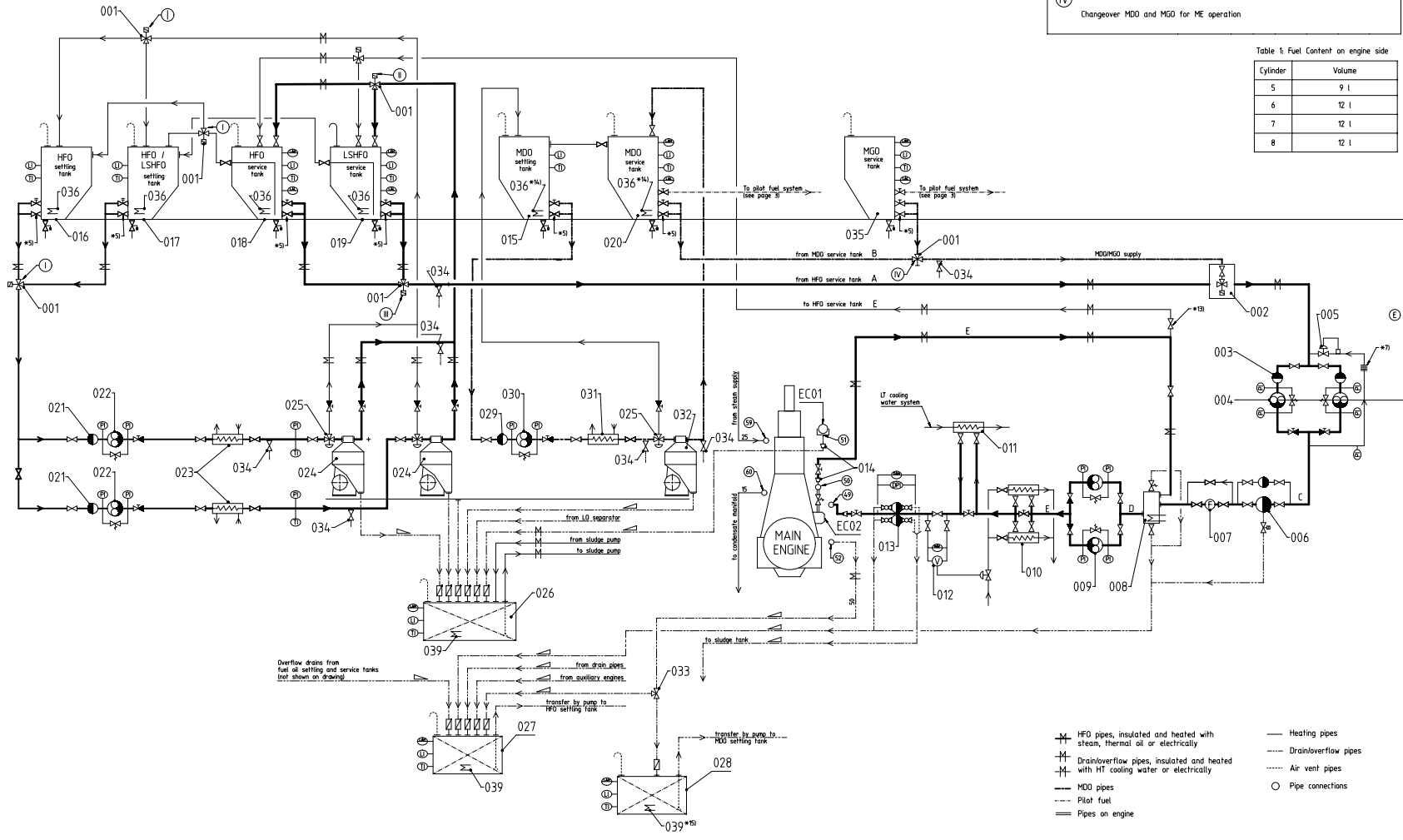
Nominal pipe diameter

A	DN	40	40	50	50
B	DN	32	32	32	32
C	DN	32	32	40	40
D	DN	50	65	65	65
E	DN	40	50	50	50

- 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

Table 1: Fuel Content on engine side

Cylinder	Volume
5	9 l
6	12 l
7	12 l
8	12 l



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 end-heater (E)
011	MDO/MGO heat exchanger (E)
012	Viscosimeter
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 drain tank *11) *12) (E)
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 (E)
- 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 "Fuel velocities and flow rates, recommended values for pipework of diesel plants". Rating specific flow rates are provided by GTU.
 - *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 normal drainage rate of MDO/MGO is significantly higher than the normal drainage rate of HFO. Therefore during long-term operation on MDO/MGO the collection of clean MDO/MGO in a separate drain tank is highly recommended. Regarding the tank size we recommend a volume which is approx. 10% of the volume of the MDO/MGO service tank. The design volume of the MDO/MGO drain tank considers a combination of normal drainage and unexpected emergency leakage.
 - *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 DMB is used. Target heating temperature: 40 °C.
 - *15) The location of pump's installation must comply with the supplier's requirements by considering the relative height between the pump and the service tank, in combination with the pressure drop of the piping.

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

Rev. no.	Rev. date	Rev. description	Rev. no.	Rev. date	Rev. description
1	2017.07.20	Issue for design	2	2017.07.20	Issue for design
2	2017.07.20	Issue for design	3	2017.07.20	Issue for design
3	2017.07.20	Issue for design	4	2017.07.20	Issue for design

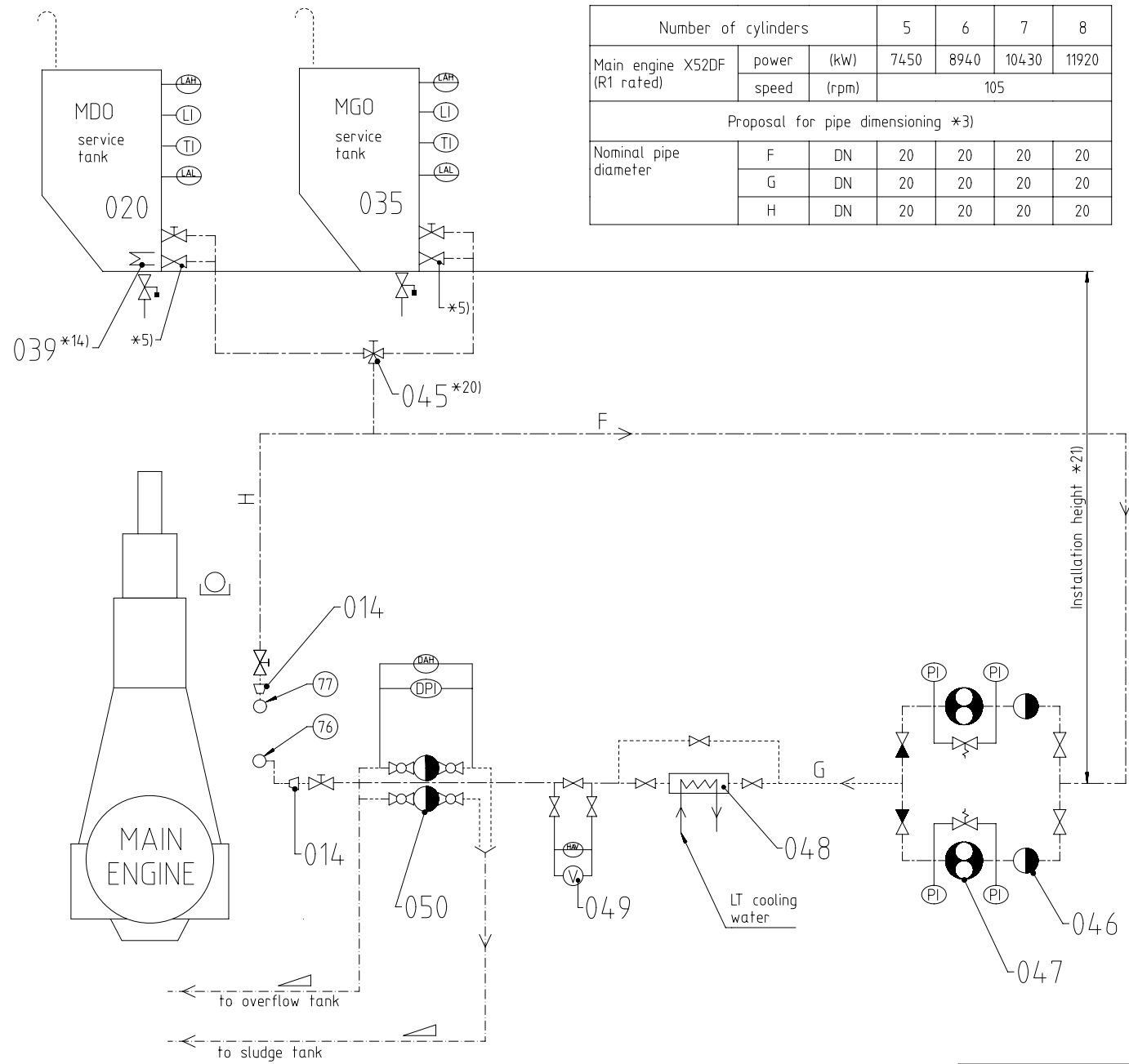
Project: FUEL OIL SYSTEM
 HFO&MDO&MGO, ext. pilot FO supply
 Brennstoffsystem

SYSTEM PROPOSAL - Pilot fuel supply

Pos.	ENGINE CONNECTIONS *2)
76	INLET - Pilot fuel
77	OUTLET - Pilot fuel

Pos.	SYSTEM COMPONENTS *1)
014	Transition Piece (adapter) *10)
020	MDO service tank
035	MGO service tank
039	Heating coil
045	Three way valve, pilot fuel supply, manually or remotely operated
046	Suction strainer (mesh size acc. to pump suppliers requirement)
047	Pilot fuel feed pump
048	Pilot fuel cooler and/or heater
049	Viscometer
050	Fuel oil filter, max. 10 micron (absolute, sphere passing mesh)

Number of cylinders		5	6	7	8	
Main engine X52DF (R1 rated)	power (kW)	7450	8940	10430	11920	
	speed (rpm)	105				
Proposal for pipe dimensioning *3)						
Nominal pipe diameter	F	DN	20	20	20	20
	G	DN	20	20	20	20
	H	DN	20	20	20	20



Remarks

- 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 supplier 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) All capacities and the given diameters are valid for the mentioned engine rating and serve just as an example. To make the layout for the project specific rating please refer to design group 9730 "Fluid velocities and flow rates, recommended values for pipework of diesel plants" Rating specific flow rates are provided by GTD.

*5) Valve to be kept closed during normal engine operation. For draining only.

*10) Installed as required (check with the "Pipe Connection Plan")

*14) A heating coil in the MDO tank is required when DMB is used. Target heating temperature: 40 °C.

*20) Just to be installed if different pilot fuel qualities are used to enable the changeover.

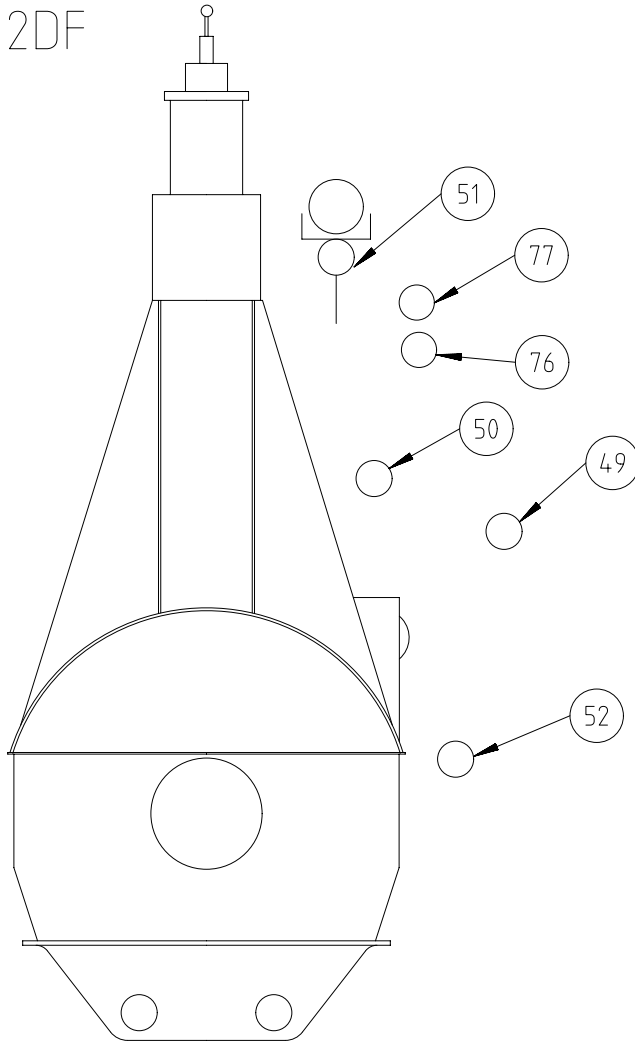
*21) The location of the pump's installation must comply with the supplier's requirements by considering the relative height between the pump and the service tank, in combination with the pressure drop of the piping.

Free space for lic.	Q-Code XXXXXX	Main Drw.
Standard ISO; JIS		
Modif. Number	Drawn date	Number
EAAD090092	11.01.2019	dk1021
EAAD090483	08.04.2019	DH.Kim
EAAD090034	08.07.2019	
EAAD091789	03.12.2019	
Product 5-8X52DF		
FUEL OIL SYSTEM HFO&MDO&MGO, ext. pilot FO supply Brennstoffsystem		
Units	mm kg	NX
Basic Material		Net Weight 0,001
SURFACE PROTECTION SEE GROUP 0344		Made 20.03.2017
TOLERANCING PRINCIPLE ISO8015		dk1021 DH.Kim
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Scale -
Appd 28.07.2017 mhu019 Hug		Size A2 Page 3/3
Design Group 9723		Material PAAD254068
Drawing ID DAAD087390		Rev. E

SPECIFICATION which must be met

- 76 INLET - Pilot fuel oil
 - Fuel quality, pressure and viscosity: same as the main fuel oil. (connection 49)
 - Volume flow: according to GTD.
- 77 OUTLET - Pilot fuel oil return
 - Normal operation condition: returning to FO supply pump suction.
 - Back pressure at ME outlet: max. 1.5 bar(g)

X52DF



- 49 INLET - Fuel oil
 - Fuel oil quality: MDO with sulphur content: $\leq 0.5\%$
AND
MGO with sulphur content: $\leq 0.1\%$
 - Pressure at engine inlet: stopped engine: 10 bar
running engine: 7-10 bar
 - Volume flow: according to GTD
 - Viscosity MDO/MGO: 2-17 cSt
 - Filtration:
 - Main fuel oil filter with max. 10 micron (absolute, sphere passing mesh) close to engine inlet.
 - 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 table 1 on page 2.
 - Fuel amount on system side: According to project specific system layout.
- 50 OUTLET - Fuel return
 - Normal operation condition: returning to upstream of the FO supply pump.
- 51 OUTLET - Drain rail-unit (dirty)
 - Dirty fuel: Mixed drain (LO,FO) from rail-unit, not for re-use
 - Free flow by gravity to sludge oil tank or appropriate tank.
- 52 OUTLET - Fuel return, pressureless (clean)
 - This pressureless fuel return consists of the following 2 types of clean fuel, namely:
 - 'Normal drainage'
Expected (design) fuel return from the fuel pump and injection control side during normal operation.
 - 'Leakage'
Unexpected fuel return from an emergency situation only (e.g. high pressure pipe damage).
 - Clean fuel must be collected in a drain tank (or appropriate tank) by gravity free flow
 - Piping must be insulated and heated (50-95°C)

Free space for lic.								Q-Code XXXXXX	Main Drw.			
								Standard ISO; JIS				
Modif.	A	EAAD089573	01.10.2018	B	EAAD090483	08.04.2019	C	EAAD090034	08.07.2019	D	EAAD091789	02.12.2019
		Number	Drawn date		Number	Drawn date		Number	Drawn date		Number	Drawn date
		Product 5-8X52DF		FUEL OIL SYSTEM MDO&MGO only, int. pilot FO supply Brennstoffsystem								
Units	mm kg	NX				Basic Material			Net Weight 0,001			
SURFACE PROTECTION SEE GROUP 0344		Made	16.11.2017 mhu019 M.Hug		Scale	-		Size	A3	Page	1/2	
TOLERANCING PRINCIPLE ISO8015		Chkd	21.12.2017 wwa008 Wang		Design Group		7723		Material ID		PAAD276380	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	21.12.2017 dst009 Strödecke		Drawing ID		DAAD092985		Rev.		D	

UID - DIMENSIONAL DRAWING - Confidential

SYSTEM PROPOSAL - Combined main fuel oil and pilot fuel supply + MDO treatment

Pos.	ENGINE COMPONENTS *3)
EC01	Fuel supply unit
EC02	Fuel rail unit
EC03	Pressure retaining valve
EC04	Pilot fuel supply unit
EC05	Pressure reduction valve

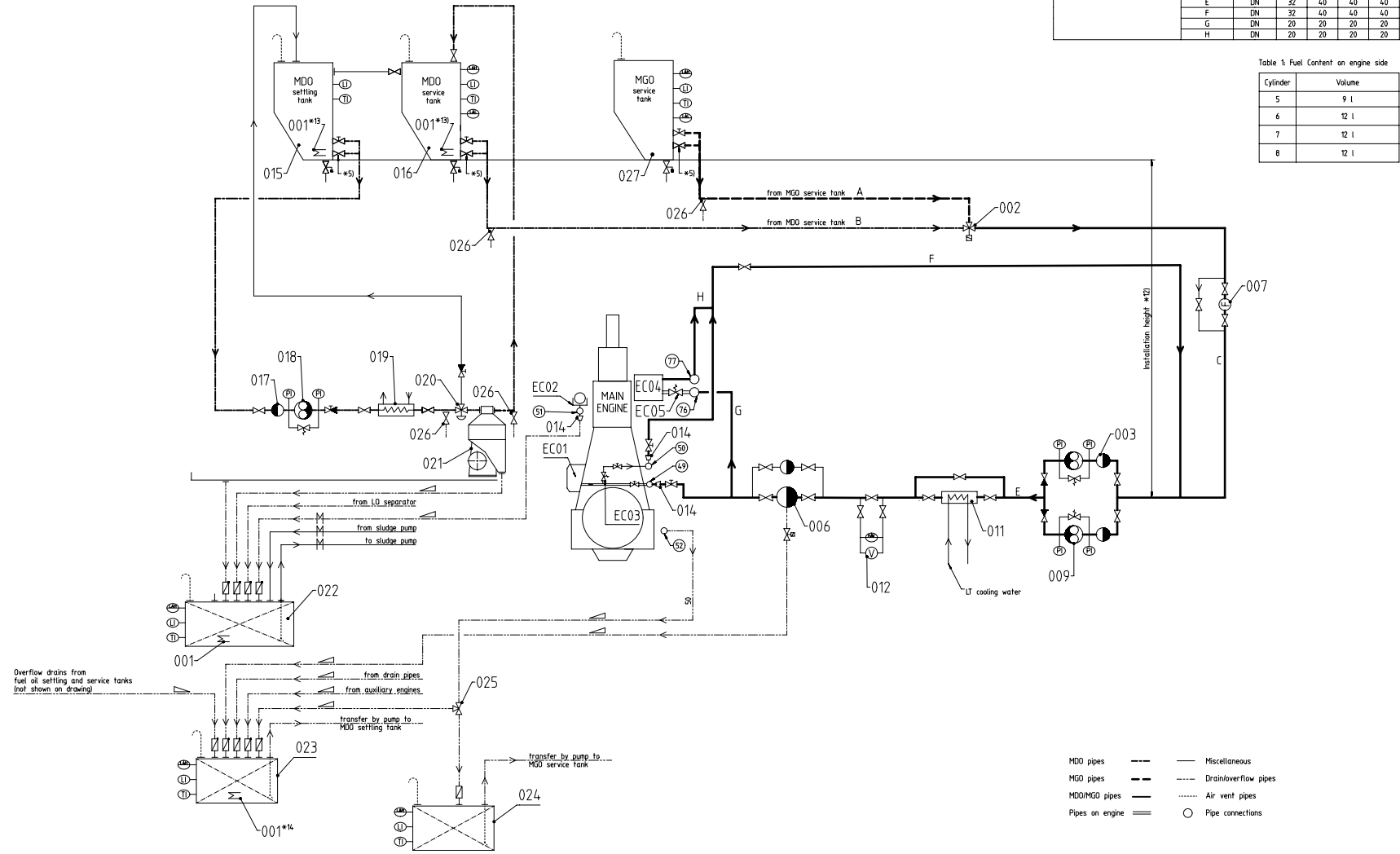
Pos.	ENGINE CONNECTIONS *2)
(49)	INLET - Fuel oil
(50)	OUTLET - Fuel return
(51)	OUTLET - Drain rail-unit (dirty)
(52)	OUTLET - Fuel return, pressureless (clean)
(76)	INLET - Pilot fuel oil
(77)	OUTLET - Pilot fuel oil return

Pos.	SYSTEM COMPONENTS *1)
001	Heating coil
002	Change-over valve
003	Suction strainer (mesh size according to pump suppliers requirement)
006	Automatic self-cleaning filter, 10 micron (absolute sphere passing mesh size)
007	Flowmeter
009	FO supply pump
011	MDO/MGO heat exchanger (1)
012	Viscometer
014	Transition piece (adapter) *10)
015	MDO settling tank, heated and insulated
016	MDO service tank
017	Suction strainer (mesh size acc. to pump suppliers requirement)
018	MDO separator supply pump, with safety valve
019	MDO pre-heater
020	Three-way valve, diaphragm operated
021	Self-cleaning MDO separator *6)
022	Sludge tank
023	Fuel oil drain tank *1)
024	MGO clean leakage tank *11)
025	Three-way valve for switching between fuel drain tank and MDO/MGO clean leakage tank *9)
026	Fuel sampling cock *8)
027	MGO service tank

Number of cylinders		5	6	7	8
Main engine X52DF (R1 rated)	power (kW)	7450	894.0	104.30	11920
	speed (rpm)	105			
Proposal for dimensioning *4)					
Mixing unit	volume (l)	acc. to separate drawing			
MDO/MGO service tank	volume (m³)	12	14	16	16
MDO/MGO drain tank	volume (m³)	12	14	16	16
Nominal pipe diameter	A	DN 40	40	40	50
	B	DN 40	40	40	50
	C	DN 40	40	40	50
	E	DN 32	40	40	40
	F	DN 32	40	40	40
	G	DN 20	20	20	20
	H	DN 20	20	20	20
	H	DN 20	20	20	20

Table 1: Fuel Content on engine side

Cylinder	Volume
5	9 l
6	12 l
7	12 l
8	12 l



- Remarks
- 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 pipework of steel plants. Rating specific flow rates are provided by GTO.
 - *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.
 - *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 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 tank inlet only to be equipped with a swing check valve to avoid inadmissible backpressure.
 - *12) The location of the pump's installation must comply with the supplier's requirements by considering the relative height between the pump and the service tank, in combination with the pressure drop of the piping.
 - *13) A heating coil in the MDO tank is required when DMB is used. Target heating temperature: 40 °C.

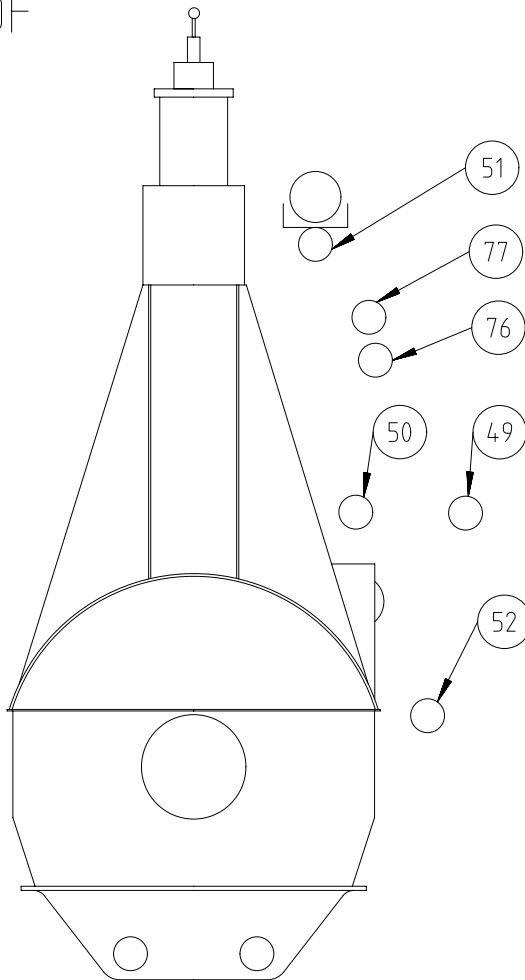
- MDO pipes - - - - - Miscellaneous
- MGO pipes - - - - - Drain/overflow pipes
- MDO/MGO pipes - - - - - Air vent pipes
- Pipes on engine - - - - - Pipe connections

Overflow drains from fuel oil settling and service tanks (not shown on drawing)

WIND Manufacturer and Dealer		S-X52DF FUEL OIL SYSTEM MDO&MGO only, int. pilot FO supply Brennstoffsystem	
Date: 16.11.2017 Drawn: 1/22 Checked: 1/22 Design Group: PAAD276380	Date: 16.11.2017 Drawn: 1/22 Checked: 1/22 Design Group: PAAD092985	Date: 16.11.2017 Drawn: 1/22 Checked: 1/22 Design Group: PAAD092985	Date: 16.11.2017 Drawn: 1/22 Checked: 1/22 Design Group: PAAD092985

SPECIFICATION which must be met

X52DF



- 76 INLET - Pilot fuel oil
 - Fuel quality, pressure, and viscosity: same as specified for the main fuel oil (connection 49)
 - Volume flow: according to GTD.
- 77 OUTLET - Pilot fuel oil return
 - Normal operation condition: returning to FO supply pump suction.
 - Back pressure at ME outlet: max. 1.5 bar(g).

- 49 INLET - Fuel oil
 - Fuel oil quality: MGO
 - Sulphur content: $\leq 0.1\%$
 - Pressure at engine inlet: stopped engine: 10 bar
running engine: 7-10 bar
 - Volume flow: according to GTD
 - Viscosity MGO: 2-17 cSt
 - Filtration:
 - Main fuel oil filter with max. 10 micron (absolute, sphere passing mesh) close to engine inlet.
 - Bypass filter in parallel to the main fuel oil filter with max. 25 micron (absolute, sphere passing mesh).
- 50 OUTLET - Fuel return
 - Normal operation condition: Returning to service tank.
 - Back pressure related to the static height of the service tank to ME outlet: max. 1.8 bar(g)
- 51 OUTLET - Drain rail-unit (dirty)
 - Dirty fuel: Mixed drain (LO,FO) from rail-unit, not for re-use
 - Free flow by gravity to sludge oil tank or appropriate tank.
- 52 OUTLET - Fuel return, pressureless (clean)
 - This pressureless fuel return consists of the following 2 types of clean fuel, namely:
 - 'Normal drainage'
 - Expected (design) fuel return from the fuel pump and injection control side during normal operation.
 - 'Leakage'
 - Unexpected fuel return from an emergency situation only (e.g. high pressure pipe damage).
 - Clean fuel must be collected in a drain tank (or appropriate tank) by gravity free flow
 - Piping must be insulated and heated (50-95°C)

Free space for lic.	Q-Code XXXXXX						Main Drw.							
	Standard ISO; JIS													
Modif.	A	EAAD089573	01.10.2018	B	EAAD090034	08.07.2019	C	EAAD091789	02.12.2019					
		Number	Drawn date		Number	Drawn date		Number	Drawn date	Number	Drawn date			
		Product 5-8X52DF		FUEL OIL SYSTEM MGO only, int. pilot FO supply Brennstoffsystem										
Units	mm kg	NX		Basic Material		Net Weight 0,001								
SURFACE PROTECTION SEE GROUP 0344		Made	16.11.2017 mhu019 M.Hug		Scale	-		Size	A3	Page	1/2	Material ID	PAAD279937	
TOLERANCING PRINCIPLE ISO8015		Chkd	21.12.2017 wwa008 Wang		Design Group		9723		Drawing ID		DAAD094617		Rev.	C
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	21.12.2017 dst009 Strödecke											

UID - DIMENSIONAL DRAWING - Confidential

SYSTEM PROPOSAL - Combined main fuel oil and pilot fuel supply (for operation on MGO only)

Pos.	Engine Components *3)
EC01	Fuel supply unit
EC02	Fuel rail unit
EC03	Pressure retaining valve
EC04	Pilot fuel supply unit
EC05	Pressure reduction valve

Pos.	System Components *2)
001	Suction strainer (mesh size according to pump suppliers requirement)
002	Supply pump
004	Flowmeter
005	MGO heat exchanger (C)
006	Viscometer
007	Automatic self-cleaning filter, 10 micron (absolute sphere passing mesh size)
008	Fuel oil sampling cock *8)
009	Transition piece (adapter) *7)
010	Fuel drain tank
011	Sludge tank
012	MGO service tank

Pos.	Engine Connections *1) (C)
(49)	INLET - Fuel oil
(50)	OUTLET - Fuel return
(51)	OUTLET - Drain rail-unit (dirty)
(52)	OUTLET - Fuel return, pressureless (clean)
(76)	INLET - Pilot fuel oil
(77)	OUTLET - Pilot fuel oil return

Remarks:

- Air vent and drain pipes must be fully functional at all inclination angles of the ship of which the engine must be operational.
- Overflow and drain pipes for fuel oil tanks are not shown

*1) Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connections.

*2) To be delivered by external supplier and to be installed by the shipyard.

*3) To be delivered by the engine builder, 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. To make the layout in regard to the project specific rating please refer to design group 9730 "Fluid velocities and flow rates, recommended values for pipework of diesel plants" for selecting the appropriate pipe diameter. Rating specific flow rates are provided by GTD.

*6) To be kept closed during normal engine operation. For draining only.

*7) Installed as required (check with the "Pipe Connection Plan")

*8) Recommended position for fuel oil sampling to check fuel oil quality.

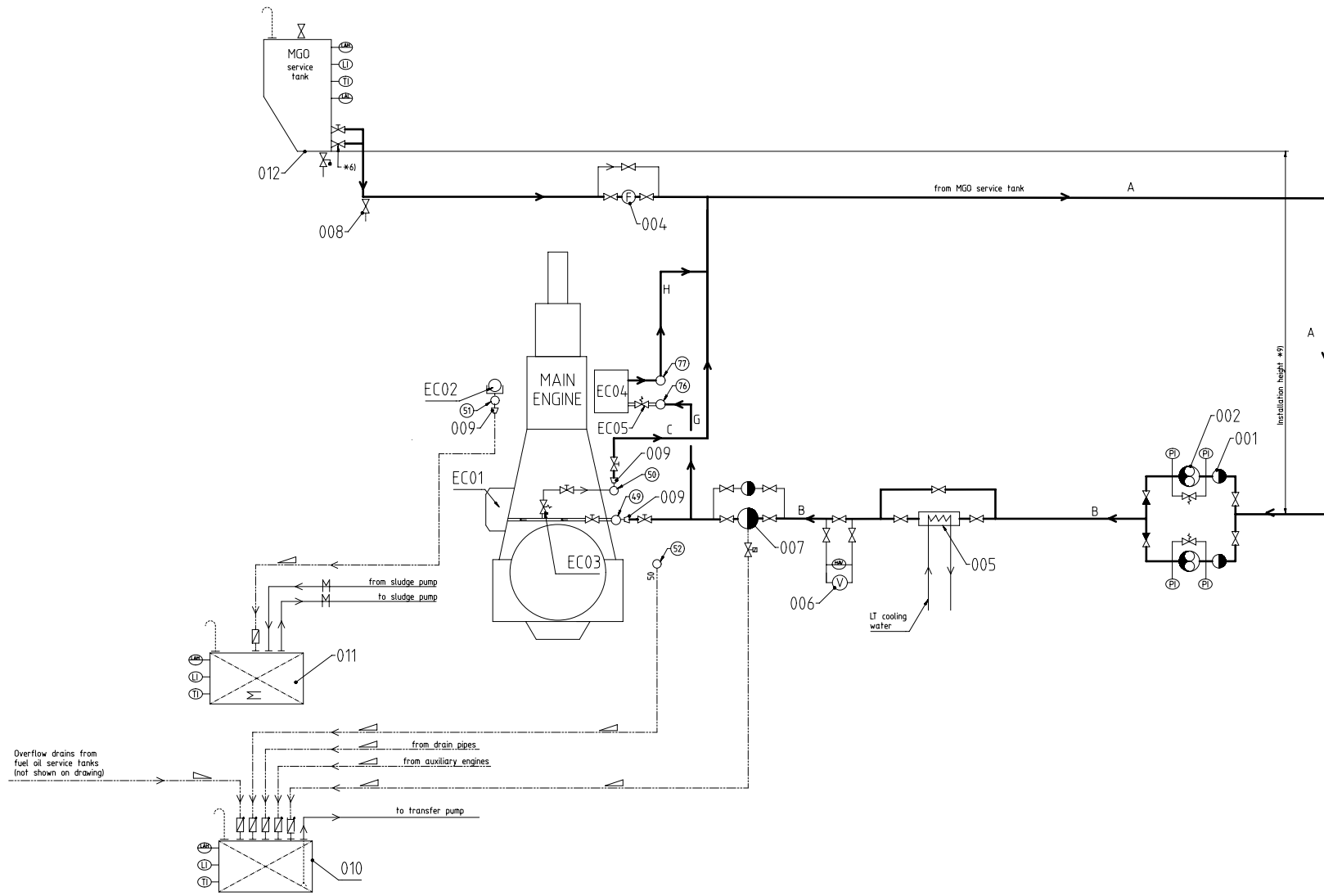
*9) The location of the pump's installation must comply with the supplier's requirements by considering the relative height between the pump and the service tank, in combination with the pressure drop of the piping.

Number of cylinders		5	6	7	8
Main engine X52DF (R1 rated)	power (kW)	7450	8940	10430	11920
	speed (rpm)	105			

Proposal for dimensioning *4)

MGO service tank	volume (m³)	12	14	16	16
MGO drain tank	volume (m³)	1.2	1.4	1.6	1.6

Nominal pipe diameter	A	B	C	G	H
DN	4.0	4.0	4.0	4.0	5.0
DN	32	4.0	4.0	4.0	4.0
DN	20	20	20	20	20
DN	20	20	20	20	20

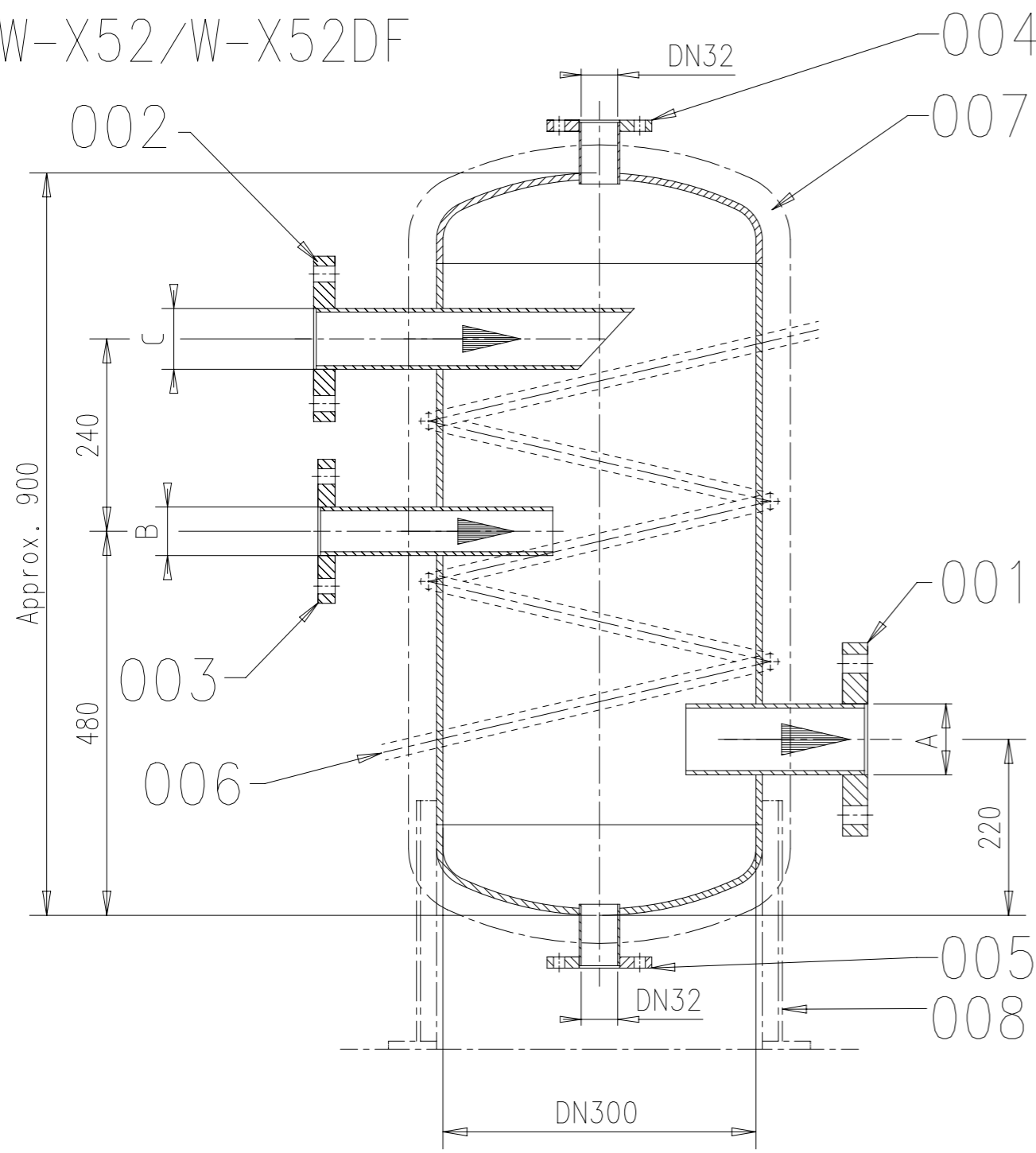


Legend:

- MGO pipes
- Pipes on engine
- Drain / overflow pipes
- Air vent pipes
- Pipe connections

SURNAME PROTECTION SEE GROUP 004 TOLERANCE PRINCIPLE SCHEM SPECIAL TOLERANCES ACCORDING TO DIN EN ISO 2768-MS		Date: 15.11.2017 Drawn: mh/19 Checked: mh/19 Design Group: 9723		Scale: 1/2 Sheet: 01 Total Sheets: 01 Title: FUEL OIL SYSTEM MGO only, int. pilot FO supply Brennstoffsystem	
WINGD Manufacturer and Supplier		S-BX52DF Manufacturer and Supplier		PAAD279937 DAAD094617	

W-X52/W-X52DF



Nominal pipe diameters (DN)

No. of cyl.	A	B	C
	DN	DN	DN
4	50	32	50
5	50	40	50
6	50	40	50
7	50	40	50
8	65	50	65

*2)

Capacity: 65 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)

(A)

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.
- *2) Shown on drawing.

Free space for ltr.	Q-Code XXXXXX		Main Drw.
	Standard ISO; JIS		

Modif.	(A)	EAAD087849	14.06.2017						
		Number	Drawn date			Number	Drawn date		



Winterthur Gas & Diesel

Product
W-52

MIXING UNIT
TO FUEL OIL SYSTEM

Units	mm kg	NX	Basic Material	Net Weight 0.001
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SURFACE PROTECTION SEE GROUP 0344		Scale	-	Size	A3	Page	1/1	Material ID	PAAD222763
TOLERANCING PRINCIPLE ISO8015		Chkd	30.03.2016	mhu019 Hug		Design Group		9723	Drawing ID
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	30.03.2016	dst009 Strödecke		DAAD076916			

Approved
DID - DIMENSIONAL DRAWING - Confidential

MIDS - WinGD X52DF - FUEL-OIL-SYSTEM (DG9723)

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2017-08-07	DRAWING SET	First web upload
2017-12-22	DAAD087882 DAAD087390 DAAD092985 DAAD094617	Main drg - new revision System drg - new revision (HFO&MDO&MGO) System drg - new drawing (MDO&MGO only) System drg - new drawing (MGO only)
2018-10-01	DAAD092985 DAAD094617	System drg - new revision (MDO&MGO only) System drg - new revision (MGO only)
2019-01-15	DAAD087390	System drg - new revision
2019-04-10	DAAD087390 DAAD092985	System drgs - new revision
2019-07-09	DAAD087390 DAAD092985 DAAD094617	System drg - new revision (HFO&MDO&MGO) System drg - new drawing (MDO&MGO only) System drg - new drawing (MGO only)
2019-09-18	DAAD087882	Main drg - new revision
2020-09-30	DAAD087390 DAAD092985 DAAD094617	System drgs - new revision

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