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

Net Weight 0,001			SEQ NO	Material ID	Material Name / Dimension, Occ	Standard or Drawing	Basic Material / Material Standard	Weight GR./NET
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	PAAD332690	FUEL OIL SYSTEM MGO only, int. pilot fuel supply	DAAD118454		0,001
-	1	-	002	PAAD332689	FUEL OIL SYSTEM MDO&MGO only, int. pilot fuel supply	DAAD118453		0,001
1	-	-	001	PAAD332670	FUEL OIL SYSTEM HFO&MDO&MGO	DAAD118445		0,001

Quantity PER ENGINE

Material ID		
PAAD332693	PAAD332692	PAAD332691

Free space for lic.

Q-Code: XXXXX

Standard: ISO; JIS

Main Drw.: H

Modif.	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date

WIN GD Winterthur Gas & Diesel

Product: W5-8X40DF

FUEL OIL SYSTEM

Brennstoffsystem

Units	mm kg	NX	Basic Material	Net Weight

SURFACE PROTECTION SEE GROUP 0344	Made	04.07.2019 Sudant Deogade	Scale -	Size A3	Page 1/1	Material ID
TOLERANCING PRINCIPLE ISO8015	Chkd	06.09.2019 cku010 Claudio	Design Group 9723	Drawing ID DAAD118455		Rev. -
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	06.09.2019 mhu019 Hug				

Approved

DID - DIMENSIONAL DRAWING - Confidential

SPECIFICATION which must be met

(76)

INLET - Pilot fuel oil
Fuel oil quality at engine inlet: MDO or MGO

Pressure at engine inlet: 7.0-9.5 bar

Volume flow: according to GTD

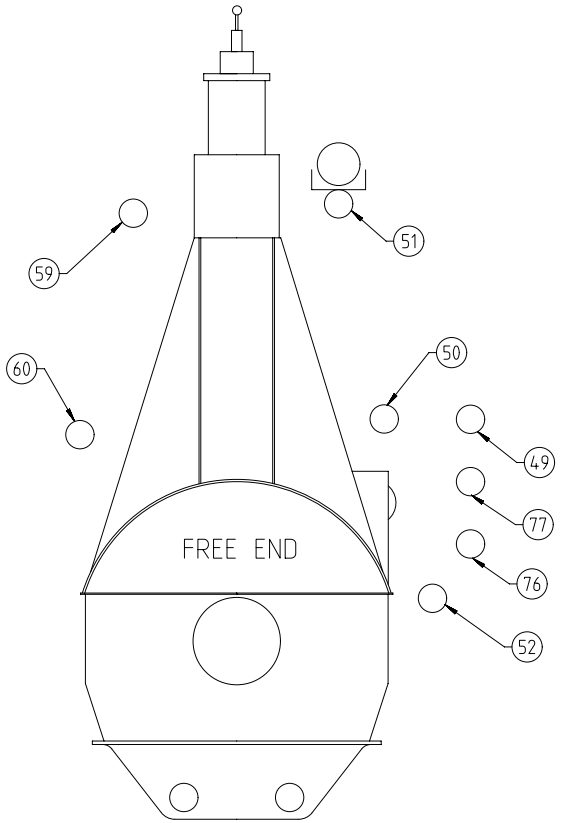
Viscosity:
- Viscosity MDO/MGO: 2-17 cSt

Filtration:
- One filter unit with max. 10 micron (absolute, sphere passing mesh) close to engine inlet.

(77)

OUTLET - Pilot fuel oil
- Normal operation condition: Returning to feed pump.
- Back pressure at engine outlet: max. 1.5 bar(g)

X40DF



(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 table 1 on page 2.
- Fuel amount on system side: According to project specific system layout.

(50) (A)

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

(51) (A)

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.
- Pipe insulated and heated up (50-95 °C)

(52) (A)

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)

(59)

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

(60)

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

1	008	PAAD059949	MIXING UNIT		DAAD020383		0,001
QTY	SEQ NO	Material ID	Material Name / Dimension, Occ		Standard or Drawing	Basic Material / Material Standard	Weight GR/NET

Free space for lic.

Q-Code: XXXXX
Standard: ISO; JIS
Main Drw.

Modif.										
	A	EAAD091789	02.12.2019							
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date

WIN GD Winterthur Gas & Diesel

Product: 5-8X40DF

FUEL OIL SYSTEM
HFO&MDO&MGO
Brennstoffsystem

Units	mm kg	NX	Basic Material	Net Weight 0,001

SURFACE PROTECTION SEE GROUP 0344	Made	03.07.2019	Sudant Deogade	Scale -	Size A2 / Page 1/3	Material ID PAAD332670
TOLERANCING PRINCIPLE ISO8015	Chkd	06.09.2019	cku010 Claudio	Design Group 9723	Drawing ID DAAD118445	Rev. A
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	06.09.2019	mhu019 Hug			

Approved

DID - DIMENSIONAL DRAWING - Confidential

SYSTEM PROPOSAL - Main fuel oil supply and fuel oil treatment

Pos.	ENGINE COMPONENTS *3)
EC01	Fuel rail unit
EC02	Fuel supply unit
EC03	Pressure reduction valve

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 & LSFO 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
5	3 l
6	3 l
7	3 l
8	3 l

Pos.	ENGINE CONNECTIONS *2)
49	INLET - Fuel oil
50	OUTLET - Fuel return
51	OUTLET - Drain rail-unit (dirty)
52	OUTLET - Fuel return, pressureless (clean)
59	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 X40DF (R1)	power	(kW)	4675	5610	6545	7480
	speed	(rpm)	146			
Proposal for dimensioning *4)						
Mixing unit	volume	(l)	acc. to separate drawing			
HFO settling tank	volume	(m^3)	7	9	10	11
HFO service tank	volume	(m^3)	7	9	10	11
MDO/MGO service tank	volume	(m^3)	7	9	10	11
MDO/MGO drain tank *11)	volume	(m^3)	0.7	0.9	1	1.1
Nominal pipe diameter	A	DN	32	32	32	40
	B	DN	32	32	32	32
	C	DN	32	32	40	40
	D	DN	32	32	40	40
	E	DN	32	32	32	40

(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 end-heater (A)
011	MDO/MGO heat exchanger (A)
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 drain tank *11) *12) (A)
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 (A)

- All heaters to be fitted with thermometers, relief valves, drains and drip trays. Not shown on drawing.
- Steam tracers 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 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.

*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").

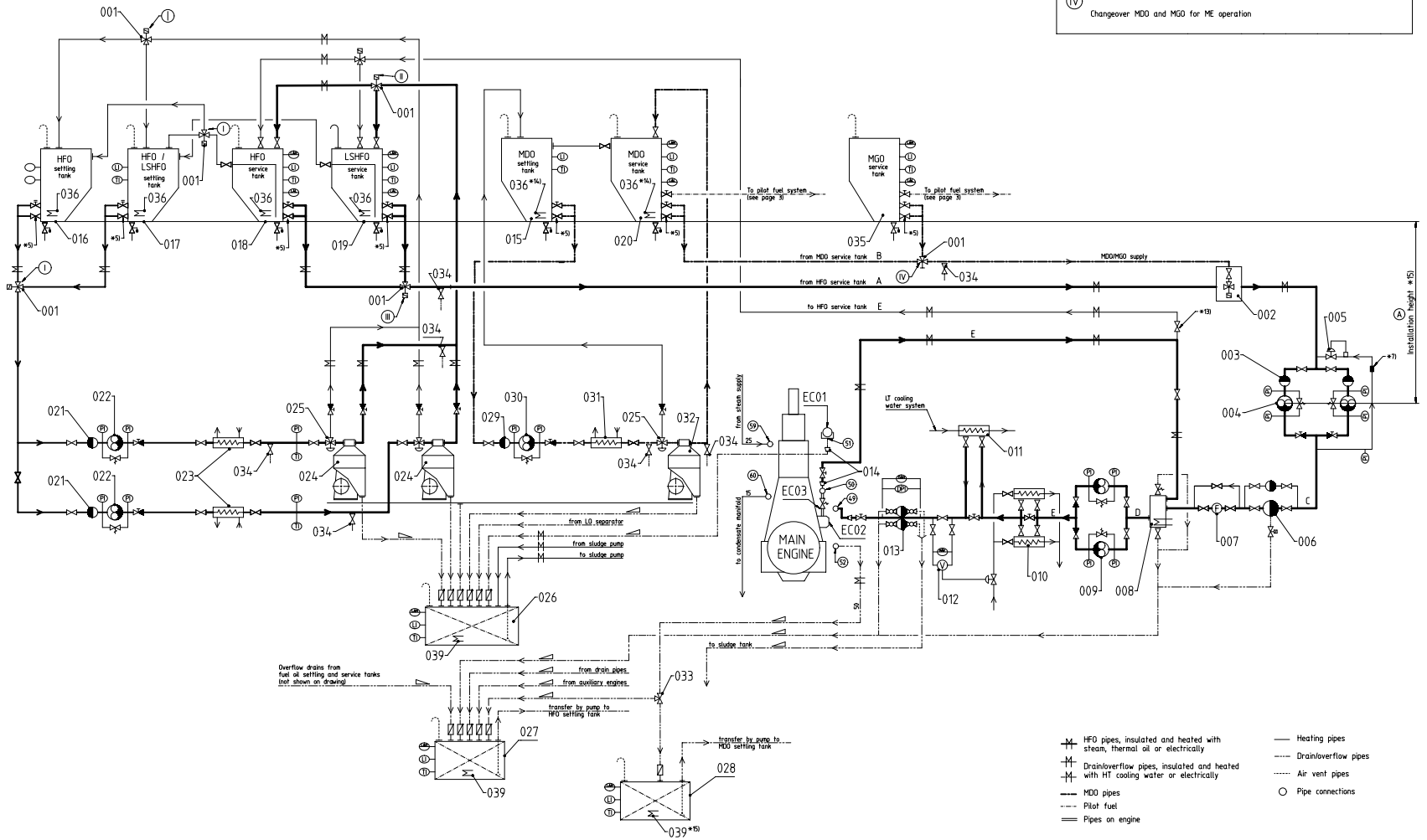
11) The normal drainage rate of MDO/MGO is significantly higher than the normal drainage rate of HFO. Therefore during long-term operation on MDO/MGO the collection of clean MDO/MGO in a separate drain tank is highly recommended. Regarding the tank size we recommend a volume which is approx. 10% of the 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

Drain/overflow pipes, insulated and heated with HT cooling water or electrically

MDO pipes

Pilot fuel

Pipes on engine

Heating pipes

Drain/overflow pipes

Air vent pipes

Pipe connections

Rev.	Rev. description	By	Date	Number	Drawn	Date	Number
A	KAADBYTMH		02.12.2019				

G-Code: XXXXX
Standard: ISO, JIS
Main Drv.

Product: 5-8X40DF

FUEL OIL SYSTEM HFO&MDO&MGO
Brennstoffsystem

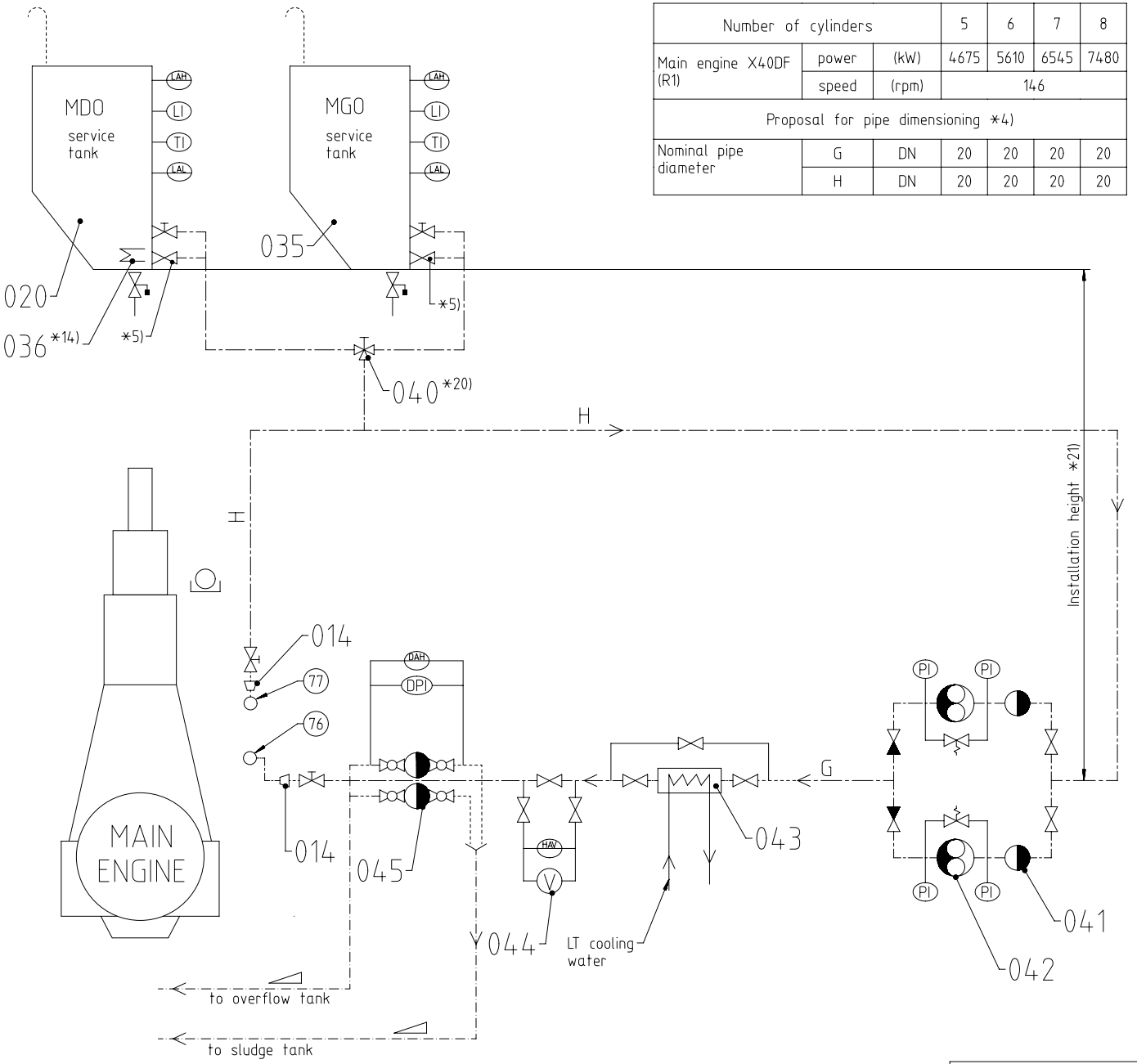
Units	mm kg	NX	Basic Material:			Net weight 0,001	
SURFACE PROTECTION SEE GROUP 9344	Made	03.07.2019	Sudant Deogade	Scale	-	Size	A0
TOLERANCING PRINCIPLE ISO8015	Chkd	06.09.2019	ckls010 Claudio	Design Group	9723	Page	2/3
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	06.09.2019	mtls019 Haig	Drawing ID	DAAD118445	Material ID	PAAD332670
						Rev.	A

SYSTEM PROPOSAL - Pilot fuel supply

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

Number of cylinders			5	6	7	8
Main engine X40DF (R1)	power	(kW)	4675	5610	6545	7480
	speed	(rpm)	146			
Proposal for pipe dimensioning *4)						
Nominal pipe diameter	G	DN	20	20	20	20
	H	DN	20	20	20	20

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



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 deliverd 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.

*4) 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 pipewor 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 depending on the fuel in use.

*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.

Approved

Free space for lic.		Q-Code XXXXX	Main Drw.
		Standard ISO; JIS	

Modif.	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
A	EAAD091789	02.12.2019						

WIN GD Winterthur Gas & Diesel

Product 5-8X40DF

FUEL OIL SYSTEM
HFO&MDO&MGO
Brennstoffsystem

Units	mm kg	NX	Basic Material	Net Weight 0,001

SURFACE PROTECTION SEE GROUP 0344	Made	03.07.2019 Sudant Deogade	Scale -	Size A2	Page 3/3	Material ID PAAD332670
TOLERANCING PRINCIPLE ISO8015	Chkd	06.09.2019 cku010 Claudio	Design Group 9723	Drawing ID DAAD118445		Rev. A
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	06.09.2019 mhu019 Hug				

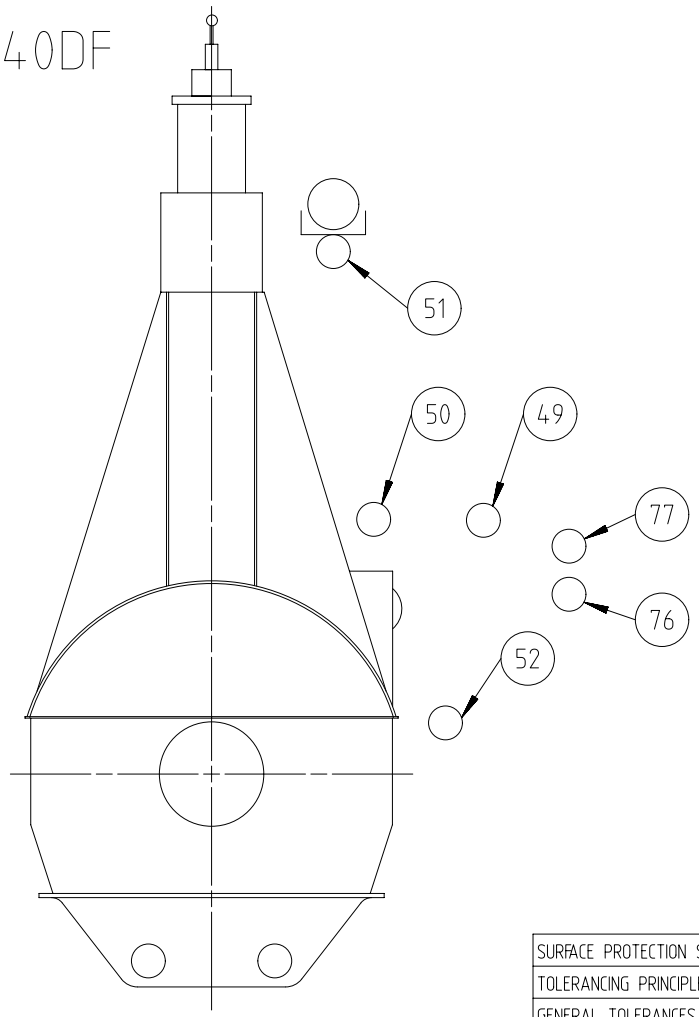
DID - DIMENSIONAL DRAWING - Confidential

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)

X40DF



(49) (A) INLET - Fuel oil

Fuel oil quality: MDO with sulphur content: ≤0.5 %
AND
MGO with sulphur content: ≤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) (A) OUTLET - Fuel return

- Normal operation condition: returning to upstream of the FO supply pump.

(51) (A) 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) (A) 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)

Approved

Free space for lic.

Q-Code XXXXX
Standard ISO; JIS
Main Drw.

Modif.	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
A	EAAD091789	02.12.2019						

WIN GD Winterthur Gas & Diesel

Product 5-8X40DF

FUEL OIL SYSTEM
MDO&MGO only, int. pilot FO supply
Brennstoffsystem
Hauptkreislauf

Units	mm kg	NX	Basic Material	Net Weight 0,001

SURFACE PROTECTION SEE GROUP 0344
TOLERANCING PRINCIPLE ISO8015
GENERAL TOLERANCES ACCORDING TO ISO2768-mK

Made	03.07.2019	Sudant Deogade	Scale -	Size A3	Page 1/2	Material ID PAAD332689
Chkd	06.09.2019	cku010 Claudio	Design Group 9723	Drawing ID DAAD118453		Rev. A
Appd	06.09.2019	mhu019 Hug				

DID - 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

Number of cylinders			5	6	7	8
Main engine X40DF (R1 rated)	power	(kW)	4675	5610	6545	7480
	speed	(rpm)	146			
Proposal for dimensioning *4)						
Mixing unit	volume	(l)	acc. to separate drawing			
MDO service tank	volume	(m³)	19	23	27	31
MGO service tank	volume	(m³)	19	23	27	31
MDO/MGO drain tank	volume	(m³)	1.9	2.3	2.7	3.1
Nominal pipe diameter	A	DN	32	32	32	40
	B	DN	32	32	32	32
	C	DN	32	32	32	32
	E	DN	32	32	40	40
	F	DN	32	32	32	40
	G	DN	20	20	20	20
	H	DN	20	20	20	20

Ⓐ

Table1: Fuel amount on engine side

Cylinder	Volume
5	3 l
6	3 l
7	3 l
8	3 l

Pos.	SYSTEM COMPONENTS *1)
001	Heating coil *13)
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 Ⓐ
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 *11)
024	MGO drain 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

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 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.

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

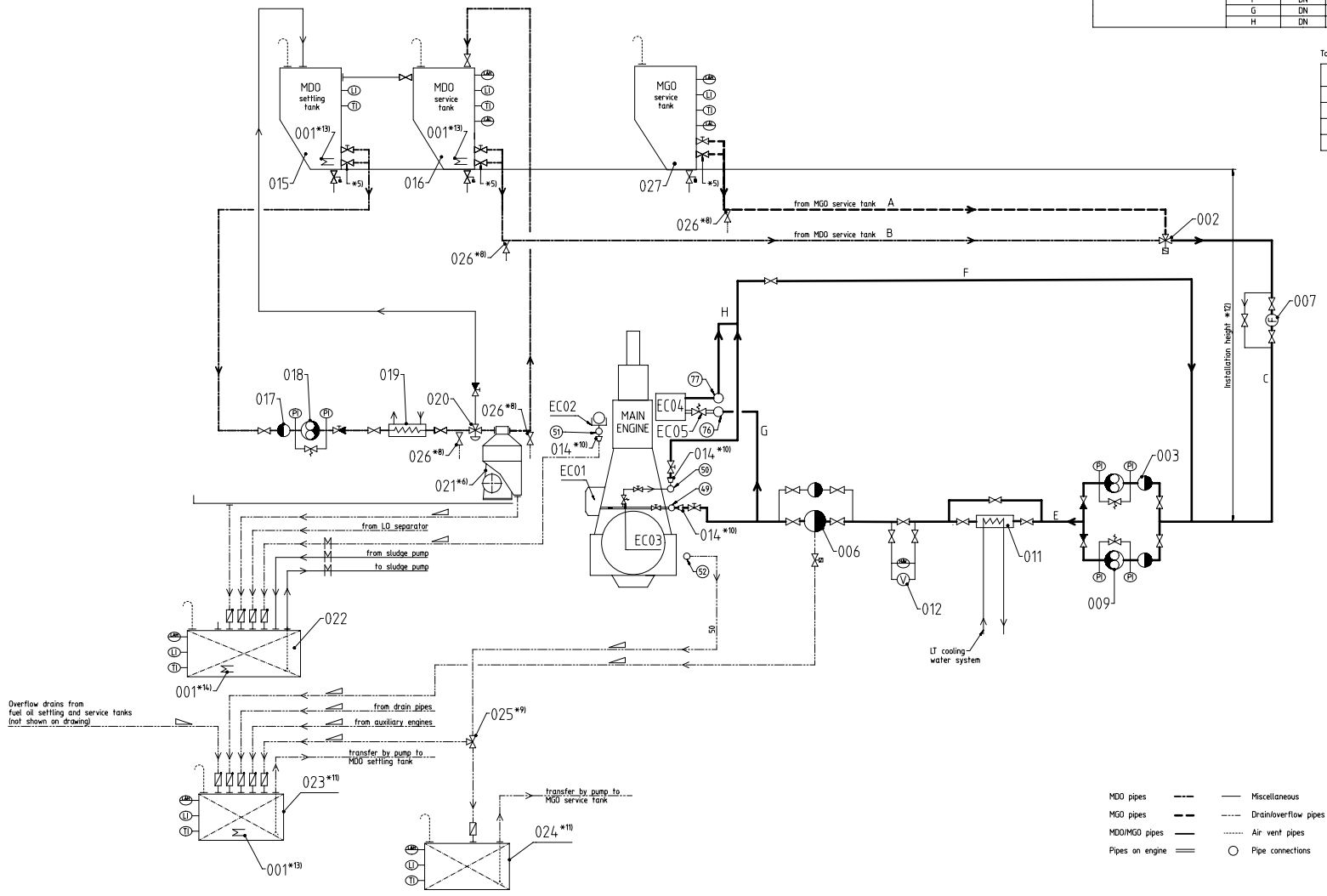
*9) Just to be applied if in addition to the fuel drain tank a separate tank for collection of clean MGO is installed to enable the switching between the different tanks depending on the fuel in use.

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

*11) The tank inlet only to be equipped with a swing check valve to avoid inadmissible backpressure.

*12) 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.

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



Rev. Index	Rev. Nr.					G-Code: XXXXX	Main Drw.
						Standard: ISO; JIS	
Appd	A	KAAD097MH	02.12.2019				
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date

Product: 5-8X40DF

FUEL OIL SYSTEM
MDO&MGO only, int. pilot FO supply
Brennstoffsystem
Hauptkreislauf

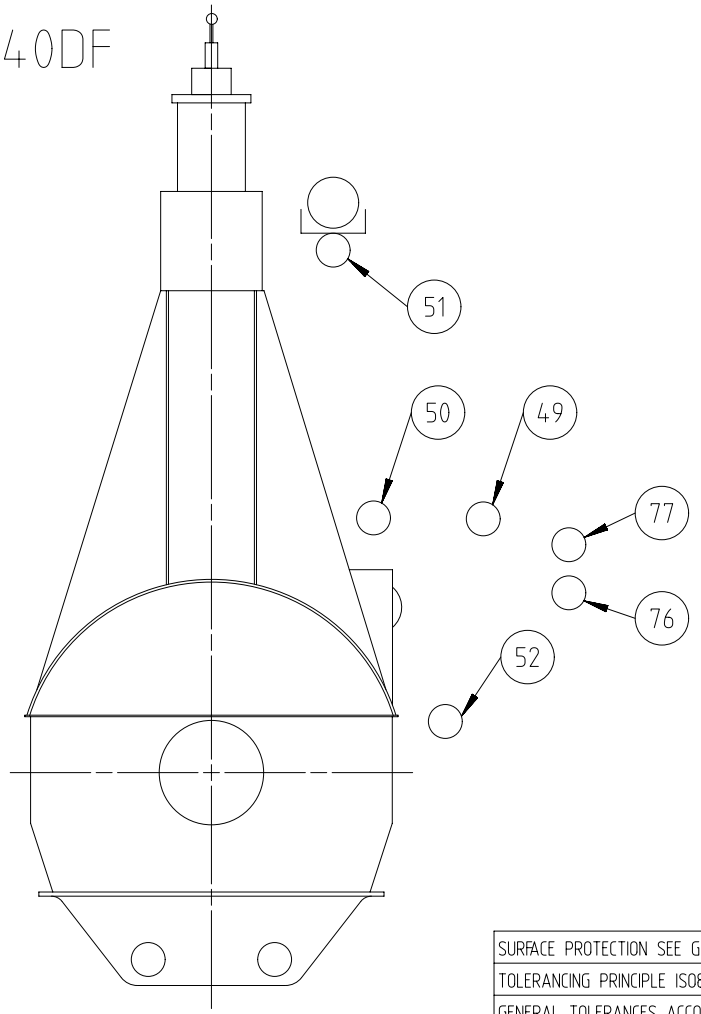
Units	mm kg	NX		Basic Material:		Net weight 0,001
SURFACE PROTECTION SEE GROUP 9344	Made	03.07.2019	Sudant Deogade	Scale -	Size A0	Page 2/2
TOLERANCING PRINCIPLE ISO8015	Chkd	06.09.2019	ctlu010 Claudio	Design Group 9723	Material ID	PAAD332689
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	06.09.2019	ctlu019 Haig	Drawing ID	DAAD118453	Rev. A

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)

X40DF



(49) (A) INLET - Fuel oil

Fuel oil quality: MDO with sulphur content: ≤0.5 %
AND
MGO with sulphur content: ≤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) (A) OUTLET - Fuel return

- Normal operation condition: returning to upstream of the FO supply pump.

(51) (A) 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) (A) 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)

Approved

Free space for lic.

Q-Code XXXXX
Standard ISO; JIS
Main Drw.

Modif.		Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
	A	EAAD091789	02.12.2019						

WIN GD Winterthur Gas & Diesel

Product 5-8X40DF

FUEL OIL SYSTEM
MGO only
Brennstoffsystem

Units	mm kg	NX	Basic Material	Net Weight 0,001

SURFACE PROTECTION SEE GROUP 0344
TOLERANCING PRINCIPLE ISO8015
GENERAL TOLERANCES ACCORDING TO ISO2768-mK

Made	04.07.2019	Sudant Deogade	Scale -	Size A3	Page 1/2	Material ID PAAD332690
Chkd	06.09.2019	cku010 Claudio	Design Group 9723	Drawing ID DAAD118454		Rev. A
Appd	06.09.2019	mhu019 Hug				

DID - 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 (A)
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	MGO drain tank
011	Sludge tank
012	MGO service tank

Pos.	Engine Connections *1) (A)
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 at 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 by 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.

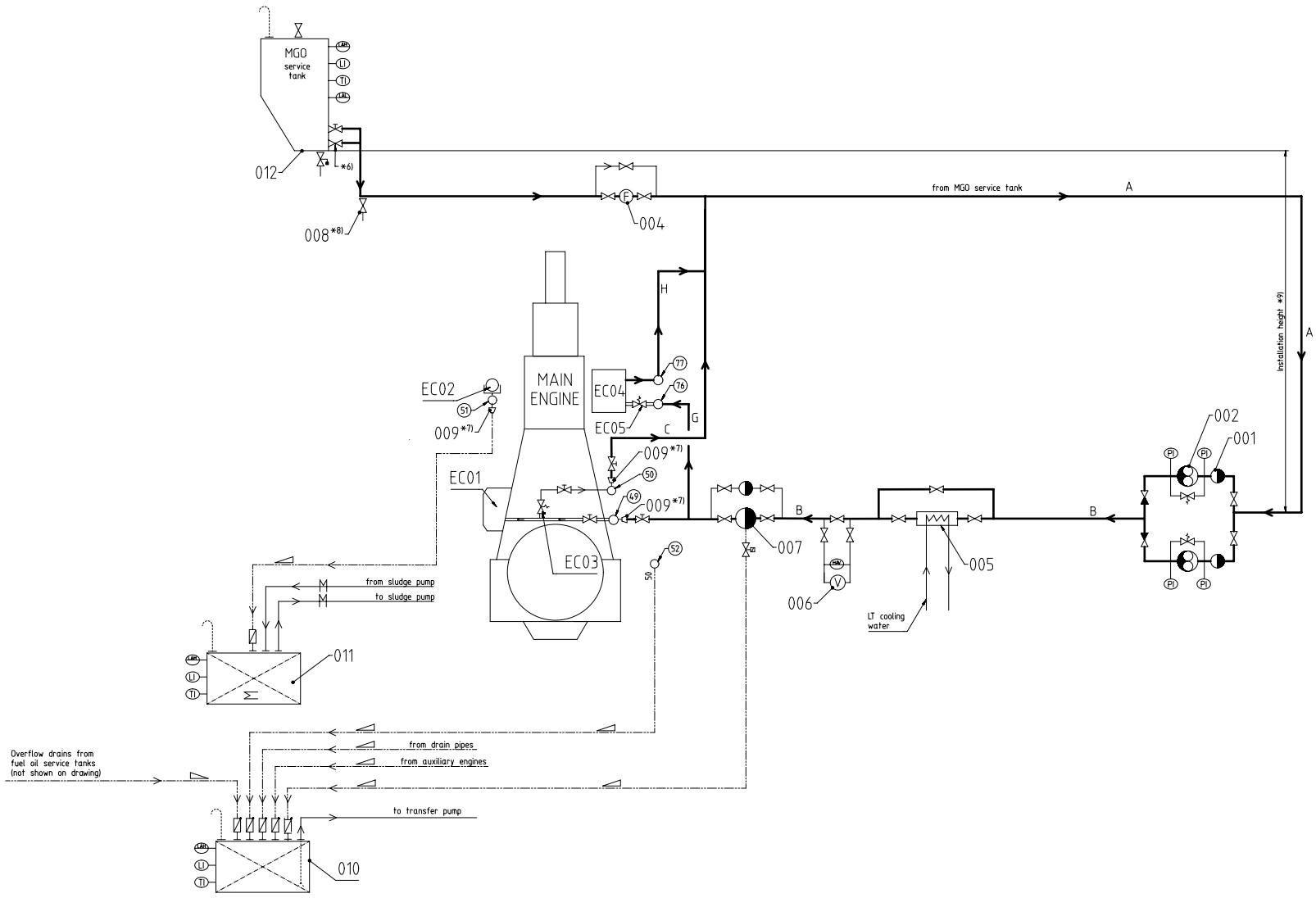
*6) To be kept closed during normal engine operation. For draining only.

*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 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 X40DF (R1 rated)	power	(kW)	4675	5610	6545	7480
	speed	(rpm)	146			
Proposal for dimensioning *4)						
MDO service tank	volume	(m^3)	19	23	27	31
(A) MDO drain tank	volume	(m^3)	1.9	2.3	2.7	3.1
Nominal pipe diameter	A	DN	32	32	32	32
	B	DN	32	32	32	32
	C	DN	32	32	40	40
	G	DN	20	20	20	20
	H	DN	20	20	20	20



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

Rev. reason							G-Code: XXXXX	Main Drw.
							Standard: ISO, JIS	
Mod.	A KAAD097089	02.12.2019						
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date

Product: S-8X40DF

FUEL OIL SYSTEM
MGO only
Brennstoffsystem

Units	mm kg	NX	Basic Material:			Net weight 0,001
Mode	04.07.2019	Sudant Deogade	Scale	-	Size A0	Page 2/2
Chkd	06.09.2019	ckls010 Claudio	Design Group	9723	Material ID	PAAD332690
Appd	06.09.2019	ntlu019 Hug	Drawing ID	DAAD118454	Rev.	A

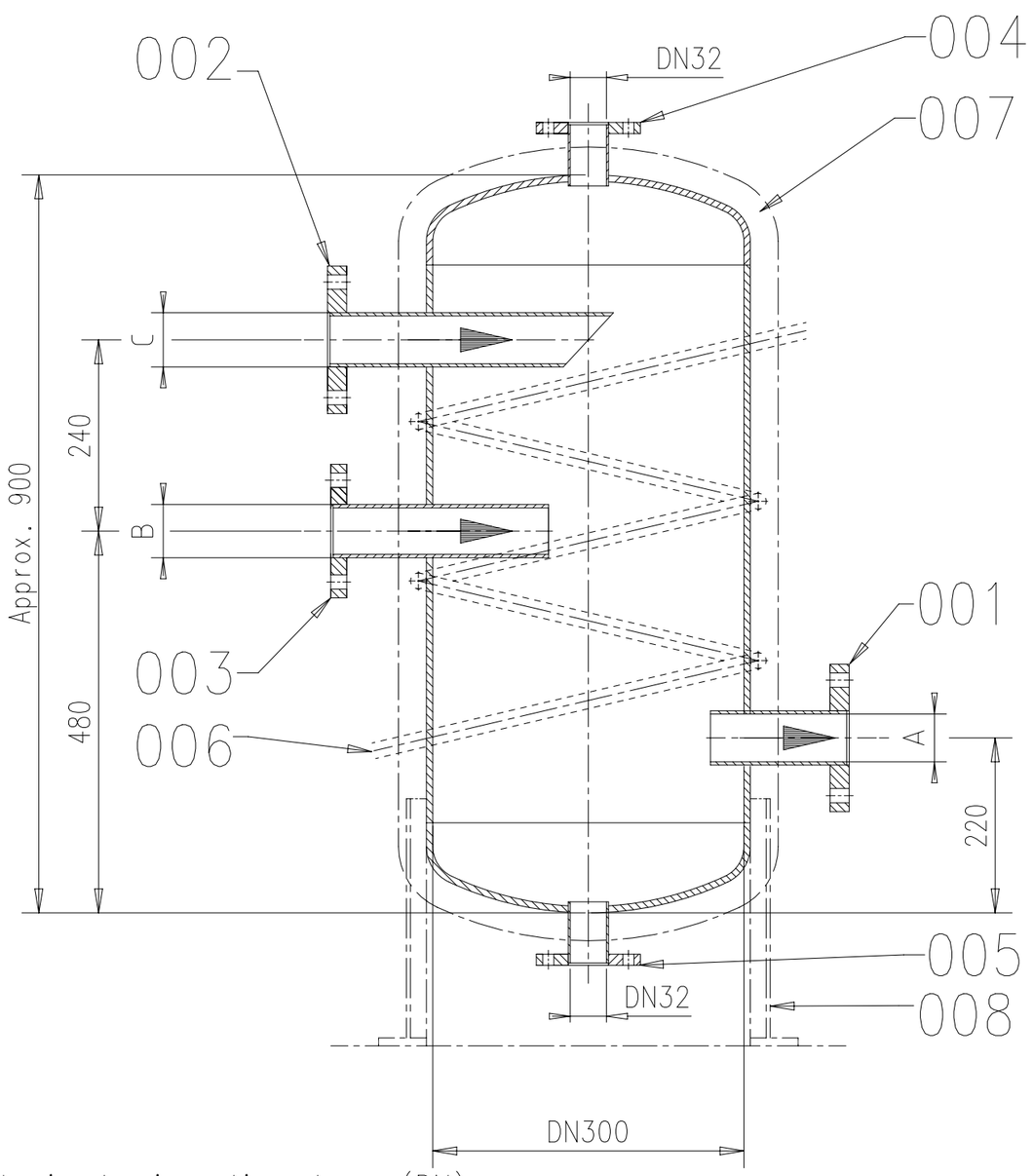
SURFACE PROTECTION: SEE GROUP 9344
TOLERANCING PRINCIPLE: ISO8015
GENERAL TOLERANCES ACCORDING TO: ISO2768-mK

Approved

Confidential

Winterthur Gas & Diesel

W-X40/-B



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.

*2) Shown on drawing.

Nominal pipe diameters (DN)

No. of cyls.	A	B	C	
	DN	DN	DN	
5	40	32	40	
6	40	40	40	*2)
7	50	40	50	
8	50	40	50	

Capacity: 65 l
Design pressure: 10 bar
Service temperature: 150 °C

SURFACE PROTECTION SEE GROUP 0344
TOLERANCING PRINCIPLE ISO8015
GENERAL TOLERANCES ACCORDING TO ISO2768-mK

Free space for lic.

Q-Code XXXXX
Standard ISO; JIS
Main Drw.

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

WIN GD Winterthur Gas & Diesel

Product W-40

MIXING UNIT
TO FUEL OIL SYSTEM

Units	mm kg	NX	Basic Material	Net Weight 0.001

Made	08.09.2011	lmux02	L.Müller	Scale –	Size A3	Page 1/1	Material ID PAAD059949
Chkd	10.10.2011	wwr001	Wroblewski	Design Group 9723	Drawing ID DAAD020383		Rev. A
Appd	10.10.2011	dst009	Strödecke				

Approved

DID - DIMENSIONAL DRAWING - Confidential

MIDS - WinGD X40DF – Fuel Oil System

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2019-09-09	DRAWING SET	First web upload
2020-09-30	DAAD118445 DAAD118453 DAAD118454	System drgs – new revision

DISCLAIMER

Winterthur Gas & Diesel Ltd.
Winterthur Gas & Diesel AG.
Winterthur Gas & Diesel S.A.
Schützenstrasse 3
PO Box 414, CH-8401
Winterthur, Switzerland
Tel. +41 (0)52 264 8844
Fax +41 (0)52 264 8866
www.wingd.com