

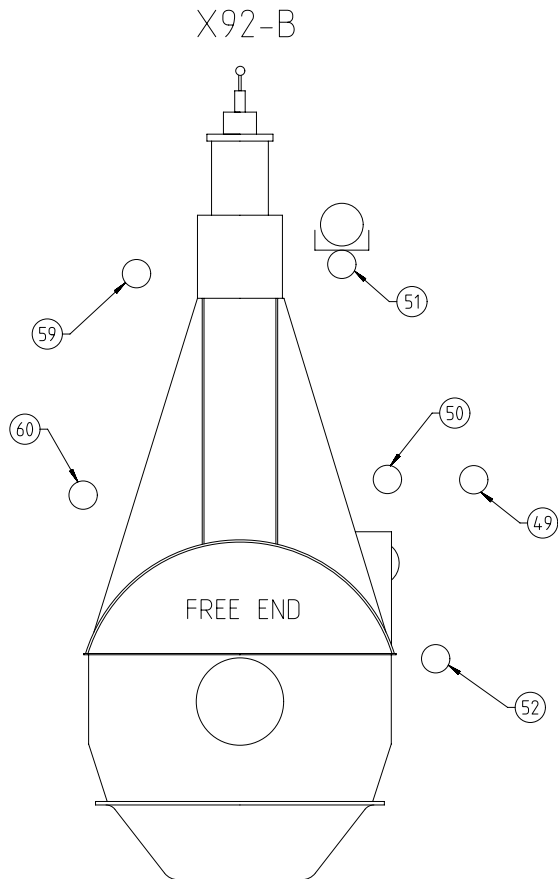


1	2	3	4	5	6	7	8
A							
B							
C							
D							
E							
F							

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	PAAD303120	FUEL OIL SYSTEM HFO&MDO&MGO		DAAD104305		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 XXXXXX	Main Drw. H	
						Standard ISO; JIS		
Modif.	A	EAAD090871	18.07.2019					
		Number	Drawn date		Number	Drawn date		
			Product W6-12X92-B (A)		FUEL OIL SYSTEM Brennstoffsystem			
Units	mm kg	NX				Basic Material		Net Weight 0,001
SURFACE PROTECTION SEE GROUP 0344		Made	26.07.2018 Sudant Deogade		Scale -	Size A3	Page 1/1	Material ID PAAD303385
TOLERANCING PRINCIPLE ISO8015		Chkd	21.03.2019 wwa008 Wang		Design Group 9723	Drawing ID DAAD104370	Rev. A	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	21.03.2019 mhu019 Hug					

SPECIFICATION which must be met



- 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 1 on page 2.
 - Fuel amount on system side: According to project specific system layout.
- 50 OUTLET - Fuel return
- Normal operation condition: Returning to mixing unit.
 - During fuel change-over while engine is not in service: returning to service tank.
- 51 OUTLET - Drain rail-unit (dirty)
- Dirty fuel: Mixed drain (LQ,FQ) 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 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

1	008	PAAD142316	MIXING UNIT	DAAD044290		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		Main Drw.	
Standard ISO; JIS							
Modif.	A	EAAD095177	12.11.2020	B	EAAD095731	11.12.2020	
Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
WIN GD Winterthur Gas & Diesel			Product 6-12X92-B		FUEL OIL SYSTEM HFO&MDO&MGO Brennstoffsystem		
Units	mm kg	NX	Basic Material		Net Weight 0,001		
SURFACE PROTECTION SEE GROUP 0344		Made	25.07.2018	Sudant	Deogade	Scale -	Size A2
TOLERANCING PRINCIPLE ISO8015		Chkd	21.03.2019	www008	Wang	Design Group	Page 1/2
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	21.03.2019	rmu019	Hug	7273	Material ID PAAD303120
Drawing ID DAAD104305						Rev. B	

SYSTEM PROPOSAL - Main fuel oil supply and fuel oil treatment

Tablet Fuel Amount on Engine Side

Cylinder	Volume
6	110 l
7	110 l
8	110 l
9	120 l
10	130 l
11	130 l
12	130 l

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 *3)
- (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

	6	7	8	9	10	11	12
Main engine X92-B (R1 rated)	power (kW)	38700	45750	51600	58950	64500	77400
	speed (rpm)				80		

Proposal for dimensioning *4)

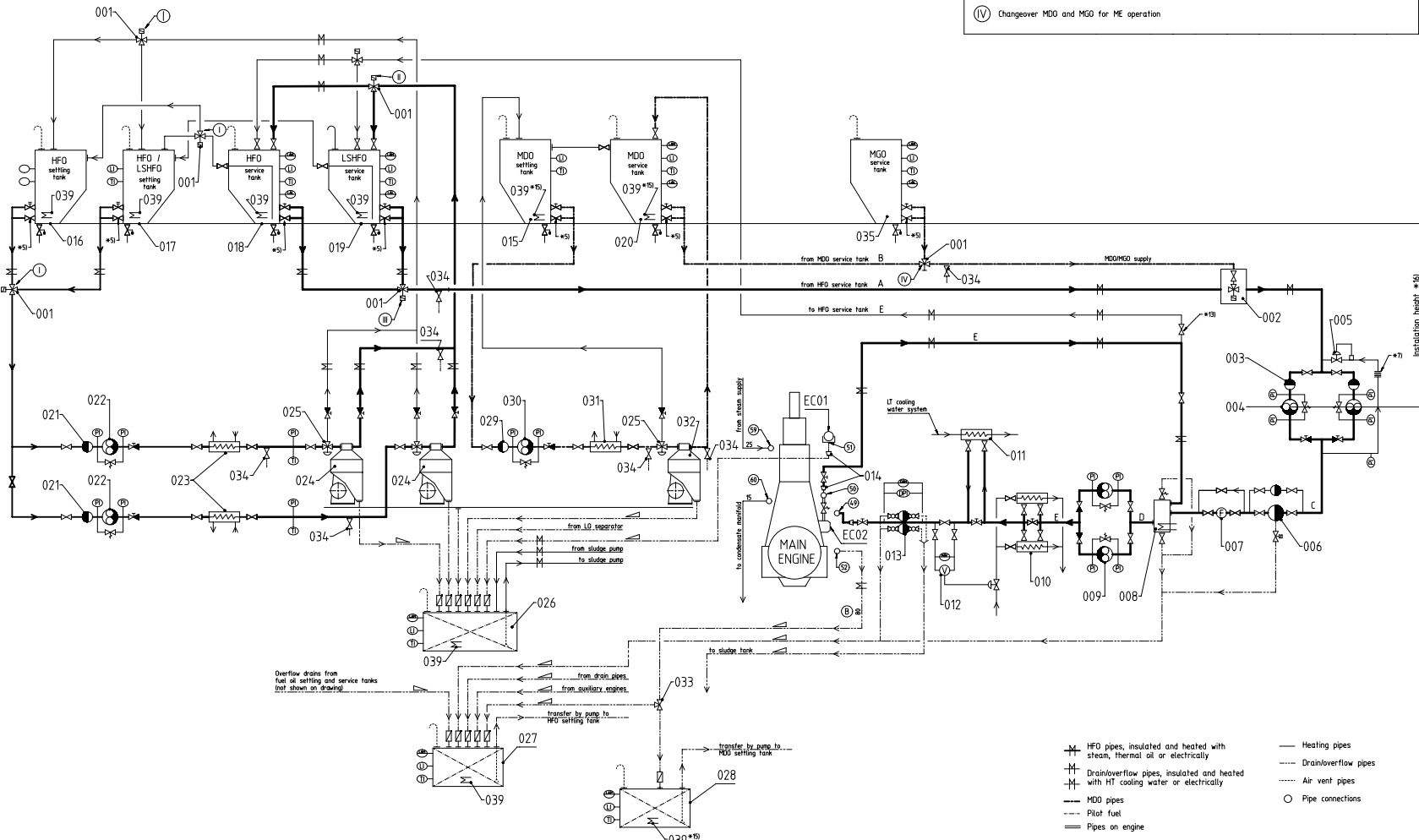
Mixing unit	volume (m³)	acc. to separate drawing (system component 008)
HFO settling tank	62 72 83 93 103 114 124	
HFO service tank	62 72 83 93 103 114 124	
MDO/MGO service tank	62 72 83 93 103 114 124	
MDO/MGO drain tank *11)	6.2 7.2 8.3 9.3 10.3 11.4 12.4	
Nominal pipe diameter	A DN 80 100 125 100 100 100 100	
	B DN 65 65 65 80 80 80 80	
	C DN 65 80 80 80 80 100 100	
	D DN 100 100 125 125 125 125 125	
	E DN 100 100 100 100 100 100 100	

- ① Both valves to be interconnected
- ② Changeover LSHFO and HFO for fuel treatment
- ③ Changeover LSHFO and HFO for ME operation
- ④ 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 10)
- 009 High pressure booster pump
- 010 Fuel oil end-heater
- 011 MDO/MGO heat exchanger
- 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)
- 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
- 039 Heating coil

Remarks

- 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 9736 "Fuel 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 vent 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

WINGO

DATE: 25.07.2018

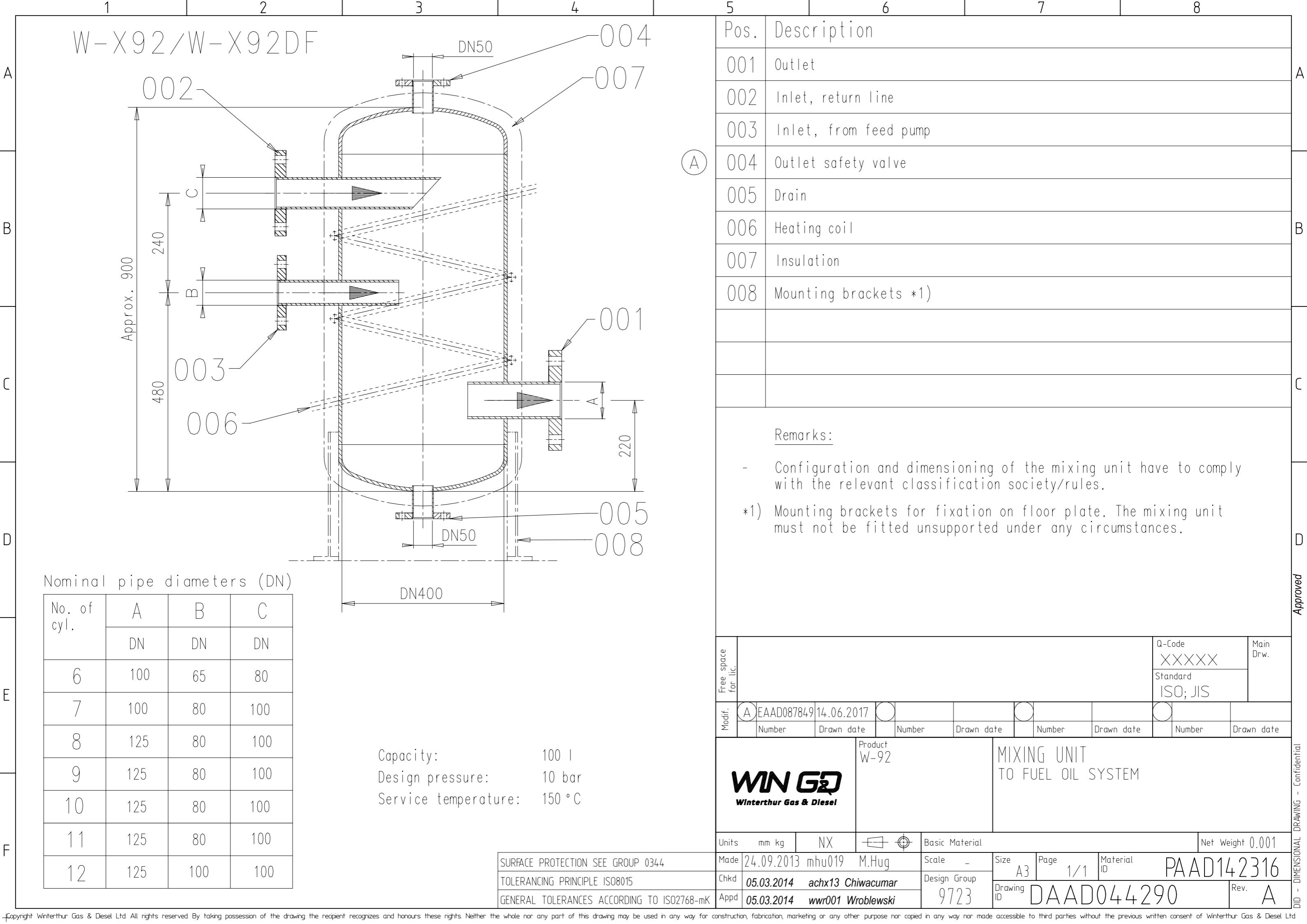
DESIGNER: [Signature]

SCALE: 1:2

PROJECT: FUEL OIL SYSTEM

REVISION: 1

PAAD303120



WinGD X92-B – Fuel Oil System (DG9723)

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2019-03-22	DRAWING SET	First web upload
2019-03-26	DAAD104370	Main drg – new revision
2020-11-25	DAAD104305	System drg – new revision
2021-04-22	DAAD104305	System drg – new revision

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