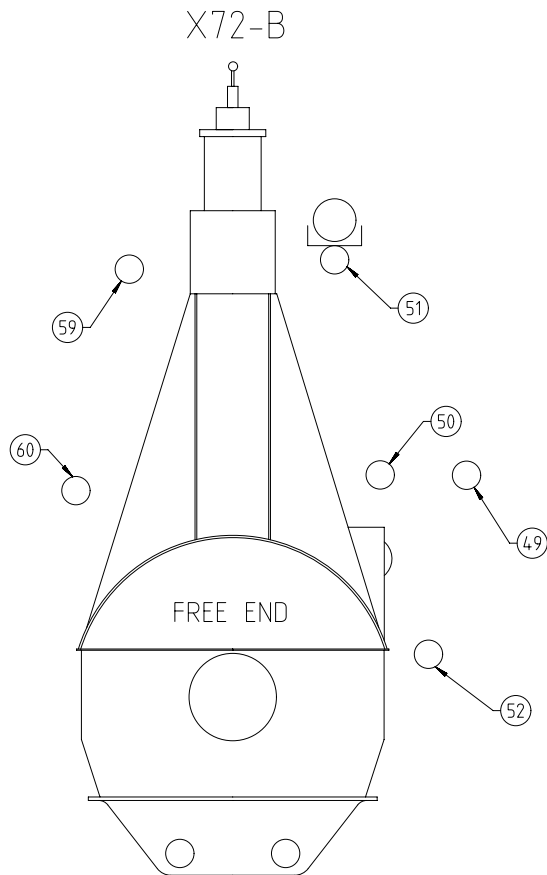




SPECIFICATION which must be met

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



49	INLET - Fuel oil
A	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	OUTLET - Fuel return
A	- 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)
A	- 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)
A	- 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)

1	008	PAAD103066	MIXING UNIT			DAAD032414				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	Main Drw.	
									XXXXXX		
									Standard ISO; JIS		
Modif.	A	EAAD091789	02.12.2019	<input type="radio"/>		<input type="radio"/>		<input type="radio"/>			
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date			
 Winterthur Gas & Diesel			Product 5-8X72-B		FUEL OIL SYSTEM HFO&MDO&MGO Brennstoffsystem						
Units	mm kg	NX			Basic Material					Net Weight 0,001	
Made	09.05.2018	Arindam			Scale	-		Size	Page	Material ID	PAAD294820
Chkd	19.07.2018	www008 Wang			Design Group			A2	1/2		
Appd	27.07.2018	mhu019 Hug			9723		Drawing ID	DAAD100463			Rev. A

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

Table1: Fuel amount on engine side

Cylinder	Volume
5	21 l
6	29 l
7	29 l
8	29 l

Pos.	ENGINE CONNECTIONS *2) (A)
(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 X72-B (RT rated)	power	19600	23520	27440	31360
	speed	89			

Proposal for dimensioning *4)						
Mixing unit	volume	(l)	acc. to separate drawing (system component 008)			
HFO settling tank	volume	(m³)	31	38	44	50
HFO service tank	volume	(m³)	31	38	44	50
MDO/MGO service tank	volume	(m³)	31	38	44	50
MDO/MGO drain tank *11)	volume	(m³)	31	38	44	5

Nominal pipe diameter	A	B	C	D	E
	DN 50	40	50	50	80
	50	50	50	80	50
	65	50	65	80	65

I

Both valves to be interconnected

II

Changeover LSHFO and HFO for fuel treatment

III

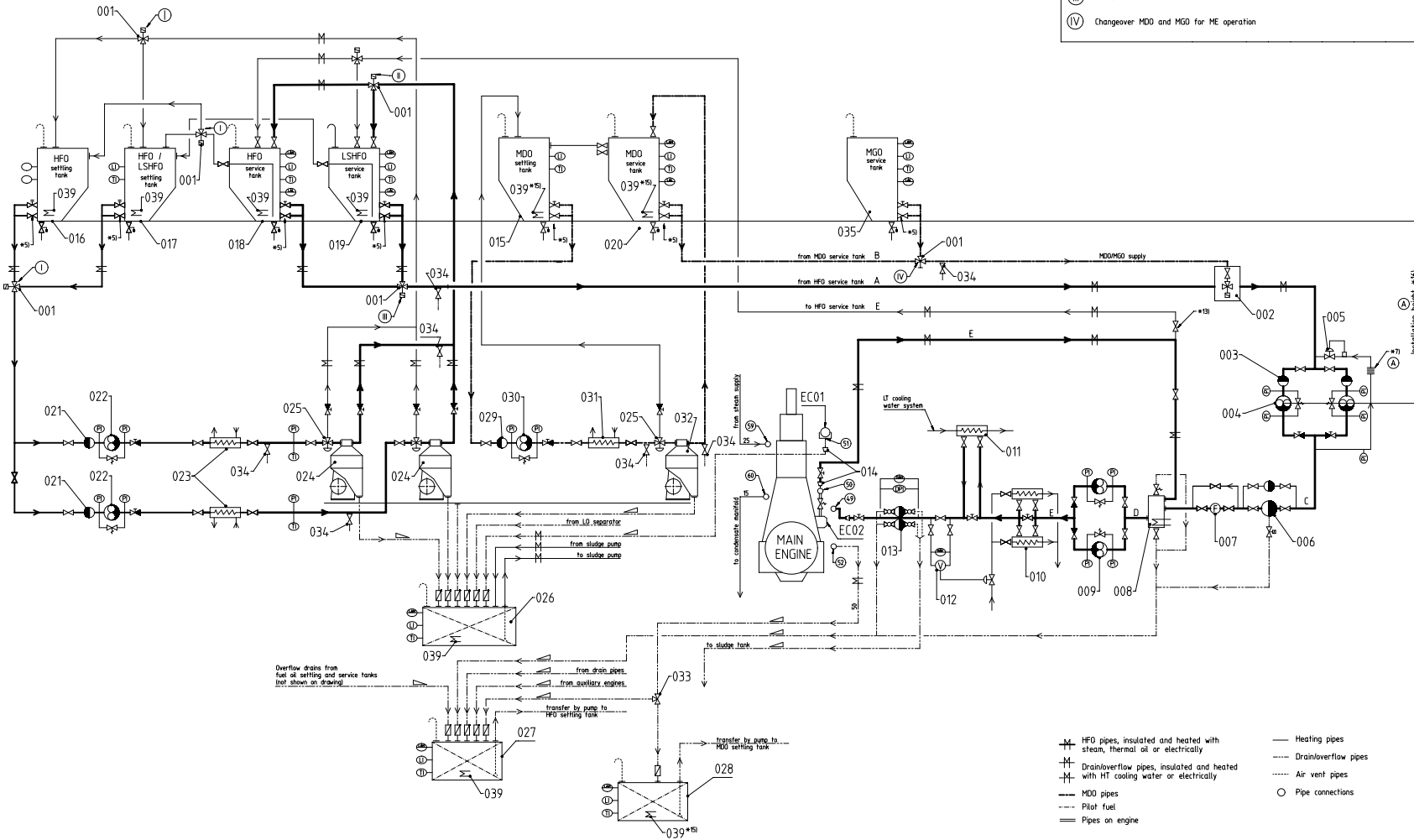
Changeover LSHFO and HFO for ME operation

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
039	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 9739 "Fluid 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 value 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.
- *15) A heating coil in the MDO tank is required when DMB is used. Target heating temperature: 40 °C.
- *16) 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 pipes.

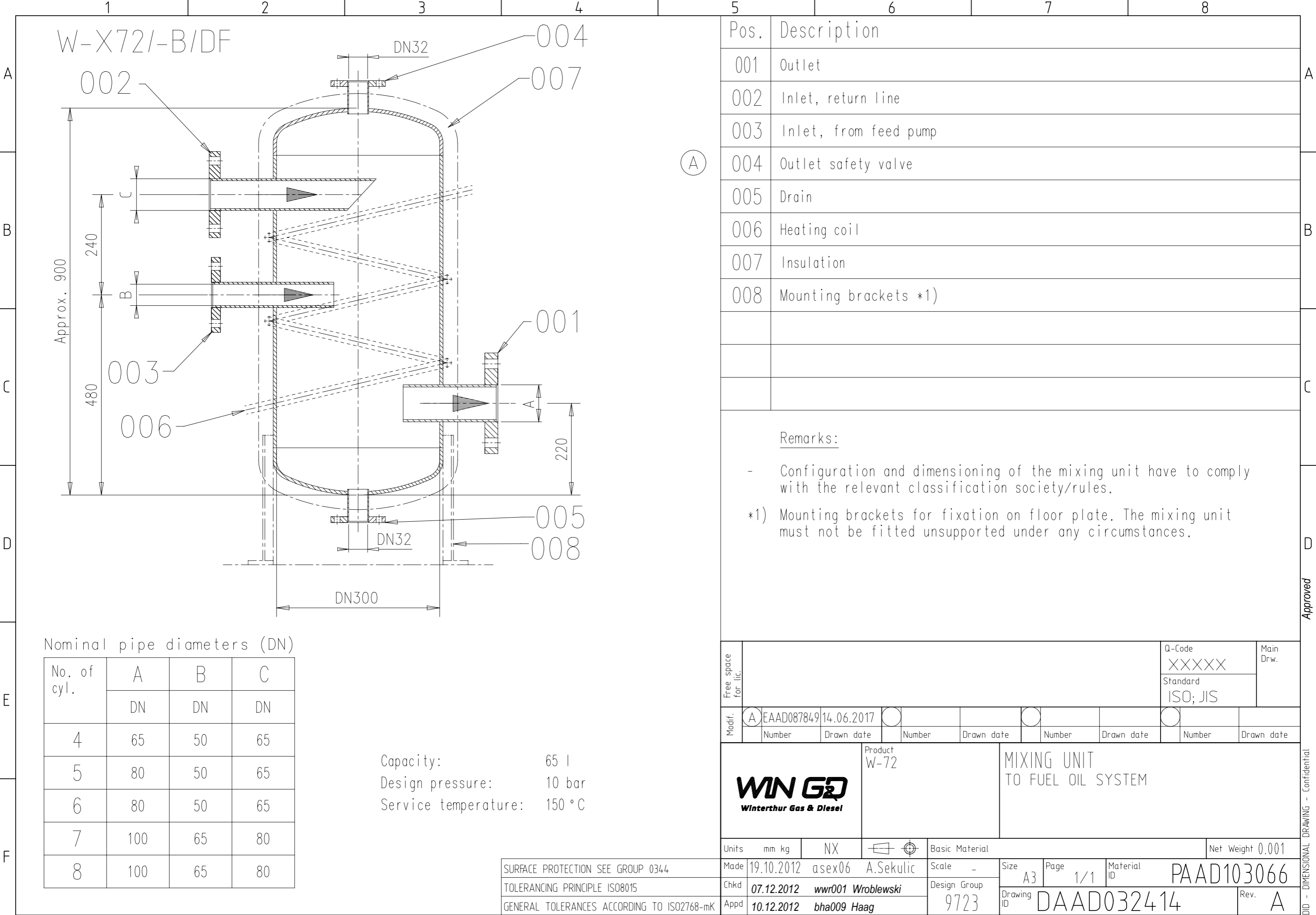


Legend:

- 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

WIND logo and project information:

Project: FUEL OIL SYSTEM
Drawing: PAAD294820
Revision: 1/2/1
Date: 09.05.2018
Author: A-Ingen
Checked: 09.05.2018
Design Group: 9739
Drawing Number: PAAD100463



WinGD-X72-B Fuel Oil System

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2018-09-12	DRAWING SET	First web upload
2020-09-30	DAAD100463	System drg – new revision

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.