






SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
2	1	PAAD207844	LUBRICATING OIL SYSTEM				0.001
4	1	107.432.793.200	LUBRICATING OIL DRAIN TANK				183
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK				0.001

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Prod	6 X82-B										
Change History											
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice				4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis			Activity Code	E	C

				LUBRICATING OIL SYSTEM					
Bill Of Material				Dimension					
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				[m] [kg]				167	
				Main Design		Design Group		Standard	
				Yes		9722		Q-Code XXXXX	
				Qty per		Engine		BOM Page/s	
				A4		Item ID		01/01	
						PAAD249872			

SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
1	1	107.398.114.500	LUBRICATING OIL SYSTEM				0.001
4	1	107.432.793.200	LUBRICATING OIL DRAIN TANK				183
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK				0.001

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Prod	6 X82-B										
Change History											
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice				4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis			Activity Code	E	C


				LUBRICATING OIL SYSTEM					
Bill Of Material				Dimension					
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				Main Design		Design Group		Standard	
				Qty per		Item ID		BOM Page/s	
				[m] [kg]		9722		167	
				Yes		XXXXX		WDS	
				Engine		A4		01/01	
						PAAD249870			



SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
2	1	PAAD207844	LUBRICATING OIL SYSTEM				0.001
3	1	PAAD245338	LUBRICATING OIL SYSTEM				0.001
4	1	107.432.793.200	LUBRICATING OIL DRAIN TANK				183
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK				0.001

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Prod	6 X82-B										
Change History											
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice				4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis			Activity Code	E	C

				LUBRICATING OIL SYSTEM				
Bill Of Material				Dimension				
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				Main Design Yes		Design Group 9722	Q-Code XXXXX	Standard WDS
				Qty per Engine	A4	Item ID PAAD249871		BOM Page/s 01/01





SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
1	1	107.398.114.500	LUBRICATING OIL SYSTEM			0.001
3	1	PAAD245338	LUBRICATING OIL SYSTEM			0.001
4	1	107.398.517.200	LUBRICATING OIL DRAIN TANK			266
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING			0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK			0.001

Prod.	7 X82-B								
Change History									
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice		4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis		Activity Code	E C




Bill Of Material	Dimension								
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	Main Design	Yes	Design Group		9722	Q-Code	XXXXX	Standard	WDS
	Qty per	Engine	A4	Item ID	PAAD249878		BOM Page/s	01/01	

SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
2	1	PAAD207844	LUBRICATING OIL SYSTEM				0.001
3	1	PAAD245338	LUBRICATING OIL SYSTEM				0.001
4	1	107.398.517.200	LUBRICATING OIL DRAIN TANK				266
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK				0.001

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Prod	7 X82-B										
Change History											
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice				4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis				Activity Code	E

				LUBRICATING OIL SYSTEM					
Bill Of Material				Dimension					
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				[m] [kg]				251	
				Main Design		Design Group		Standard	
				Yes		9722		Q-Code XXXXX	
				Qty per		Engine		BOM Page/s	
				A4		Item ID		01/01	
						PAAD249882			

SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
2	1	PAAD207844	LUBRICATING OIL SYSTEM				0.001
3	1	PAAD245338	LUBRICATING OIL SYSTEM				0.001
4	1	PAAD079363	LUBRICATING OIL DRAIN TANK				0.001
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK				0.001

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Prod	8 X82-B										
Change History											
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice				4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis			Activity Code	E	C

<div>WIN GD</div> <div>Winterthur Gas &amp; Diesel</div>		LUBRICATING OIL SYSTEM										
Bill Of Material		Dimension										
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		Main Design		Yes		Design Group		9722	Q-Code	XXXXX	Standard	WDS
		Qty per		Engine		A4	Item ID		PAAD249899		BOM Page/s	01/01








SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
1	1	107.398.114.500	LUBRICATING OIL SYSTEM				0.001
3	1	PAAD245338	LUBRICATING OIL SYSTEM				0.001
4	1	PAAD079363	LUBRICATING OIL DRAIN TANK				0.001
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK				0.001

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Prod	8 X82-B										
Change History											
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice				4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis			Activity Code	E	C

				LUBRICATING OIL SYSTEM					
Bill Of Material				Dimension					
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				[m] [kg]				0.001	
				Main Design		Design Group		Standard	
				Yes		9722		Q-Code XXXXX	
				Qty per		Engine		BOM Page/s	
				A4		Item ID		01/01	
						PAAD249896			

SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
1	1	107.398.114.500	LUBRICATING OIL SYSTEM				0.001
3	1	PAAD245338	LUBRICATING OIL SYSTEM				0.001
4	1	PAAD126142	LUBRICATING OIL DRAIN TANK				168
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK				0.001

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Prod	9 X82-B										
Change History											
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice				4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis			Activity Code	E	C

				LUBRICATING OIL SYSTEM				
Bill Of Material				Dimension				
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				Main Design Yes		Design Group 9722	Q-Code XXXXX	Standard WDS
				Qty per Engine	A4	Item ID PAAD250027		BOM Page/s 01/01

SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
1	1	107.398.114.500	LUBRICATING OIL SYSTEM				0.001
4	1	PAAD126142	LUBRICATING OIL DRAIN TANK				168
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK				0.001

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Prod	9 X82-B										
Change History											
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice				4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis				Activity Code	E


				LUBRICATING OIL SYSTEM					
Bill Of Material				Dimension					
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				[m] [kg]				168	
				Main Design		Design Group		Standard	
				Yes		9722		Q-Code XXXXX	
				Qty per		Engine		BOM Page/s	
				A4		Item ID		01/01	
						PAAD250028			



SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
2	1	PAAD207844	LUBRICATING OIL SYSTEM				0.001
3	1	PAAD245338	LUBRICATING OIL SYSTEM				0.001
4	1	PAAD126142	LUBRICATING OIL DRAIN TANK				168
5	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
6	1	107.400.395.500	LUBRICATING OIL DRAIN TANK				0.001

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Prod	9 X82-B										
Change History											
	-	dkl021	mhu019	09.02.2017	EAAD087222	Legacy information. See corresponding ChangeNotice				4	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis			Activity Code	E	C

<div>  <div> <b>WIN GD</b>  Winterthur Gas &amp; Diesel </div> </div>				LUBRICATING OIL SYSTEM				
Bill Of Material				Dimension				
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				[m] [kg]				168
				Main Design	Yes	Design Group	9722 Q-Code XXXXX	Standard WDS
Qty per		Engine	A4	Item ID	PAAD250029			BOM Page/s 01/01

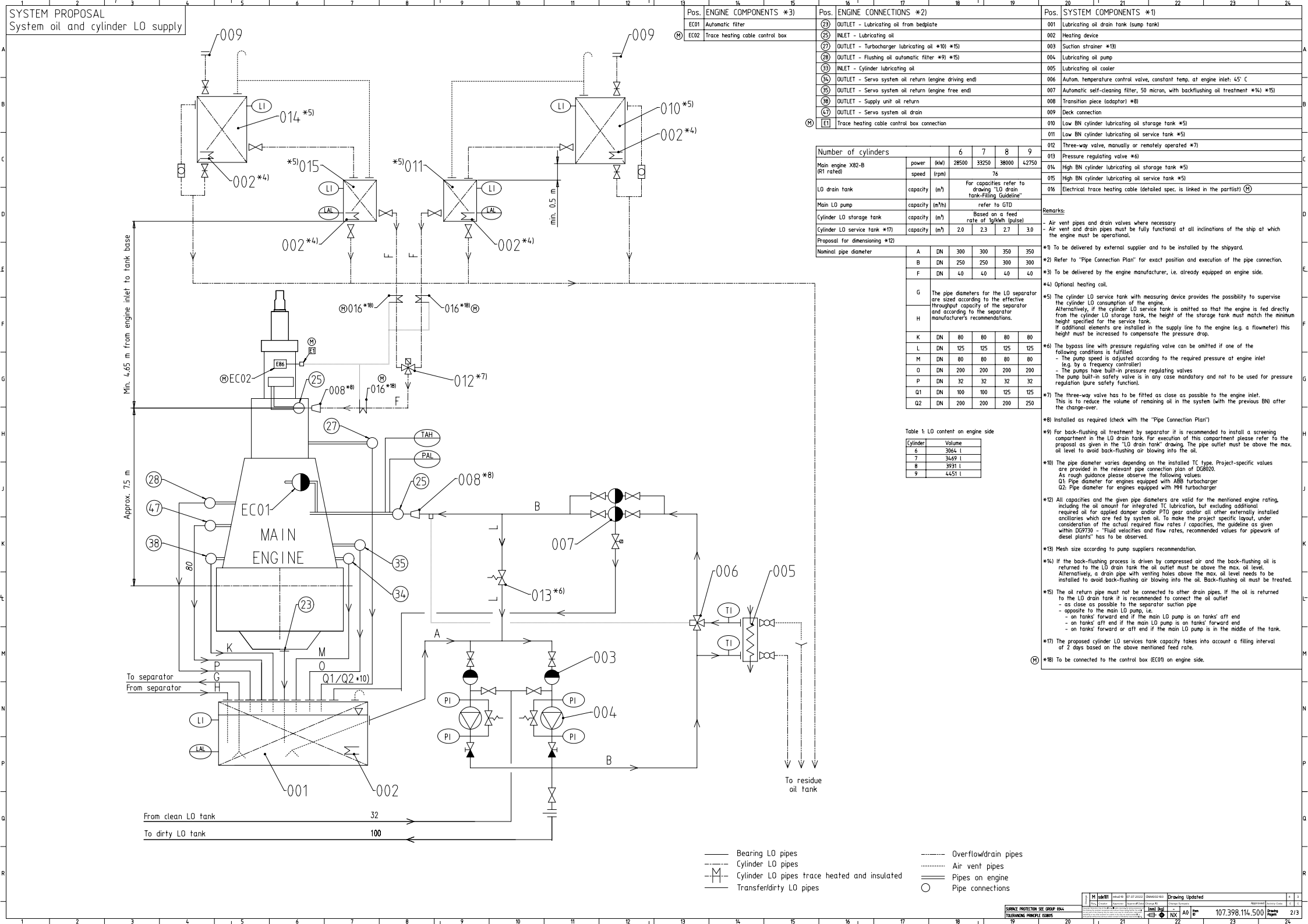
SEQ NO	QTY	Item ID		Item Name		Dimension	Standard-ID	Basic Material		Net Weight				
016	1 m	PAAD308926		HEATING ELEMENT		10QTVR2-CT				0.126				
Prod.	RT-flex82T X82		X82-B											
Change History	M	sde101	mhu019	07.07.2022	CNAA002160	Drawing Updated				4	3			
	L	dk1021	mhu019	08.09.2020	EAAD091530	Legacy information. See corresponding ChangeNotice				4	-			
	K	dk1021	mhu019	19.10.2018	EAAD089872	Legacy information. See corresponding ChangeNotice				4	-			
	-	grpadm	grpadm	02.04.2008		-				-	-			
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Approved	Activity Code	E	C				
<div>WIN GD</div> <div>Winterthur Gas &amp; Diesel</div>					LUBRICATING OIL SYSTEM MAIN CIRCUIT									
Bill Of Material					Dimension									
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					Main Design		Design Group		9722	Q-Code	XXXXX	Standard	WDS	
					Qty per		A4	Item ID	107.398.114.500			BOM Page/s	01/01	

A schematic diagram of a water treatment system. At the top is a vertical pipe with a nozzle. Below it is a cylindrical section with a horizontal line and a small rectangular component. This is followed by a larger cylindrical section with a horizontal line and a small circular component. Below this is a large, wide, conical section with a horizontal line and a small circular component. Below the conical section is a rectangular section with a horizontal line and a small circular component. Below the rectangular section is a trapezoidal section with a horizontal line and a small circular component. At the bottom is a square section with a horizontal line and a small circular component. The diagram includes various pipes, valves, and flow indicators, with numbered callouts (23, 25, 27, 28, 33, 34, 35, 38, 47) pointing to specific components.

(23)	<p>OUTLET - Lubricating oil from bedplate</p> <ul style="list-style-type: none"> <li>- Oil return via vertical oil drain to lubricating oil drain tank: Vertical oil drain position must be within permissible range as specified on the LO drain tank drawing. Final position to be informed by the shipyard to the engine manufacturer.</li> </ul>
(25)	<p>INLET - Lubricating oil</p> <ul style="list-style-type: none"> <li>- Lubricating oil temperature:             <ul style="list-style-type: none"> <li>- Controller set-point: 45 °C (controller type: PI)</li> <li>- Steady state condition: 45 ± 2 °C</li> <li>- Transient condition: 45 ± 4 °C</li> </ul> </li> <li>- Lubricating oil pressure: 3.8 - 5.0 bar *)             <ul style="list-style-type: none"> <li>*) A pressure control device (e.g. a bypass line with a pressure regulating valve) or equipment for pump flow adjustment (e.g. a frequency converter to adjust the pump speed) is needed.</li> </ul> </li> <li>- Lubricating oil volume flow: according to GTD</li> <li>- LO amount on engine side: mentioned in table 1 on page 2</li> <li>- Lubricating oil cleanliness:             <ul style="list-style-type: none"> <li>- Full flow filtered by a 50 micron (absolute sphere passing mesh) automatic self-cleaning filter</li> <li>- Bypass flow of the automatic self-cleaning filter (only active during maintenance of the automatic self-cleaning filter) filtered by a 50 micron (absolute sphere passing mesh) filter.</li> <li>- Offline cleaning of the lubricating oil in the drain tank by self-cleaning centrifugal separators</li> </ul> </li> </ul>
(27)	<p>OUTLET - Turbocharger lubricating oil</p> <ul style="list-style-type: none"> <li>- Oil return to lubricating oil drain tank</li> <li>- Oil return pipe must not be connected to other drain pipes.</li> <li>- Oil outlet must be above the max. oil level in the tank or as an alternative a drain pipe with venting holes above the max. oil level needs to be installed.</li> </ul>
(28)	<p>OUTLET - Flushing oil automatic filter</p> <ul style="list-style-type: none"> <li>- Oil return to lubricating oil drain tank.</li> <li>- Pipe outlet must end up above max. oil level in the tank to avoid back-flushing air blowing into the LO.</li> </ul>
(33)	<p>INLET - Cylinder lubricating oil</p> <ul style="list-style-type: none"> <li>- Cylinder lubricating oil temperature: 40<sup>+10</sup><sub>-5</sub> °C.</li> </ul>
(M)	<ul style="list-style-type: none"> <li>- Trace heating to be applied on the cylinder LO feed line on ship side.</li> <li>- Cylinder lubricating oil static pressure: min. 0.4 bar.</li> </ul>
(34)	<p>OUTLET - Servo system oil return (engine driving end)</p> <ul style="list-style-type: none"> <li>- Free flow to lubricating oil drain tank.</li> </ul>
(35)	<p>OUTLET - Servo system oil return (engine free end)</p> <ul style="list-style-type: none"> <li>- Free flow to lubricating oil drain tank.</li> </ul>
(38)	<p>OUTLET - Supply unit oil return</p> <ul style="list-style-type: none"> <li>- Free flow to lubricating oil drain tank.</li> </ul>
(47)	<p>OUTLET - Servo system oil drain</p> <ul style="list-style-type: none"> <li>- Free flow to lubricating oil drain tank.</li> </ul>

SURFACE PROTECTION SEE GROUP 0344
TOLERANCING PRINCIPLE ISO8015

SYSTEM PROPOSAL  
System oil and cylinder LO supply



Pos.	ENGINE COMPONENTS *3)
EC01	Automatic filter
EC02	Trace heating cable control box

Pos.	ENGINE CONNECTIONS *2)
23	OUTLET - Lubricating oil from bedplate
25	INLET - Lubricating oil
27	OUTLET - Turbocharger lubricating oil *10) *15)
28	OUTLET - Flushing oil automatic filter *9) *15)
33	INLET - Cylinder lubricating oil
34	OUTLET - Servo system oil return (engine driving end)
35	OUTLET - Servo system oil return (engine free end)
38	OUTLET - Supply unit oil return
47	OUTLET - Servo system oil drain
E1	Trace heating cable control box connection

Pos.	SYSTEM COMPONENTS *1)
001	Lubricating oil drain tank (sump tank)
002	Heating device
003	Suction strainer *13)
004	Lubricating oil pump
005	Lubricating oil cooler
006	Autom. temperature control valve, constant temp. at engine inlet: 45° C
007	Automatic self-cleaning filter, 50 micron, with backflushing oil treatment *14) *15)
008	Transition piece (adaptor) *8)
009	Deck connection
010	Low BN cylinder lubricating oil storage tank *5)
011	Low BN cylinder lubricating oil service tank *5)
012	Three-way valve, manually or remotely operated *7)
013	Pressure regulating valve *6)
014	High BN cylinder lubricating oil storage tank *5)
015	High BN cylinder lubricating oil service tank *5)
016	Electrical trace heating cable (detailed spec. is linked in the partlist) *1)

Number of cylinders		6	7	8	9
Main engine X82-B (R1 rated)	power (kW)	28500	33250	38000	42750
	speed (rpm)	76			
LO drain tank	capacity (m³)	For capacities refer to drawing "LO drain tank-Filling Guideline"			

Proposal for dimensioning *12)	A	DN	300	300	350	350
Nominal pipe diameter	B	DN	250	250	300	300
	F	DN	40	40	40	40

B	DN	250	250	300	300
F	DN	40	40	40	40
G	The pipe diameters for the LO separator are sized according to the effective throughput capacity of the separator and according to the separator manufacturer's recommendations.				
H					
K	DN	80	80	80	80
L	DN	125	125	125	125
M	DN	80	80	80	80
O	DN	200	200	200	200
P	DN	32	32	32	32
Q1	DN	100	100	125	125
Q2	DN	200	200	200	250

Table 1: LO content on engine side

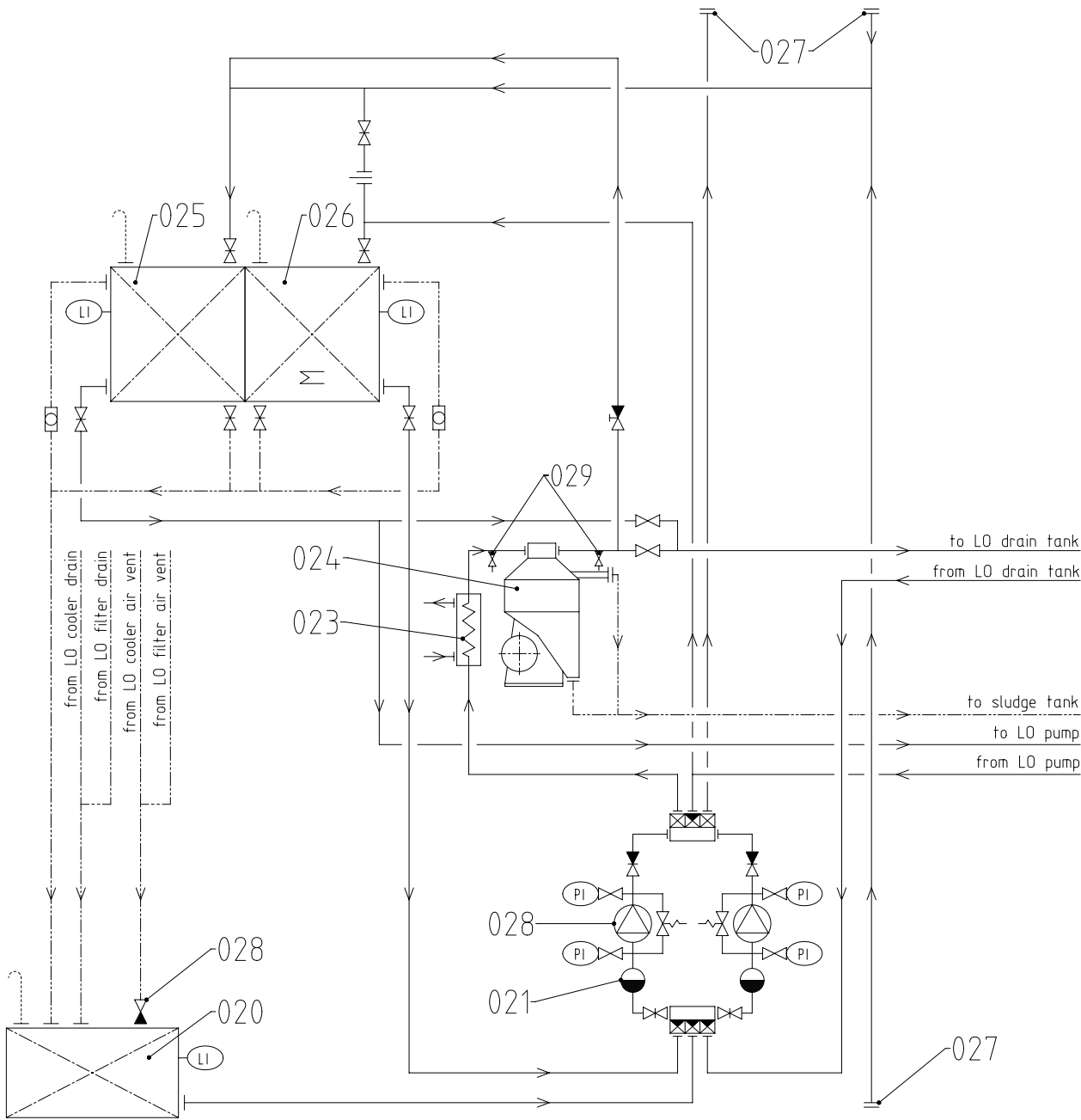
Cylinder	Volume
6	3064 l
7	3469 l
8	3931 l
9	4451 l

- Remarks:
- Air vent pipes and drain valves where necessary
  - Air vent and drain pipes must be fully functional at all inclinations of the ship at which the engine must be operational.
  - \*1) To be delivered by external supplier and to be installed by the shipyard.
  - \*2) Refer to "Pipe Connection Plan" for exact position and execution of the pipe connection.
  - \*3) To be delivered by the engine manufacturer, i.e. already equipped on engine side.
  - \*4) Optional heating coil.
  - \*5) The cylinder LO service tank with measuring device provides the possibility to supervise the cylinder LO consumption of the engine. Alternatively, if the cylinder LO service tank is omitted so that the engine is fed directly from the cylinder LO storage tank, the height of the storage tank must match the minimum height specified for the service tank. If additional elements are installed in the supply line to the engine (e.g. a flowmeter) this height must be increased to compensate the pressure drop.
  - \*6) The bypass line with pressure regulating valve can be omitted if one of the following conditions is fulfilled:
    - The pump speed is adjusted according to the required pressure at engine inlet (e.g. by a frequency controller)
    - The pumps have built-in pressure regulating valvesThe pump built-in safety valve is in any case mandatory and not to be used for pressure regulation (pure safety function).
  - \*7) The three-way valve has to be fitted as close as possible to the engine inlet. This is to reduce the volume of remaining oil in the system (with the previous BNI) after the change-over.
  - \*8) Installed as required (check with the "Pipe Connection Plan")
  - \*9) For back-flushing oil treatment by separator it is recommended to install a screening compartment in the LO drain tank. For execution of this compartment please refer to the proposal as given in the "LO drain tank" drawing. The pipe outlet must be above the max. oil level to avoid back-flushing or blowing into the oil.
  - \*10) The pipe diameter varies depending on the installed TC type. Project-specific values are provided in the relevant pipe connection plan of D58020. As rough guidance please observe the following values:
    - Q1: Pipe diameter for engines equipped with A6B turbocharger
    - Q2: Pipe diameter for engines equipped with M6B turbocharger
  - \*12) All capacities and the given pipe diameters are valid for the mentioned engine rating, including the oil amount for integrated TC lubrication, but excluding additional required oil for applied damper and/or PTO gear and/or all other externally installed auxiliaries which are fed by system oil. To make the project specific layout, under consideration of the actual required flow rates / capacities, the guideline as given within DG9730 - "Fluid velocities and flow rates, recommended values for pipework of diesel plants" has to be observed.
  - \*13) Mesh size according to pump suppliers recommendation.
  - \*14) If the back-flushing process is driven by compressed air and the back-flushing oil is returned to the LO drain tank the oil outlet must be above the max. oil level. Alternatively, a drain pipe with venting holes above the max. oil level needs to be installed to avoid back-flushing or blowing into the oil. Back-flushing oil must be treated.
  - \*15) The oil return pipe must not be connected to other drain pipes. If the oil is returned to the LO drain tank it is recommended to connect the oil outlet
    - as close as possible to the separator suction pipe
    - opposite to the main LO pump, i.e.
      - on tanks' forward end if the main LO pump is on tanks' aft end
      - on tanks' aft end if the main LO pump is on tanks' forward end
      - on tanks' forward or aft end if the main LO pump is in the middle of the tank.
  - \*17) The proposed cylinder LO services tank capacity takes into account a filling interval of 2 days based on the above mentioned feed rate.
  - \*18) To be connected to the control box (EC01) on engine side.

- Bearing LO pipes
- Cylinder LO pipes
- Cylinder LO pipes trace heated and insulated
- Transfer/dirty LO pipes
- Overflow/drain pipes
- Air vent pipes
- Pipes on engine
- Pipe connections




SYSTEM PROPOSAL - LO treatment system

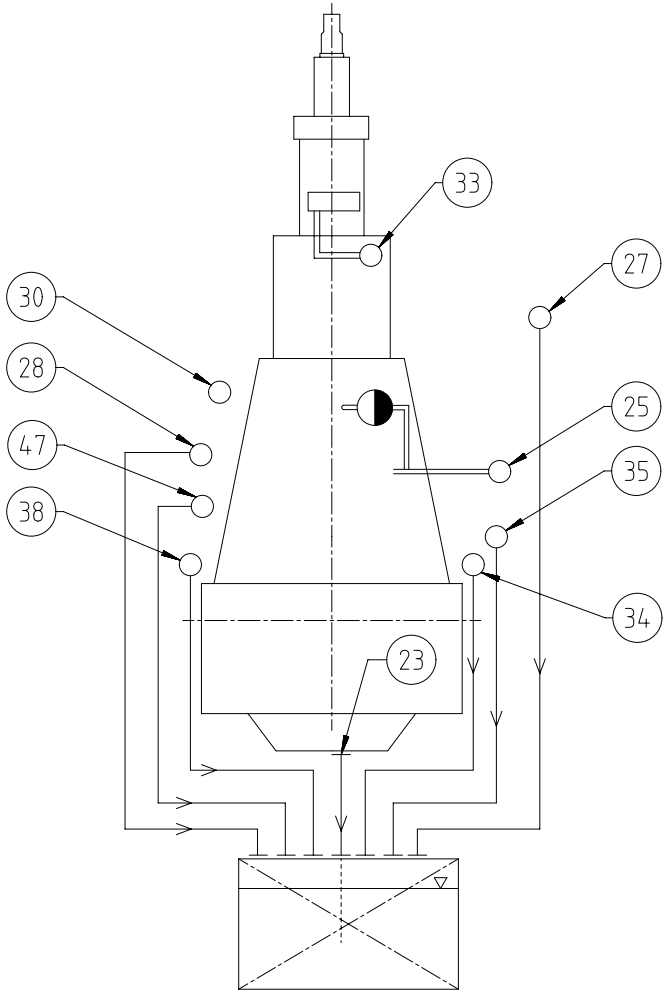


Pos.	SYSTEM COMPONENTS *1)					
020	Residue oil tank					
021	Suction strainer *13)					
022	Lubricating oil pump	one for transfer and separator service one for separator service				
023	Lubricating oil heater with relief valve and temperature control					
024	Self-cleaning centrifugal separator					
025	Clean lubricating oil tank					
026	Dirty lubricating oil tank					
027	Deck connection					
028	Float non-return valve					
029	LO sampling cock *20)					
X82-B		Number of cylinders				
		6	7	8	9	
Clean LO tank	capacity	(m³)	equal or bigger than LO drain tank volume			
Dirty LO tank	capacity	(m³)	equal or bigger than LO drain tank volume			
LO separator *21)	capacity	(l/h)	3220	3760	4290	4830
Residue oil tank	capacity	(m³)	Depending on ship's requirements			
Remarks:						
- Air vents and drain valves where necessary						
- Air vent and drain pipes must be fully functional at all inclination angles of the ship at which the engine must be operational (check Class rules)						
- Pipe diameters to be designed according to shipyards' practice and component suppliers' recommendations						
*1) To be delivered by external supplier and to be installed by the shipyard						
*13) Mesh size according to pump suppliers recommendation.						
*20) Recommended position for LO sampling to check LO quality / treatment efficiency.						
*21) Based on the min. recommended tank filling level (h1) as mentioned in the "Filling Guideline" drawing. If a larger tank volume is applied, LO separators capacity needs to be increased accordingly (it is recommended that the oil is circulated at least two times per day).						

— Main separating piping  
--- Transfer/dirty LO pipes  
- - - Overflow/drain pipes  
..... Air vent pipes

SEQ NO	QTY	Item ID	Item Name		Dimension	Standard-ID	Basic Material		Net Weight					
017	1 m	PAAD308926	HEATING ELEMENT		10QTVR2-CT				0.126					
Prod.	X82-B													
Change History	F	sde101	mhu019	07.07.2022	CNAA002160	Drawing Updated			4	3				
	E	dki021	mhu019	26.09.2019	EAAD090871	Legacy information. See corresponding ChangeNotice			4	-				
	D	dki021	mhu019	19.10.2018	EAAD089872	Legacy information. See corresponding ChangeNotice			4	-				
	-	zzh012	bha009	29.10.2015		-			-	-				
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Approved	Activity Code	E	C				
<div><div>Winterthur Gas &amp; Diesel</div></div>				LUBRICATING OIL SYSTEM WITH HP CROSSHEAD LO PUMPS										
Bill Of Material				Dimension										
Copyright <b>Winterthur Gas &amp; Diesel Ltd.</b> All rights reserved. By taking possession of the document the recipient recognizes and honours these rights. Neither the whole nor any part of this document may be used in any way for construction, fabrication, marketing or any other purpose nor copied in any way nor made accessible to third parties without the previous written consent of <b>Winterthur Gas &amp; Diesel Ltd.</b>					Units		[m] [kg]	Basic Material		Net Weight		0		
					Main Design		Design Group		9722	Q-Code	XXXXX	Standard		WDS
					Qty per		A4	Item ID	PAAD207844		BOM Page/s		01/01	

# SPECIFICATION WHICH MUST BE MET

34	OUTLET - Lubricating oil return from engine driving end - Free flow by gravity to lubricating oil drain tank.	23	OUTLET - Lubricating oil from bedplate vertical oil drain - Drain to lubricating oil drain tank: Drain pipe position must be within the permissible range as specified on the LO drain tank drawing. Final position to be informed by the shipyard to the engine manufacturer.
35	OUTLET - Lubricating oil return from engine free end - Free flow by gravity to lubricating oil drain tank.		
38	OUTLET - Oil drain supply unit - Free flow by gravity to lubricating oil drain tank.	25	INLET - Lubricating oil - Lubricating oil temperature: - Controller set-point: 45 °C (controller type: PI) - Steady state condition: 45±2 °C - Transient condition: 45±4 °C - Lubricating oil pressure: 3.8-5.0 bar *) *) An active pressure control device is needed, which could be either a bypass via pressure control valve or frequency controlled pumps, working with a closed loop control circ. - Lubricating oil volume flow according to GTD - Lubricating oil cleanliness: - Full flow filtered by 50 micron filter (absolute sphere passing mesh). - Bypass cleaning of lubricating oil in drain tank by self-cleaning centrifugal separator.
47	OUTLET - Oil drain servo system, oil return from engine free end - Free flow by gravity to lubricating oil drain tank.		
<p>X82-B rated in speed range:</p> <p>A:58 rpm ≤ CMCR speed &lt; 65 rpm (without TC cut-out)</p> <p>A:58 rpm ≤ CMCR speed ≤ 84 rpm (with TC cut-out)</p> 			
		27	OUTLET - Lubricating oil turbocharger - Oil return to lubricating oil drain tank - Oil return pipe must not be connected to other drain pipes. - Oil outlet must be above the max. oil level in the tank or as an alternative a drain pipe with venting holes above the max. oil level needs to be installed.
		28	OUTLET - Flushing oil automatic filter - Oil return to lubricating oil drain tank. - Pipe outlet must end up above max. oil level in the tank to avoid back-flushing air blowing into the LO.
		30	INLET - Crosshead Lubricating oil - Lubricating oil temperature: - Controller set-point: 45 °C (controller type: PI) - Steady state condition: 45±2 °C - Transient condition: 45±4 °C - Lubricating oil pressure: in speed range A: 10-13 bar - Lubricating oil volume flow: according to GTD - Lubricating oil cleanliness: - Full flow filtered by 35 micron filter (absolute sphere passing mesh). - Bypass cleaning of lubricating oil in drain tank by self-cleaning centrifugal separator.
		33	INLET - Cylinder lubricating oil - Cylinder lubricating oil temperature: 40+10-5 °C (F) - Trace heating to be applied on the cylinder LO feed line on ship side. - Cylinder lubricating oil static pressure: min 0.4 bar

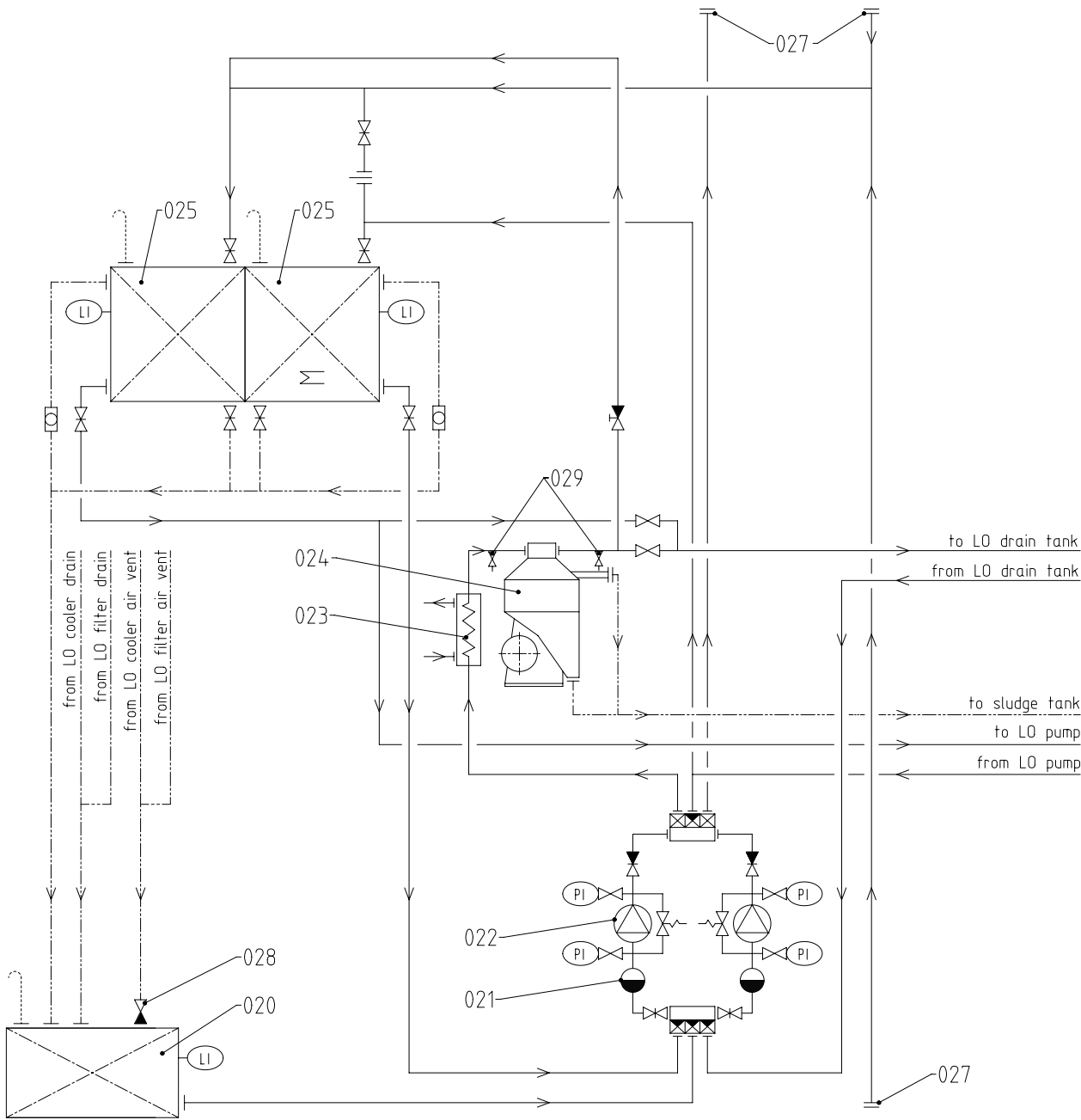
Prod.	X82-B													
Change History	F	sde101	mhu019	07.07.2022	QNA002160	Drawing Updated						4	3	
	E	dk021	mhu019	26.09.2019	EAAD090871	Legacy information. See corresponding ChangeNotice						4	-	
	D	dk021	mhu019	19.10.2018	EAAD089872	Legacy information. See corresponding ChangeNotice						4	-	
	-	zzh012	bha009	29.10.2015	-							-	-	
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis						Approved	Activity Code	E
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SURFACE PROTECTION SEE GROUP 0344

TOLERANCING PRINCIPLE ISO8015



SYSTEM PROPOSAL - LO treatment system



Pos.	SYSTEM COMPONENTS *1)
020	Residue oil tank
021	Suction strainer *2)
022	Lubricating oil pump one for transfer and separator service one for separator service
023	Lubricating oil heater with relief valve and temperature control
024	Self-cleaning centrifugal separator
025	Clean lubricating oil tank
026	Dirty lubricating oil tank
027	Deck connection
028	Float non-return valve
029	LO sampling cock *3)

X82-B		Number of cylinders			
		6	7	8	9
Clean LO tank	capacity (m³)	equal or bigger than LO drain tank volume			
Dirty LO tank	capacity (m³)	equal or bigger than LO drain tank volume			
LO separator	capacity (l/h)	3220	3760	4290	4830
Residue oil tank	capacity (m³)	Depending on ship's requirements			

**Remarks**

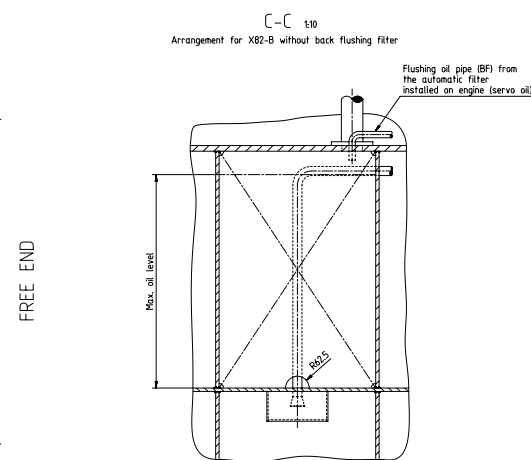
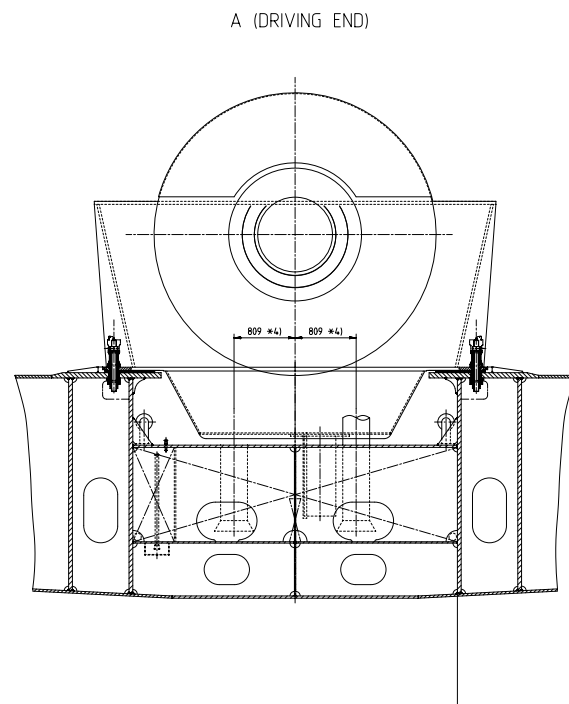
- Air vents and drain valves where necessary.
- Air vent and drain pipes must be fully functional at all inclination angles of the ship at which the engine must be operational (check Class rules).
- Pipe diameters to be designed according to shipyards' practice and component suppliers' recommendations.

\*1) To be delivered by external supplier and to be installed by the shipyard.

\*2) Mesh size according to pump suppliers recommendation.

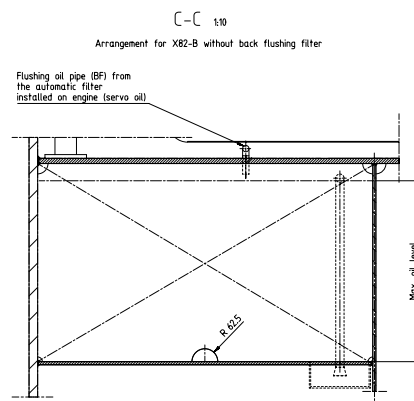
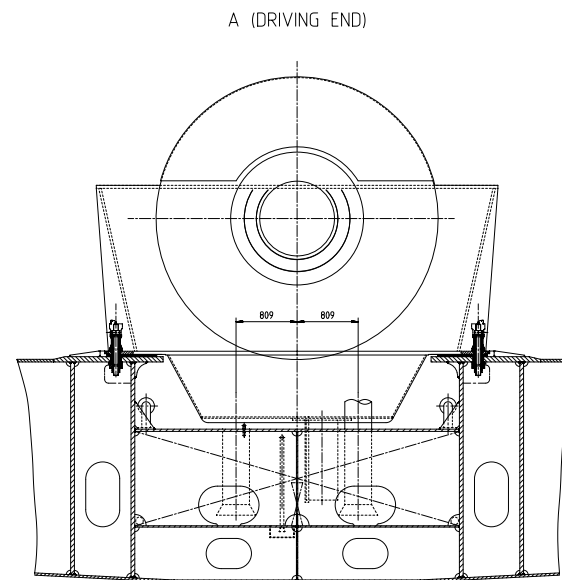
\*3) Recommended position for LO sampling to check LO quality / treatment efficiency.

— Main separating piping  
— Transfer/dirty LO pipes  
- - - Overflow/drain pipes  
..... Air vent pipes



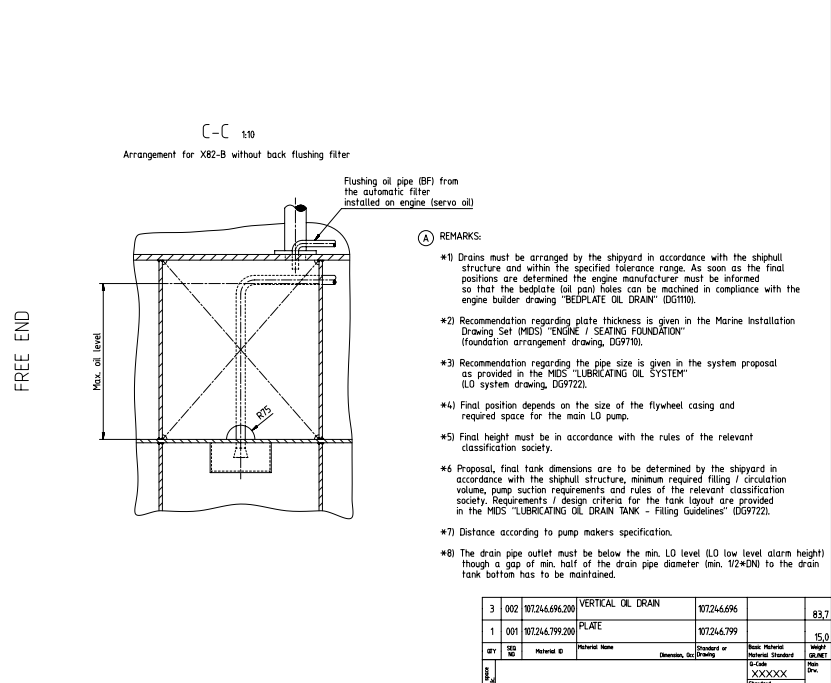
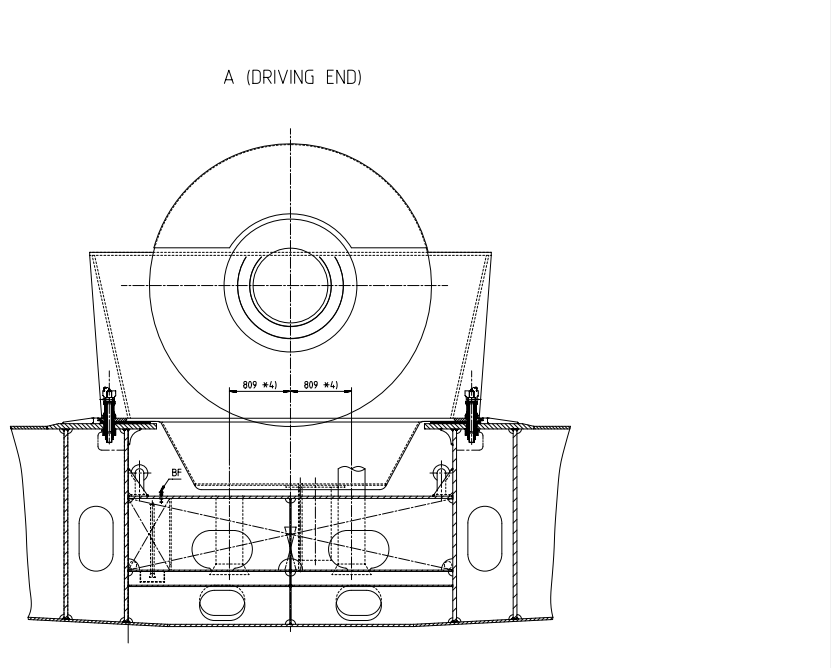
- (A) REMARKS:**
- 1) Drains must be arranged by the shipyard in accordance with the shipboard structure and within the allowed tolerance range. As soon as the final positions are determined the engine manufacturer must be informed so that the bedplate (all pan) holes can be machined in compliance with the engine builder drawing "BEDPLATE AND DRAIN" (DG9701).
  - 2) Recommendation regarding plate thickness is given in the Marine Installation Drawing Set (MDS) "ENGINE / SEATING FOUNDATION" (foundation arrangement drawing, DG9701).
  - 3) Recommendation regarding the pipe size is given in the system proposal as provided in the MDS "LUBRICATING OIL SYSTEM" (I.O system drawing, DG722).
  - 4) Final position depends on the size of the flywheel casing and required space for the main I.O pump.
  - 5) Final height must be in accordance with the rules of the relevant classification society.
  - 6) Proposal, final tank dimensions are to be determined by the shipyard in accordance with the shipboard structure, minimum required filling / circulation volume, pump suction requirements and rules of the relevant classification society. Requirements / design criteria for the tank layout are provided in the MDS "LUBRICATING OIL DRAIN TANK - Filling Guidelines" (DG722).
  - 7) Distance according to pump makers specification.
  - 8) The drain pipe outlet must be below the min. I.O level (low level alarm height) through a gap of min. half of the drain pipe diameter (min. 120mm) to the drain tank housing to be maintained.


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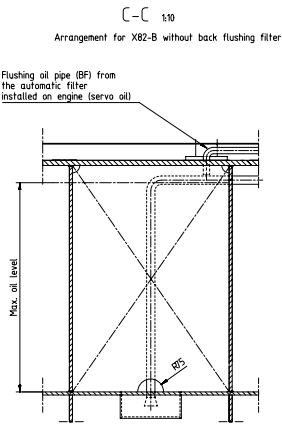
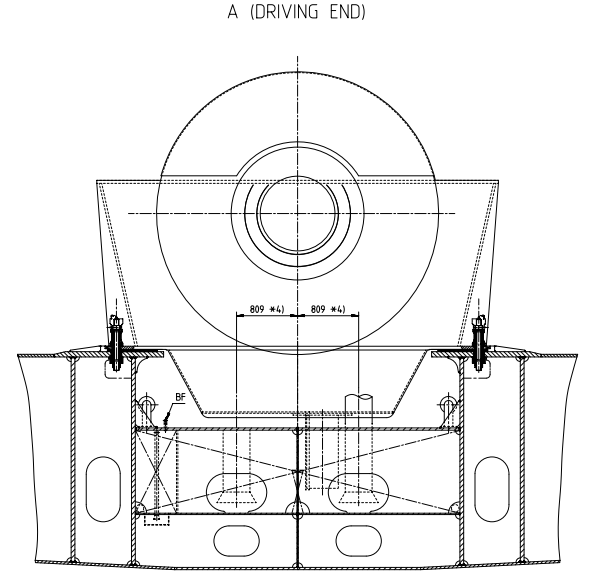
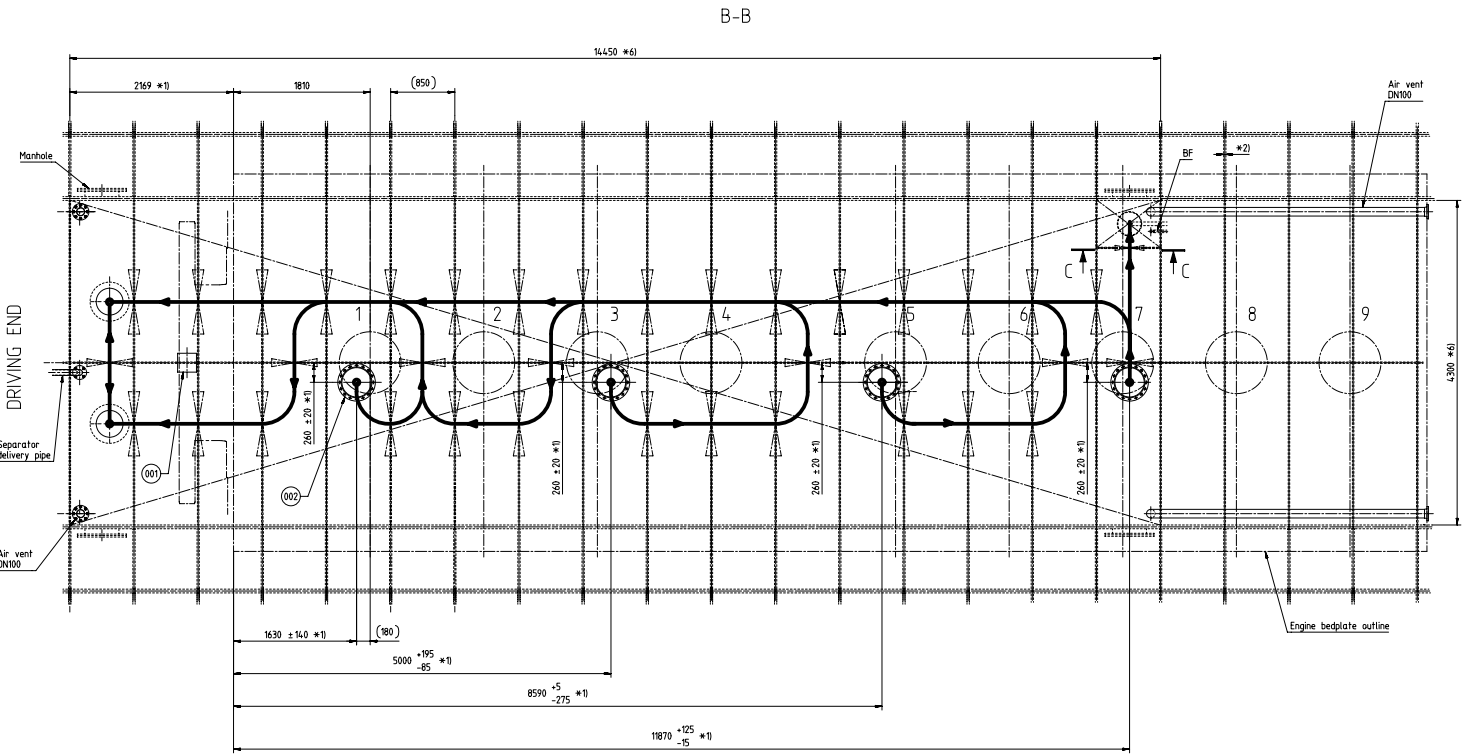
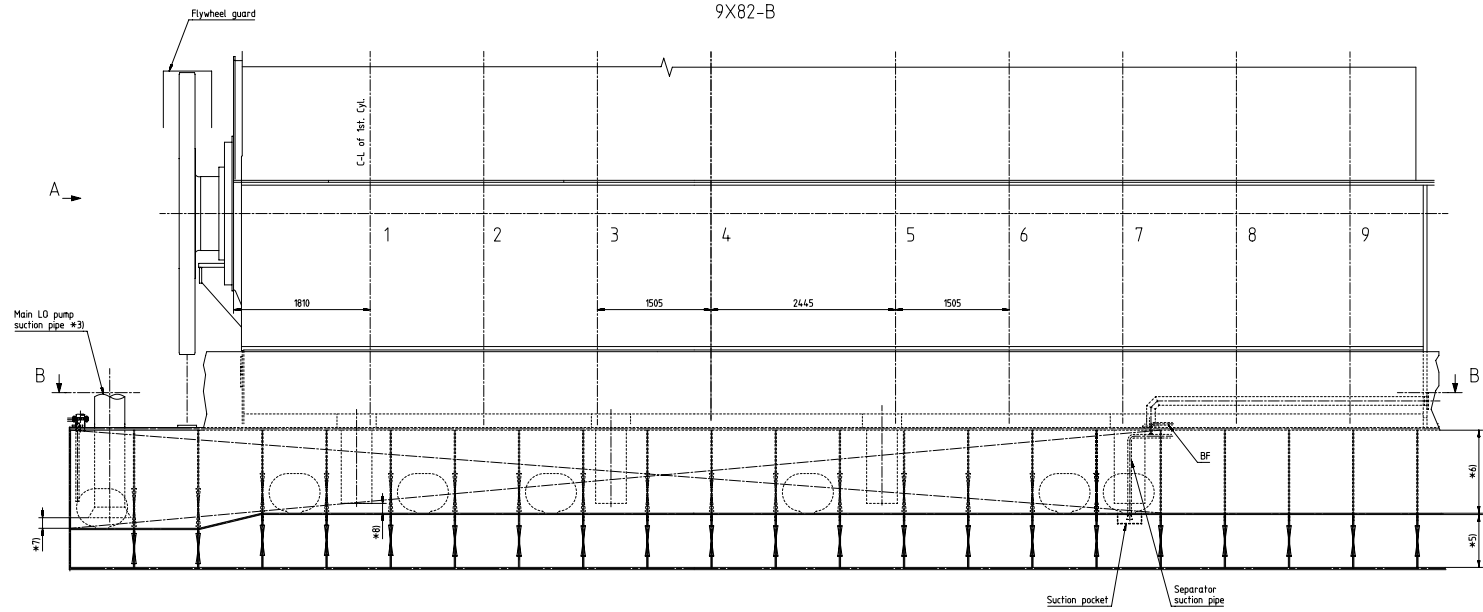
- REMARKS:
- \*1 Drains must be arranged by the shipyard in accordance with the shipyard structure and within the specified tolerance range. As soon as the final positions are determined the engine manufacturer must be informed so that the bedplate (oil pan) holder can be machined in accordance with the engine builder drawing "BEDPLATE OIL DRAIN" (DG710).
  - \*2 Recommendation regarding plate thickness is given in the Marine Installation Drawing Set (MDS) "ENGINE / SEATING FOUNDATION" (foundation arrangement drawing, DG770).
  - \*3 Recommendation regarding the pipe size is given in the system proposal as provided in the MDS "LUBRICATING OIL SYSTEM" (LO system drawing, DG722).
  - \*4 Final position depends on the size of the flywheel casing and required space for the main LO pump.
  - \*5 Final height must be in accordance with the rules of the relevant classification society.
  - \*6 Proposal, final tank dimensions are to be determined by the shipyard in accordance with the shipyard structure, minimum required filling / circulation volume, pump suction requirements and rules of the relevant classification society. Requirements / design criteria for the tank layout are provided in the MDS "LUBRICATING OIL DRAIN TANK - Filling Guidelines" (DG722).
  - \*7 Distance according to pump makers specification.
  - \*8 The drain pipe outlet must be below the min. LO level (LO low level drain height) through a gas seal with a minimum diameter min. 1/2" (N1) to the drain tank bottom has to be maintained.

[illegible]



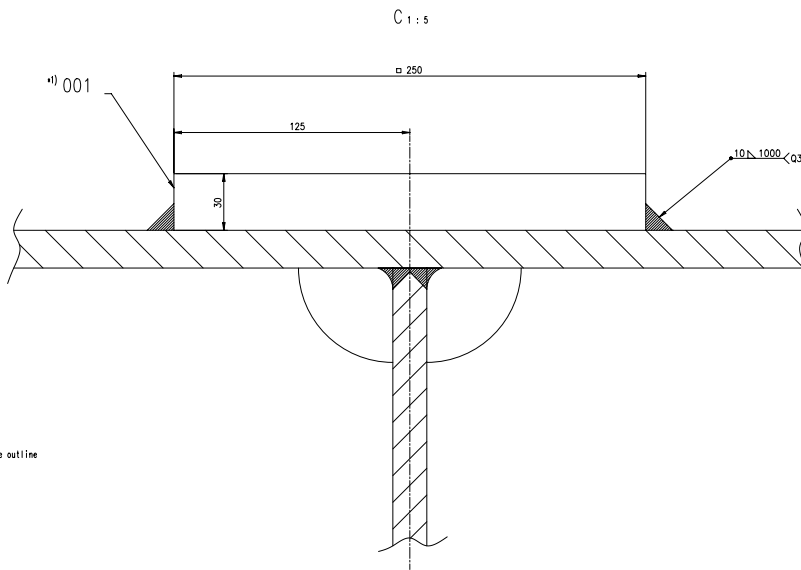
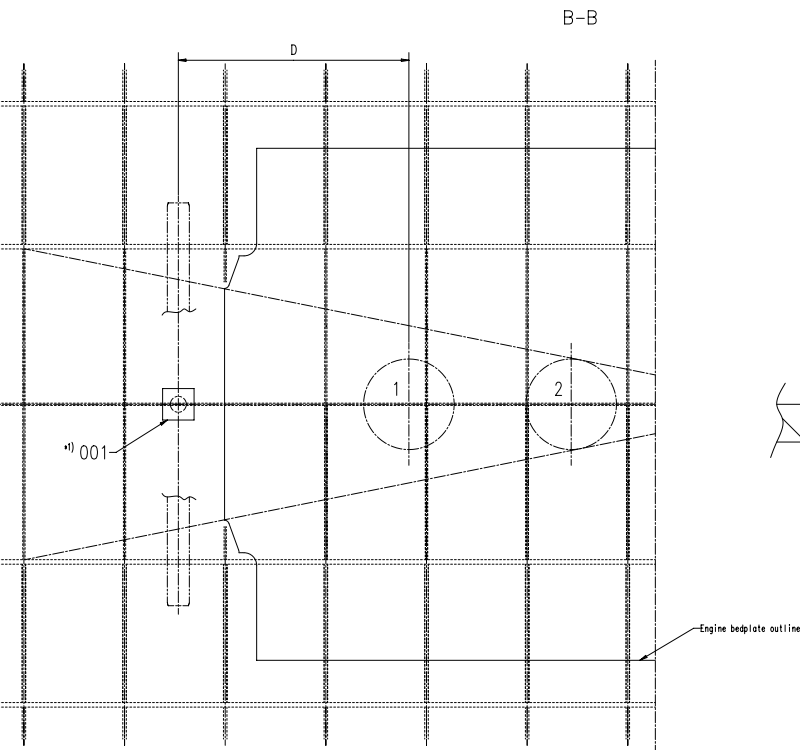
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1	001	70264.799.200	PLATE	70264.799		15,0
QTY	ISO No	Material ID	Material Name	Standard or Dimension, etc.	Special Material Basic Material Material Standard	Weight in Gms. or Mts.
QTY Part No.					XXXXXX Product ISO JS	
A	RANDWOMBS 0101.04.2019					
	Number	Drawing Size	Number	Drawing Size	Number	Drawing Size
B EXBZ-B			LUBRICATING OIL DRAIN TANK WITH VERTICAL DRAINS			
						





- REMARKS:
- \*1) Drains must be arranged by the shipyard in accordance with the shipull structure and within the specified tolerance range. As soon as the final positions are determined the engine manufacturer must be informed so that the bedplate (al pan) holes can be machined in compliance with the engine builder drawing "BEDPLATE OIL DRAIN" (DG1170).
  - \*2) Recommendation regarding plate thickness is given in the Marine Installation Drawing Set (MDS) "ENGINE / SEATING FOUNDATION" (foundation arrangement drawing, DG9710).
  - \*3) Recommendation regarding the pipe size is given in the system proposal as provided in the MDS "LUBRICATING OIL SYSTEM" (LO system drawing, DG9722).
  - \*4) Final position depends on the size of the flywheel casing and required space for the main LO pump.
  - \*5) Final height must be in accordance with the rules of the relevant classification society.
  - \*6) Proposal, final tank dimensions are to be determined by the shipyard in accordance with the shipull structure, minimum required filling / circulation volume, pump suction requirements and rules of the relevant classification society. Requirements / design criteria for the tank layout are provided in the MDS "LUBRICATING OIL DRAIN TANK - Filling Guidelines" (DG9722).
  - \*7) Distance according to pump makers specification.
  - \*8) The drain pipe outlet must be below the min. LO level (LO low level alarm height) though a gap of min. half of the drain pipe diameter (min. 1/2 DN) to the drain tank bottom has to be maintained.

4	002	107246.696.200	VERTICAL OIL DRAIN	107246.696	83,7
1	001	107246.799.200	PLATE	107246.799	15,0
QTY	NO	Material ID	Material Name	Drawn or Drawing	Basic Material
1	001	107246.799.200	PLATE	107246.799	15,0
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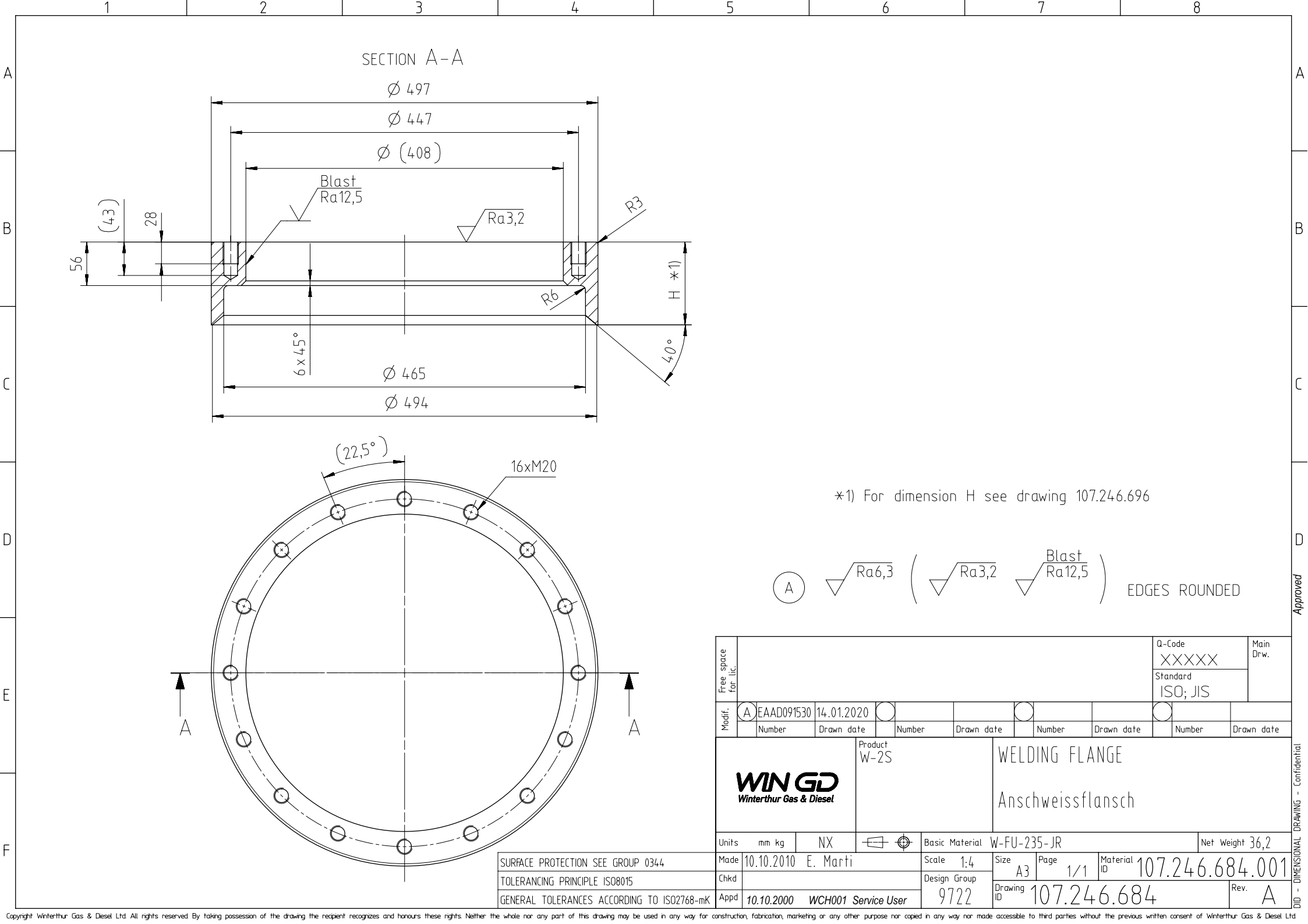
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X35-B	1015	124
X40-B	1170	172
X52/X52DF/X52DF-1,0/X52DF-2,1	1630	325
X62-B/X62DF/X62DF-1,1/X62DF-2,1	1888	343
X72-B/X72DF/X72DF-1,1&1,2/X72DF-2,1&2,2	2131	370
X82-2,0/X82DF-1,0	2395	460
X92-B/-X92DF	2677	334

REMARKS:

a) Access to the plate has to be kept clear for the hydraulic jack, to lift up the flywheel during removal of lower main bearing shell.

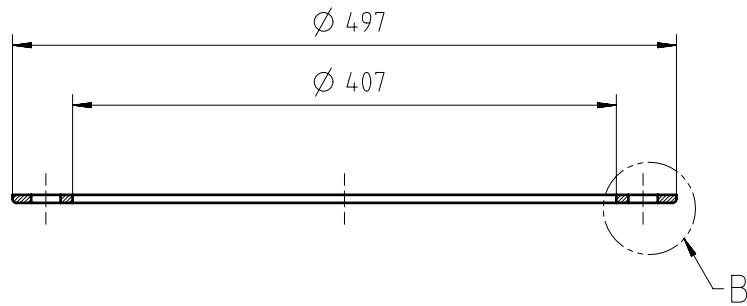
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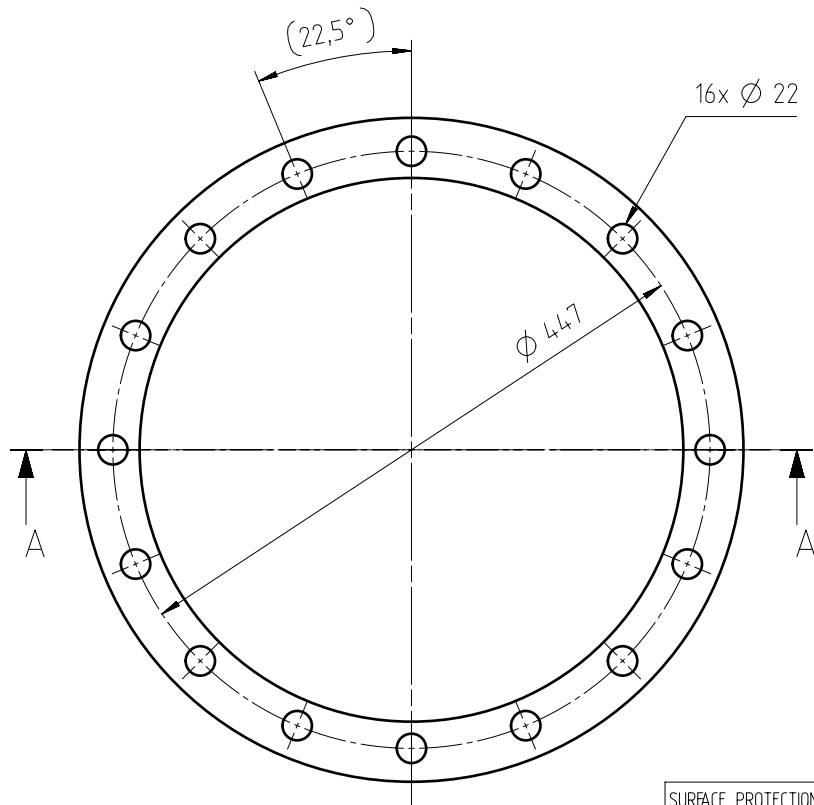
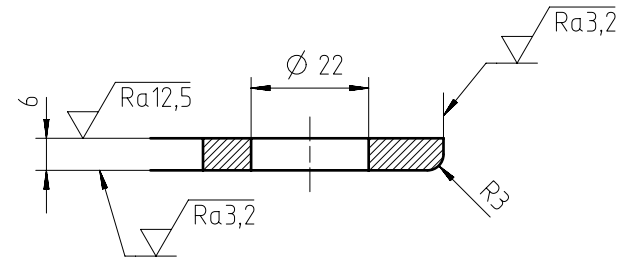


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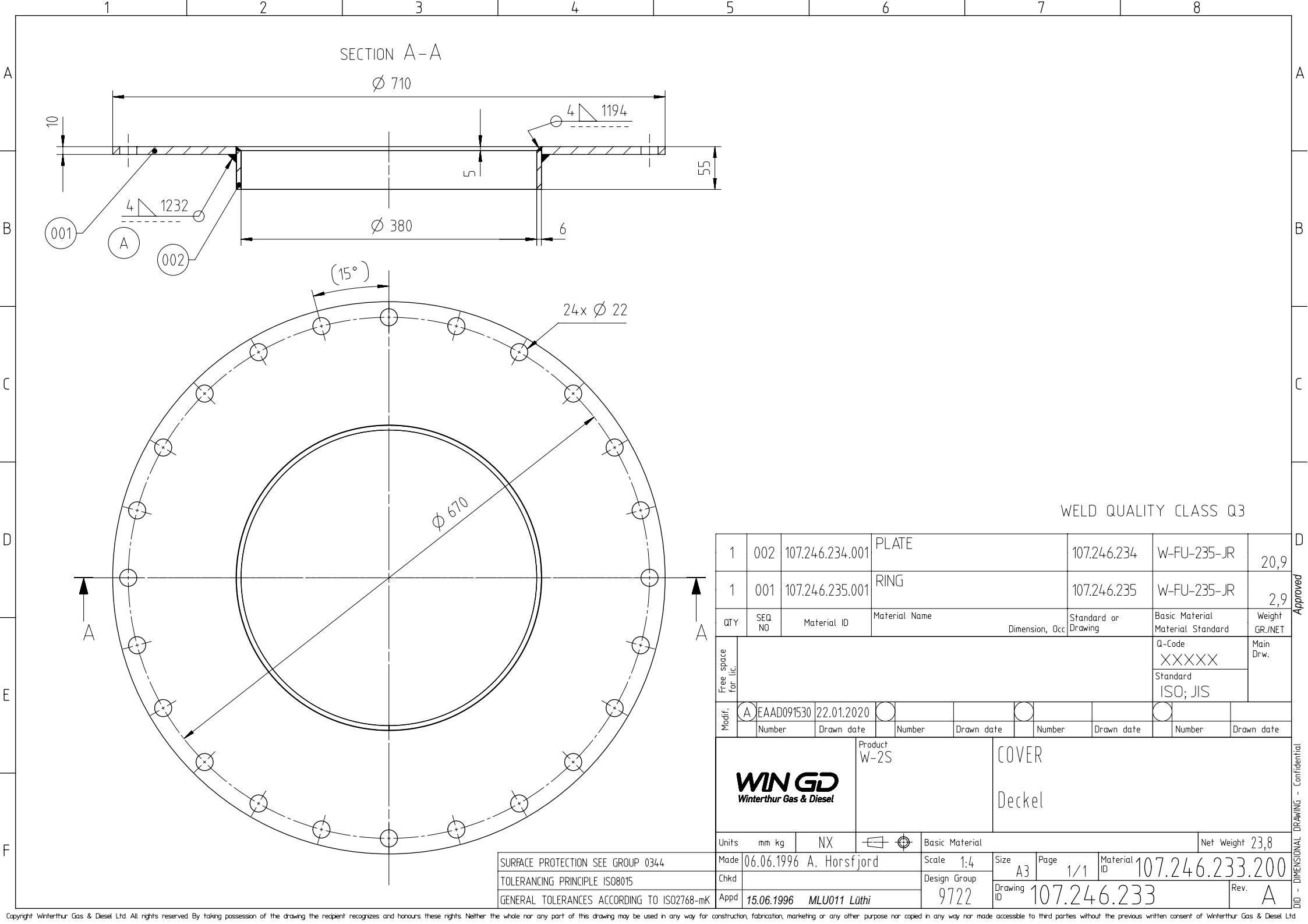
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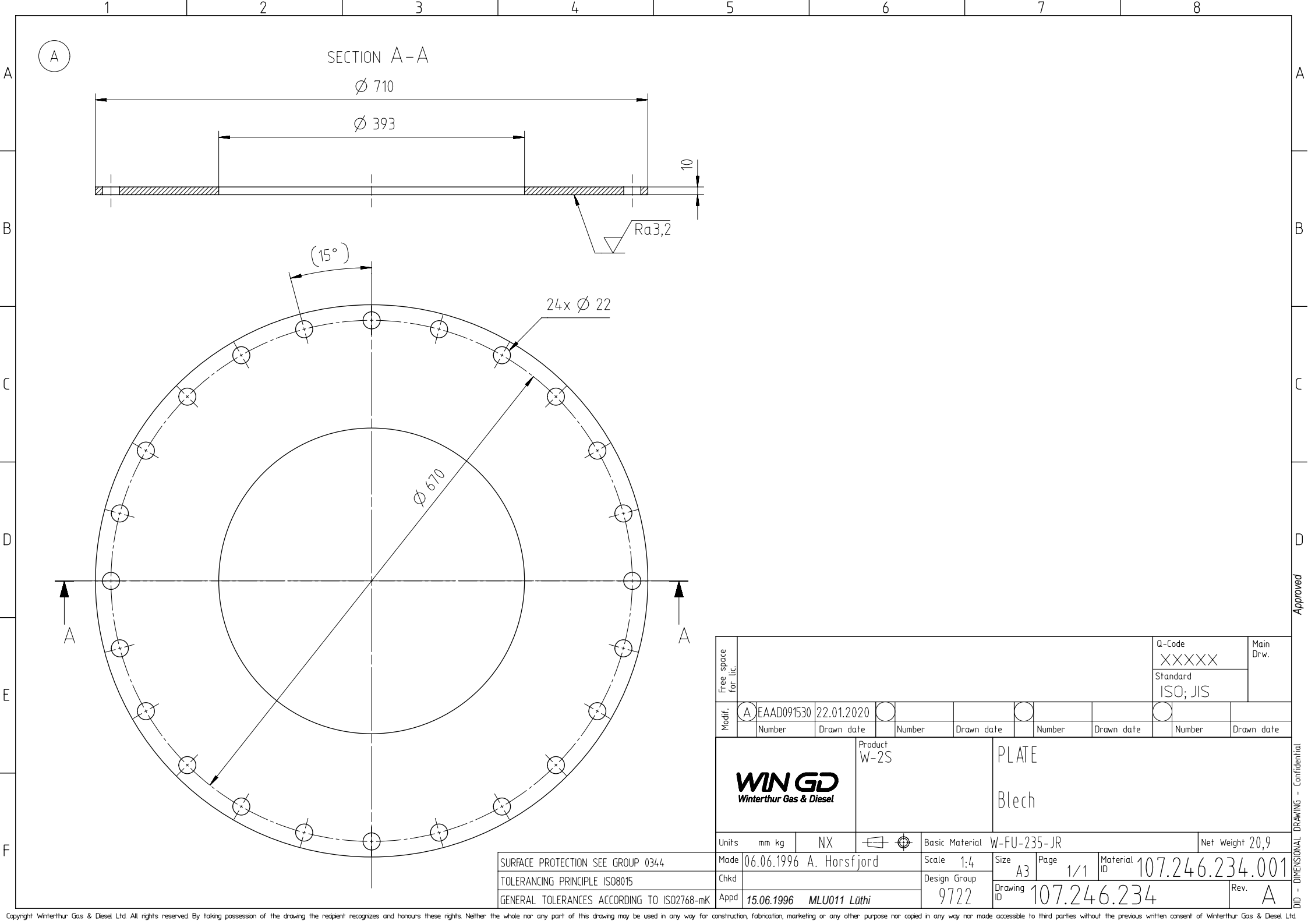


DETAIL B  
SCALE 1:1

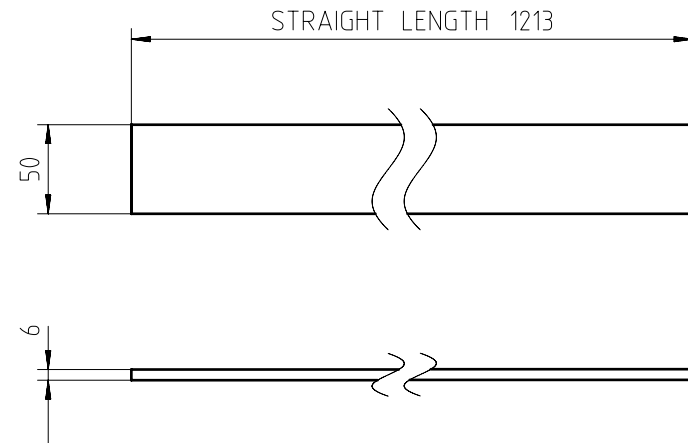
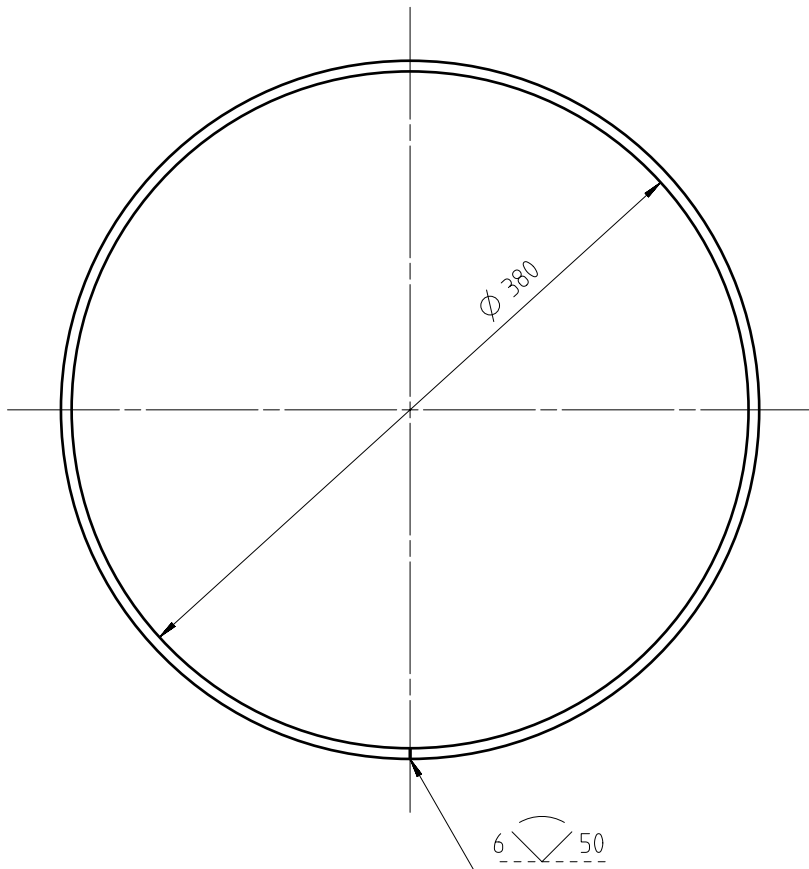
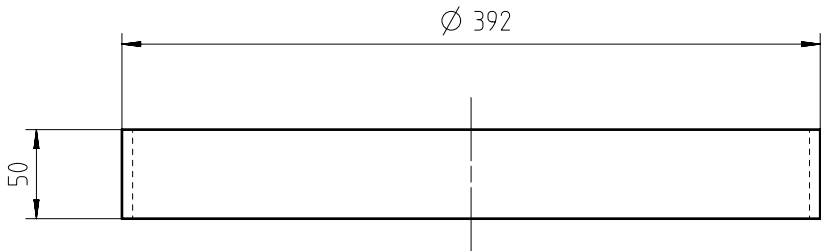


Free space for lic.	Q-Code XXXXX								Main Drw.
	Standard ISO; JIS								
Modif.	A	EAAD091530	22.01.2020						
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number
<b>WIN GD</b> Winterthur Gas & Diesel		Product W-2S		RING  Ring					
Units	mm kg	NX		Basic Material		W-FU-235-JR			Net Weight 2,75
SURFACE PROTECTION SEE GROUP 0344		Made	06.06.1996 A. Horsfjord		Scale	1:4	Size	A3	Page 1/1
TOLERANCING PRINCIPLE ISO8015		Chkd			Design Group	9722		Material ID	107.246.232.001
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	15.06.1996 MLU011 Lüthi		Drawing ID	107.246.232			Rev. A





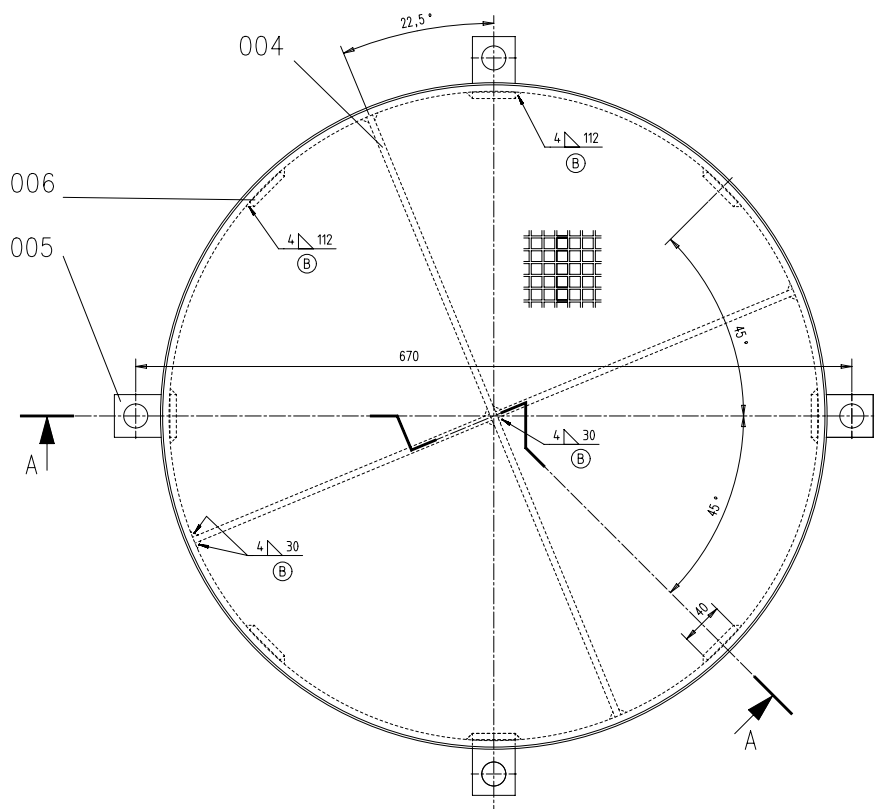
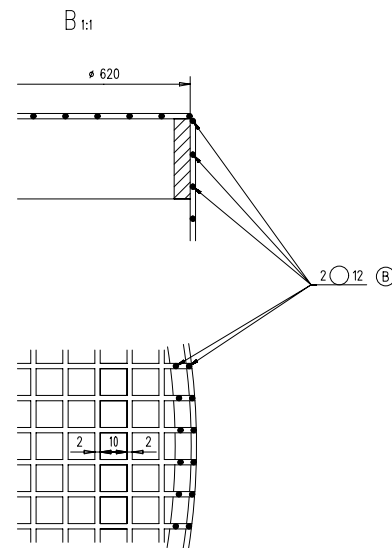
A



WELD QUALITY CLASS Q3

Free space for lic.									Q-Code XXXXX	Main Drw.	
									Standard ISO; JIS		
Modif.	A	EAAD091530	22.01.2020								
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date	
<b>WIN GD</b> Winterthur Gas & Diesel				Product W-2S			RING  Ring				
Units	mm kg	NX				Basic Material W-FU-235-JR			Net Weight 2,9		
SURFACE PROTECTION SEE GROUP 0344				Made 06.06.1996 A. Horsfjord		Scale 1:3		Size A3	Page 1/1	Material ID 107.246.235.001	
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GENERAL TOLERANCES ACCORDING TO ISO2768-mK				Appd 15.06.1996 MLU011 Lüthi							



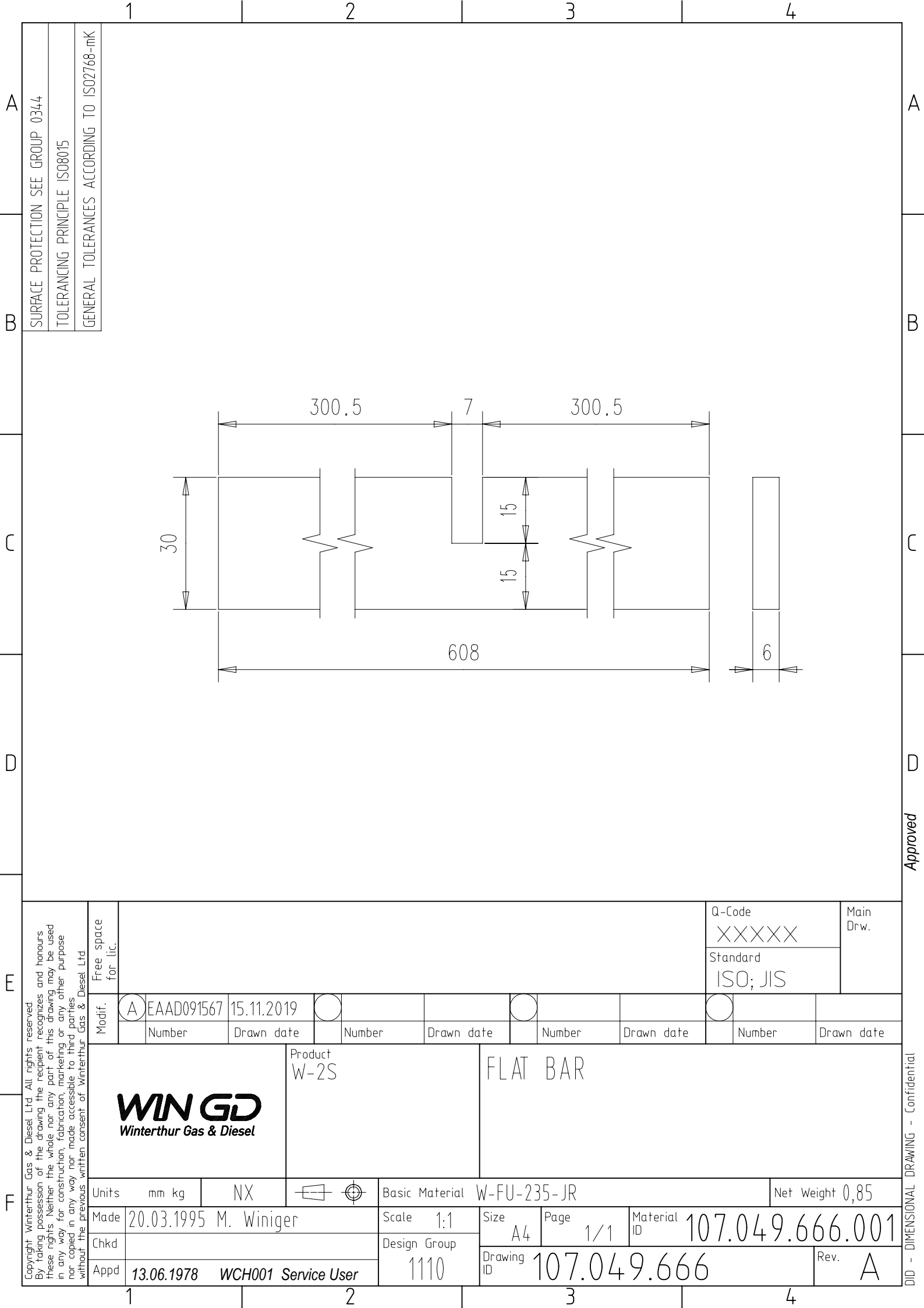


ROUGH CLEANED

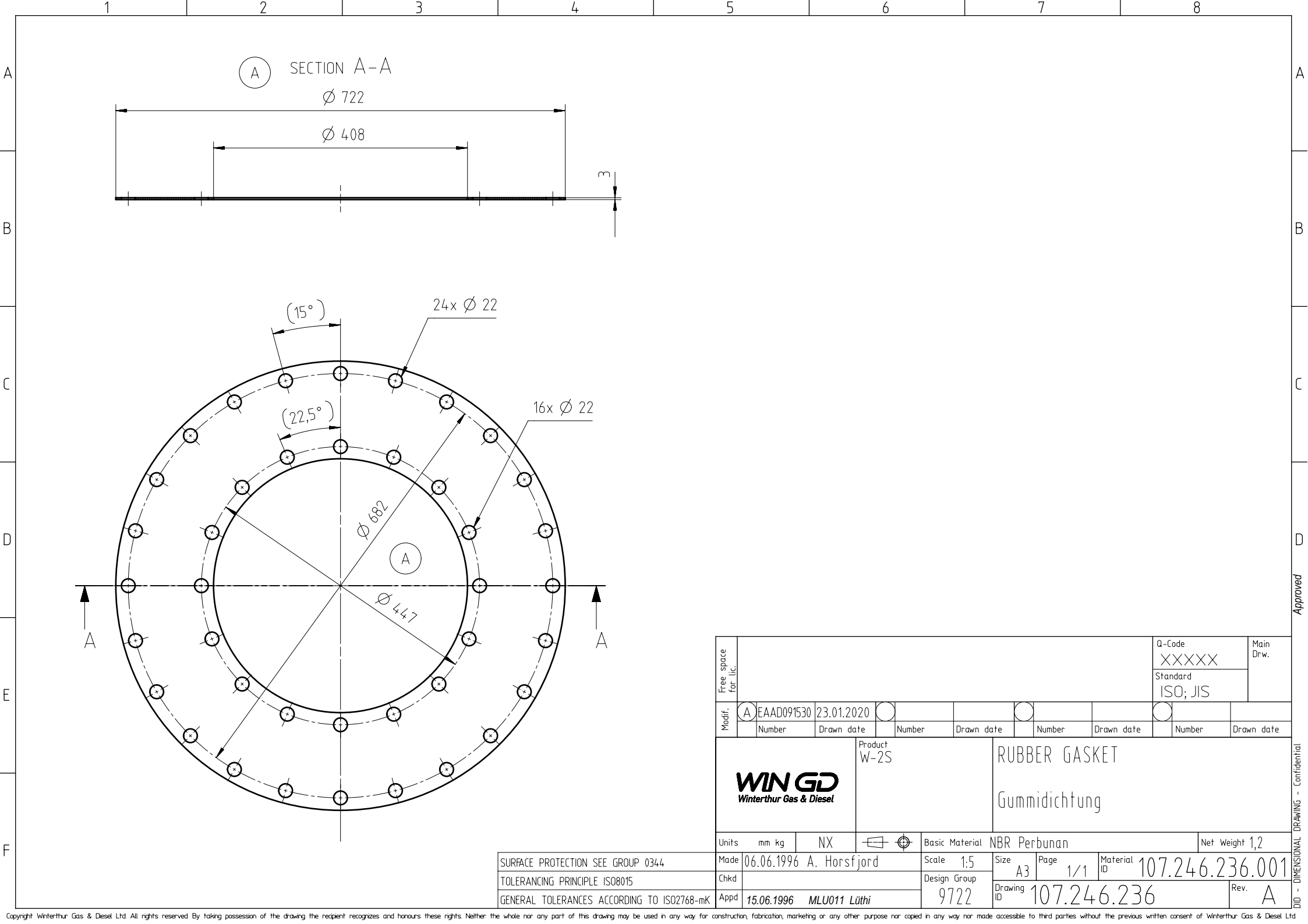
(B) WELD QUALITY LEVEL D (SEE DAAD007749; PAAD013544)

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2	004	107.04.9.666.001	FLAT BAR	107.04.9.666	W-FU-235-JR	0.85	
1	003	107.04.9.664.001	RING	107.04.9.664	W-FU-235-JR	2.7	
1	002	107.04.9.681.002	PERFORATED SHEET	107.04.9.681	W-FU-235-JR	1.4	
1	001	107.04.9.681.001	PERFORATED SHEET	107.04.9.681	W-FU-235-JR	0.9	
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Free space for TC						Q-Code XXXXXX Standard ISO	Main Item
	EA	EA0028037	04.02.2002	EA	EA009567	19.11.2019	
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number
Model	Product W-2S		OIL STRAINER		Oelsieb		
Units	mm	kg	NA	Basic Material		Net Weight 8.3	
Mod	19.06.1978	S.NALI	Scale 1:2.5	Size A1	Page 1/1	Material ID	107.04.9.681.200
Child	Design Group		9722	Drawing ID	107.04.9.681		Rev. B
Appd	19.06.1978	WCH001 Service User					





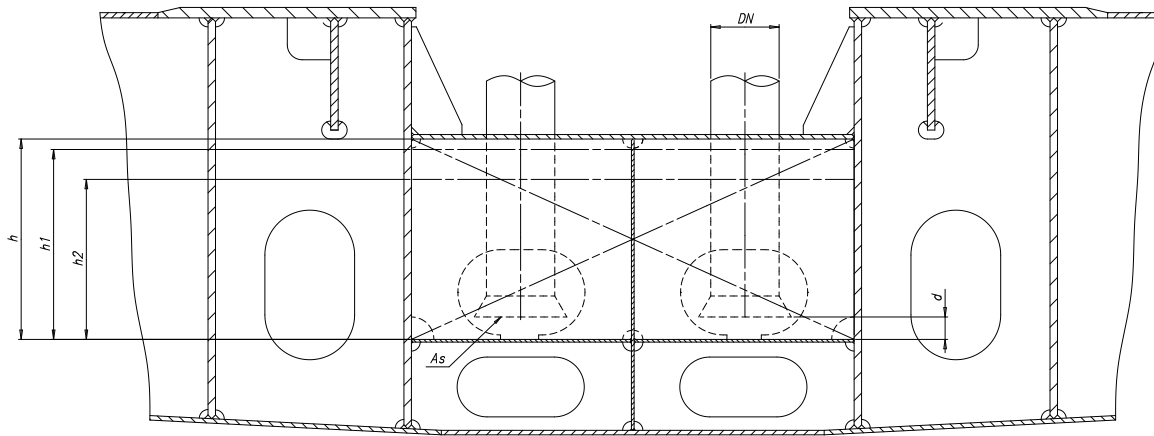
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B	TOLERANCING PRINCIPLE ISO8015																																																																										
	GENERAL TOLERANCES ACCORDING TO ISO2768-mK																																																																										
	<div><div><div>STRAIGHT LENGTH 127</div><div><div><div>6</div><div>80</div><div>R 13</div></div></div></div><div><div><div>20</div><div>38</div><div>40</div><div>20</div><div>20</div><div>58</div><div>22</div></div></div></div>																																																																										
C																																																																											
D																																																																											
	Approved																																																																										
F	<div><div><div>Copyright Winterthur Gas &amp; Diesel Ltd. All rights reserved. By taking possession of the drawing the recipient recognizes and honours these rights. Neither the whole nor any part of this drawing may be used in any way for construction, fabrication, marketing or any other purpose nor copied in any way nor made accessible to third parties without the previous written consent of Winterthur Gas &amp; Diesel Ltd.</div><div><div>Free space for lic.</div><div>Q-Code XXXXXX</div><div>Standard ISO; JIS</div><div>Main Drw.</div></div></div><table><tr><td>Modif.</td><td>A</td><td>EAAD091567</td><td>15.11.2019</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td>Number</td><td>Drawn date</td><td></td><td>Number</td><td>Drawn date</td><td></td><td>Number</td><td>Drawn date</td><td></td><td>Number</td></tr></table><div><div><div><div>WIN GD</div><div>Winterthur Gas &amp; Diesel</div></div><div><div>Product</div><div>W-2S</div></div><div><div>HOLDER</div></div></div></div><table><tr><td>Units</td><td>mm kg</td><td>NX</td><td><div><div></div><div></div></div></td><td colspan="4">Basic Material W-FU-235-JR</td><td colspan="2">Net Weight 0,24</td></tr><tr><td>Made</td><td colspan="3">20.03.1995 M. Winiger</td><td>Scale</td><td>1:1</td><td>Size</td><td>A4</td><td>Page</td><td>1/1</td><td>Material</td><td>107.049.665.001</td></tr><tr><td>Chkd</td><td colspan="3"></td><td>Design Group</td><td colspan="2"></td><td>Drawing ID</td><td colspan="3">107.049.665</td><td>Rev.</td><td>A</td></tr><tr><td>Appd</td><td colspan="3">13.06.1978 WCH001 Service User</td><td colspan="2">1110</td><td colspan="3"></td><td colspan="3"></td></tr></table></div>				Modif.	A	EAAD091567	15.11.2019											Number	Drawn date		Number	Drawn date		Number	Drawn date		Number	Units	mm kg	NX	<div><div></div><div></div></div>	Basic Material W-FU-235-JR				Net Weight 0,24		Made	20.03.1995 M. Winiger			Scale	1:1	Size	A4	Page	1/1	Material	107.049.665.001	Chkd				Design Group			Drawing ID	107.049.665			Rev.	A	Appd	13.06.1978 WCH001 Service User			1110							
Modif.	A	EAAD091567	15.11.2019																																																																								
		Number	Drawn date		Number	Drawn date		Number	Drawn date		Number																																																																
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Chkd				Design Group			Drawing ID	107.049.665			Rev.	A																																																															
Appd	13.06.1978 WCH001 Service User			1110																																																																							
	1	2	3	4																																																																							



Specifications that need to be met:

Dimensioning guidelines and capacities for tank design

© W-X82/W-X82-B/W-X82DF



No. of cylinders			6	7	8	9	
D	h	Recommended total tank height	(mm)	acc. to installation requirements			
		Recommended total tank volume: 105% *4)	(m³)	31	35	40	45
D	h1	Recommended filling level	(m³)	acc. to installation requirements			
		Recommended volume: 100% *4)	(m³)	29	34	38	43
D	h2	Low-level alarm	(mm)	*2)			
		Volume	(m³)				
D	Vr	Min. retention volume *5)	(m³)	15	17	20	22
	d	Distance between suction pipe and bottom of tank	(mm)	*3)			
	As	Suction area					
				min. 1.5 x suction pipe area (DN)			

#### REMARKS:

- \*1) Level after filling of external system. Volume and level in the LO drain tank depend on capacity of pipes, coolers, filters, etc. The oil volume in tank contains a part of the oil quantity, which drains back when the pumps are stopped.
- \*2) The low-level alarm (h2) has to be positioned in such a way that a proper pump suction is ensured under the conditions defined by the classification societies.

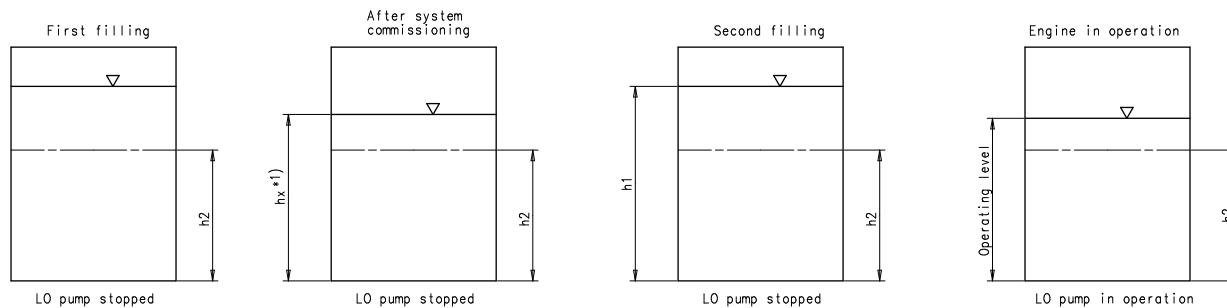
Minimum inclination angles comply with the rules of classification societies:

Heel to each side	15°
Rolling to each side	±22.5°
Trim	500/L; max. 5°
	L: ship length in meter
	Example L = 250 m
	Trim = 500/250 = 2°
Pitching	± 7.5°

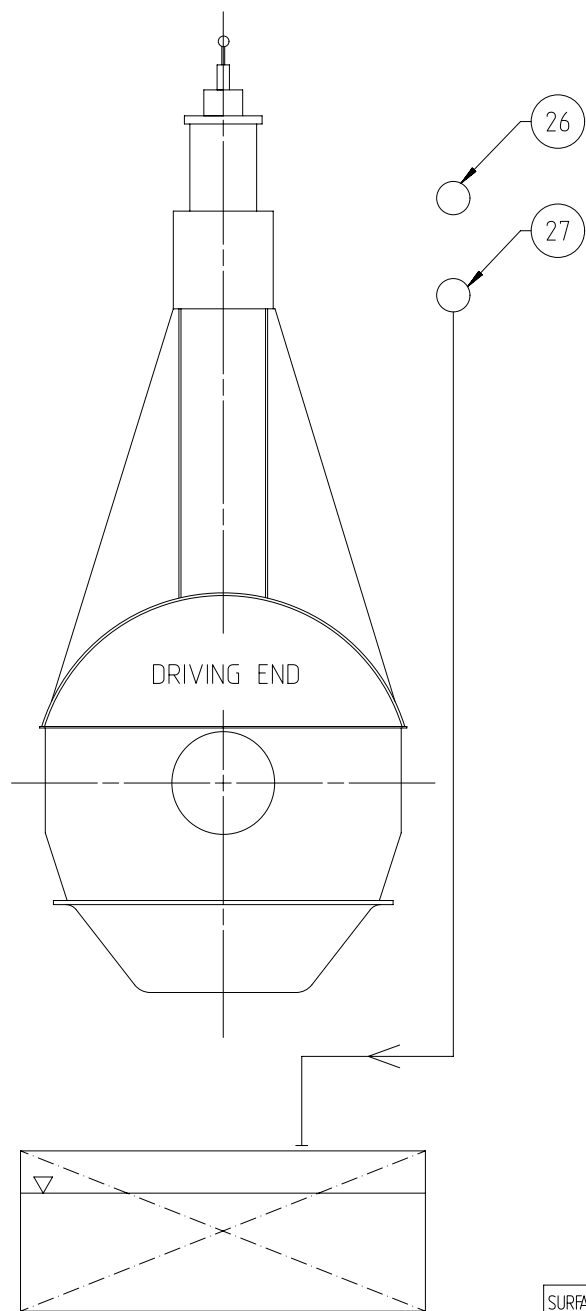
Additionally this level has to be above or equal to the minimum retention volume (Vr) for M/E operation.

- \*3) Distance (d) between suction pipe inlet of main LO pumps and LO drain tank bottom has to be in accordance with the requirements of the pump manufacturer. As guideline the following formula can be applied:  $d = DN/4 + 40$ ,  $d = \text{min. } 80 \text{ mm}$ .
- \*4) The stated tank volume represent the min. requirement. Final tank dimensions have to be aligned in regard to dimensional restrictions by ship and engine structure and the pump suction requirement.
- \*5) To be maintained during engine operation (LO pump suction without LO drain back-flow (emergency case) is ensured for at least 3 minutes).

#### LO DRAIN TANK - FILLING PROCESS





Free space for I.C.		Q-Code XXXXX		Min. Drw.	
Standard ISO JIS					
A) EAD084624 28.05.2013		B) EAD086020 15.07.2015		C) EAD086282 16.11.2015	
D) EAD086531 04.04.2016					
Number	Drawn date	Number	Drawn date	Number	Drawn date
WIN G2		Product W-82		LUBRICATING OIL DRAIN TANK FILLING GUIDELINE	
Units mm kg IDE		Basic Material		Net Weight 0,001	
Mode 22.05.2008 W.Wroblewski		Scale 1:25		Page 1/1	
TOLERANCING PRINCIPLE ISO8015		Design Group		Material 107.400.395.500	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd 02.02.2010 JBA029 Baumann		Drawing ID 107.400.395	
				Rev. D	

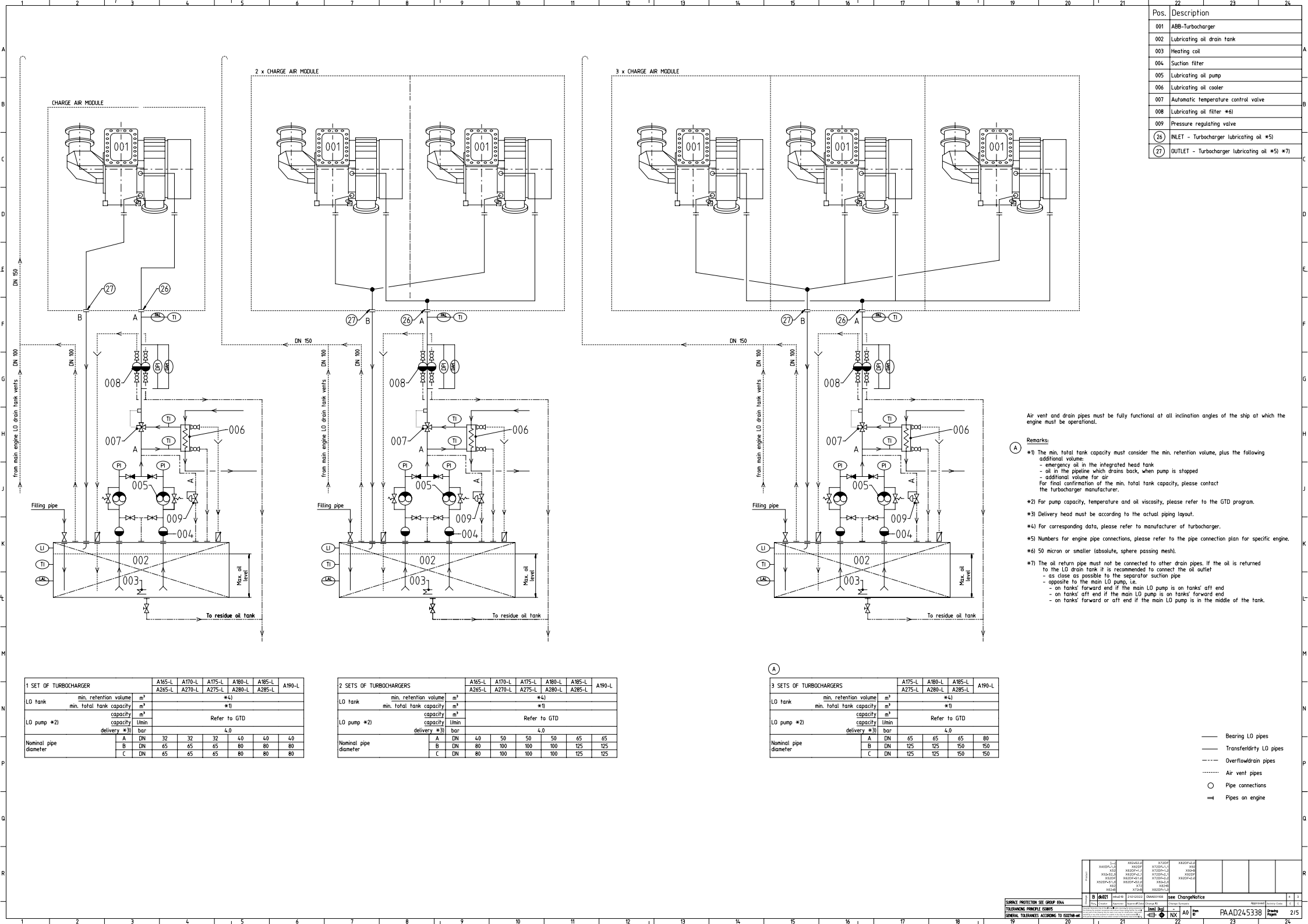


A

## SPECIFICATION which must be met

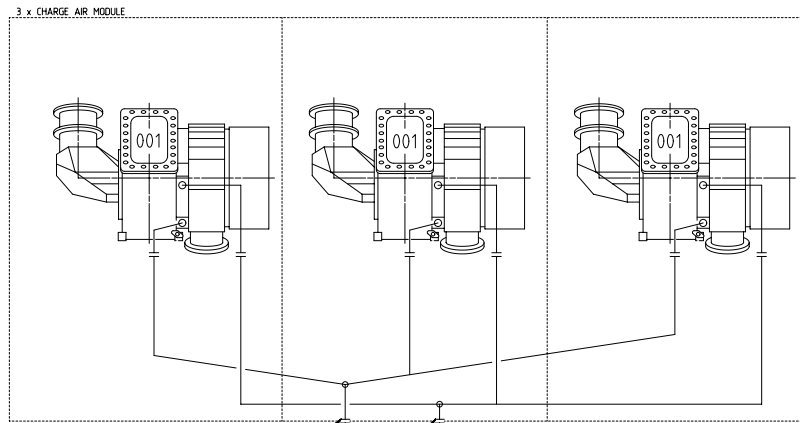
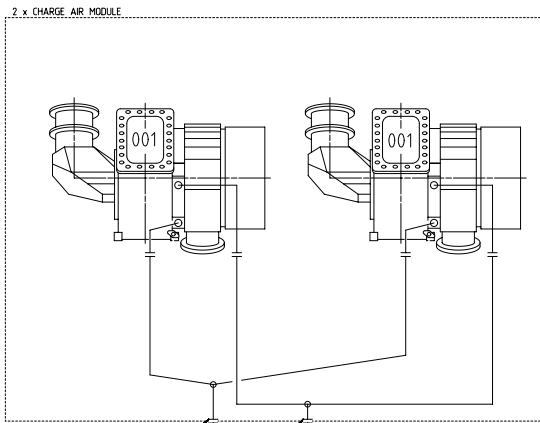
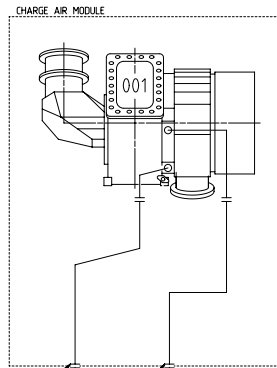
- 26 INLET - Turbocharger lubricating oil
- Lubricating oil temperature:
    - ABB: 30 ~ 85 °C
    - MHI: 35 ~ 50 °C
  - Lubricating oil pressure
    - ABB: 0.8 ~ 2.5 bar
    - MHI: 0.6 ~ 1.5 bar
  - Lubricating oil volume flow: according to the turbocharger maker's recommendation
  - Lubricating oil cleanliness:
    - Full flow filtered by a 50 micron (absolute sphere passing mesh) automatic self-cleaning filter
    - Offline cleaning of the oil return (including back-flushing oil)
- 27 OUTLET - Turbocharger lubricating oil
- Oil return to lubricating oil drain tank
  - Oil return pipe must not be connected to other drain pipes.
  - Oil outlet must be above the max. oil level in the tank or as an alternative a drain pipe with venting holes above the max. oil level needs to be installed.

Prod.	CX40DF CX52		RT-flex48T-D RT-flex50-B		RT-flex50-D RT-flex50DF		RT-flex58T-B RT-flex58T-D		RT-flex58T-D V1 RT-flex58T-D V2		RT-flex58T-ES RT-flex58TD ER-3		CR-HHM-PILOT X35-B		X40-B [...]	
Change History	B	dkl021	mhu019	21.01.2022	CNAA001108	see ChangeNotice									4	3
	A	dkl021	mhu019	08.09.2020	EAAD091530	Legacy information. See corresponding ChangeNotice									4	-
	-	dkl021	bha009	16.12.2016		-									-	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis								Approved	Activity Code	E
					LUBRICATING OIL SYSTEM FOR SEPARATED TC LUBRICATING											
					Dimension											
Scale		-		NX	Units [mm] [kg]		Basic Material					Net Weight 0.000				
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					Qty per		A3 Item ID		PAAD245338		Drawing Page/s		1/5			









Pos.	Description
001	M4-Turbocharger (MET-MB)
002	Lubricating oil drain tank
003	Heating coil
004	Suction filter
005	Lubricating oil pump
006	Lubricating oil cooler
007	Automatic temperature control valve
008	Lubricating oil filter #6)
009	Pressure regulating valve
26	INLET - Turbocharger lubricating oil #5)
27	OUTLET - Turbocharger lubricating oil #5) #7)

- Remarks:
- #1) The min. total tank capacity must consider the min. retention volume, plus the following additional volume:
    - emergency oil in the integrated head tank
    - oil in the pipeline which drains back, when pump is stopped
    - additional volume for air
 For final confirmation of the min. total tank capacity, please contact the turbocharger manufacturer.
  - #2) For pump capacity, temperature and oil viscosity, please refer to the GTD program.
  - #3) Delivery head must be according to the actual piping layout.
  - #5) Numbers for engine pipe connections, please refer to the pipe connection plan for specific engine.
  - #6) 30 micron or smaller (absolute, sphere passing mesh).
  - #7) The oil return pipe must not be connected to other drain pipes. If the oil is returned to the LO drain tank it is recommended to connect the oil outlet
    - as close as possible to the separator suction pipe
    - opposite to the main LO pump, i.e.
      - on tanks' forward end if the main LO pump is on tanks' aft end
      - on tanks' aft end if the main LO pump is on tanks' forward end
      - on tanks' forward or aft end if the main LO pump is in the middle of the tank.

(A)												
1 SET OF TURBOCHARGER			MET33MB	MET37MB	MET42MB	MET48MB	MET53MB	MET60MB	MET66MB	MET77MB	MET83MB	MET90MB
LO tank	min. retention volume	m³	0.21	0.26	0.31	0.41	0.49	0.61	0.77	1.01	1.23	1.50
	min. total tank capacity	m³	*1)									
LO pump #2)	capacity	l/min	Refer to GTD									
	delivery #3)	bar	4.0									
Nominal pipe diameter	A	DN	20	25	25	32	32	32	32	32	40	50
	B	DN	40	50	50	65	65	80	80	100	100	125
	C	DN	40	50	50	65	65	80	80	80	100	100

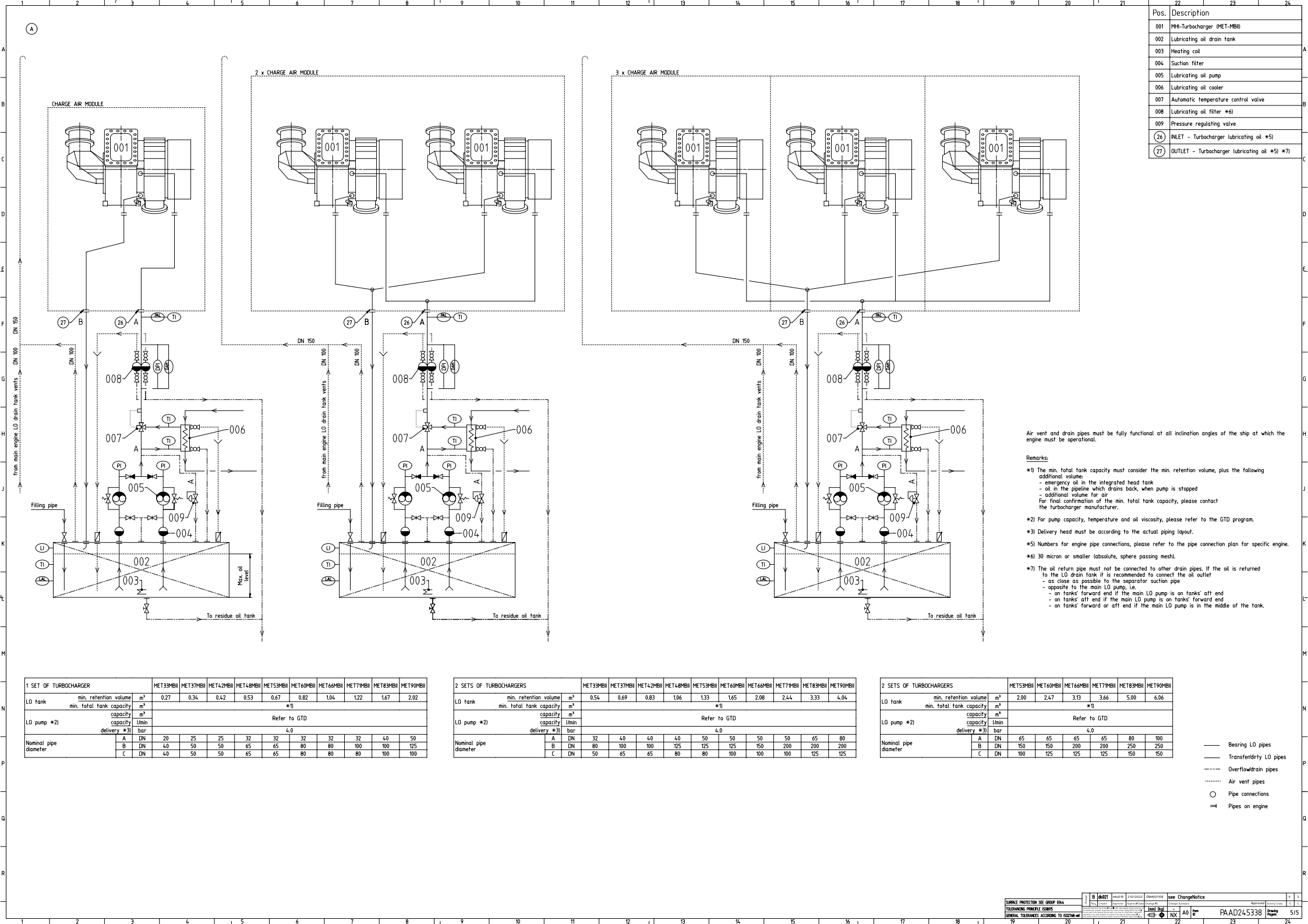
(A)																						
2 SETS OF TURBOCHARGERS			MET33MB		MET37MB		MET42MB		MET48MB		MET53MB		MET60MB		MET66MB		MET77MB		MET83MB		MET90MB	
LO tank	min. retention volume	m³	0.41		0.52		0.62		0.82		0.99		1.22		1.53		2.02		2.46		2.99	
	min. total tank capacity	m³	*1)																			
LO pump *2)	capacity	l/min	Refer to GTD																			
	delivery *3)	bar	4.0																			
Nominal pipe diameter	A	DN	32	40	40	40	50	50	50	50	50	50	65	80								
	B	DN	80	100	100	100	125	125	125	150	200	200	200	200	200							
	C	DN	50	65	65	65	80	80	80	100	100	100	100	125	125	125						

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**3 SETS OF TURBOCHARGERS**

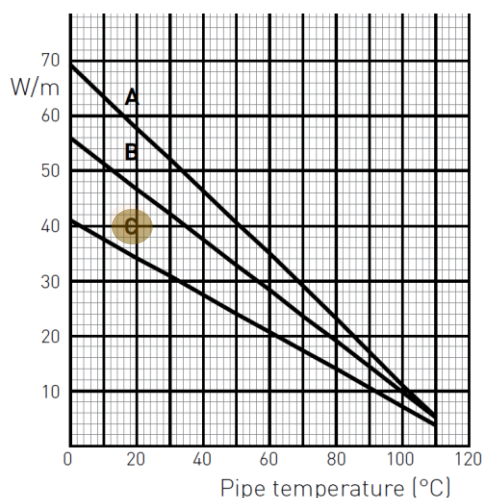
			MET33MB	MET60MB	MET66MB	MET77MB	MET83MB	MET90MB	
LO tank	min. retention volume	m <sup>3</sup>	0.41	0.52	0.62	0.82	0.99	1.22	
	min. total tank capacity	m <sup>3</sup>	*1)						
LO pump #2)	capacity	m <sup>3</sup>	Refer to GTD						
	capacity	l/min	4.0						
Nominal pipe diameter		delivery #3)	bar						
		A	DN 45	45	45	45	45	80	100
		B	DN 150	150	200	200	250	250	250
		C	DN 100	125	125	125	150	150	150

- Bearing LO pipes
- Transfer/dry LO pipes
- Overflow/drain pipes
- ..... Air vent pipes
- Pipe connections
- ≡ Pipes on engine



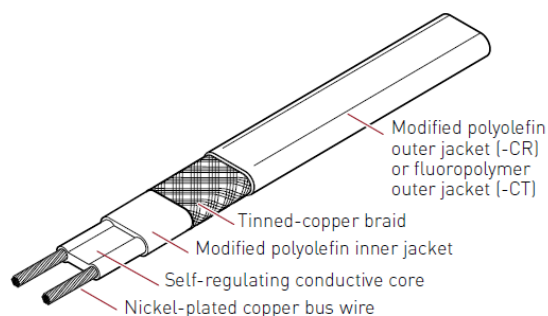
# Self-Regulating Heating Cable 10QTVR2-CT

Order drawing



C 10QTVR2-CT

## Heating cable construction



## Specification:

Description: 10QTVR2-CT  
Order No.: 391991-000  
Area Classification: Non-hazardous and hazardous locations  
Traced surface type: Metal and plastic  
Chemical Resistance: Exposure to aqueous inorganic chemicals: Use -CR (modified polyolefin outer jacket)  
Exposure to organic chemicals or corrosives: Use -CT (fluoropolymer outer jacket)  
Supply Voltage: 200-277 VAC  
Temperature Rating: Maximum maintain or continuous exposure temperature (power on) 225°F (110°C)  
Maximum intermittent exposure temperature, 1000 hours (power on) 225°F (110°C)  
Minimum installation temperature -76°F (-60°C)  
Minimum Bending Radius: 13 mm at 20°C  
35 mm at -60°C  
Height: 4.5 mm  
Width: 11.8 mm  
Weight: 0.126 kg/m

Supplier:  **PENTAIR**  
www.pentairthermal.com

MAXIMUM CIRCUIT LENGTH BASED ON TYPE 'C' CIRCUIT BREAKERS ACCORDING TO EN60898		
SUPPLY VOLTAGE 230 VAC		
Electrical protection sizing	Start-up temperature	Maximum heating cable length per circuit [m]
16A	-20°C	65
	+10°C	80
25A	-20°C	95
	+10°C	115
32A	-20°C	115
	+10°C	115
40A	-20°C	115
	+10°C	115

Substitute for: PC Q-Code X S X X X

Modif	A	EAAD090454	05.03.2019						
Number	Drawn Date	Number	Drawn Date	Number	Drawn Date	Number	Drawn Date	Number	Drawn Date

**WINGD**  
Winterthur Gas & Diesel

Product  
**W-2S**

Heating Element  
Order Drawing

Made	24.10.2018	P. Kowalski	Main Drw.	Page	1 / 1	Material ID	<b>PAAD308926</b>		
Chkd	24.10.2018	R. Leutwyler	Design Group	Drawing ID		<b>DAAD106761</b>		Rev	
Appd	24.10.2018	W. Östreicher	<b>0009</b>						

## MIDS - WinGD-X82-B - LUBRICATING-OIL-SYSTEM (DG9722)

### TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2017-02-24	DRAWING SET	First web upload
2018-05-18	107.398.114 DAAD071685	System drgs – new revision
2018-10-18	107.398.114 DAAD071685	System drgs – new revision
2019-07-24	107.432.793 DAAD026074 107.398.517 DAAD039452	LO drain tank drgs – new revision
2019-09-26	DAAD071685	System drg – new revision
2020-09-24	107.398.114 107.246.696 107.246.684 107.246.232 107.246.233 107.246.234 107.246.235 107.049.681 107.049.664 107.049.666 107.049.665 107.246.236 DAAD083642	System and tank assembly drgs – new revision
2020-11-25	DAAD039452	Lubricating oil drain tank drg – new revision
2021-05-19	107.246.799	Hydraulic jack plate positioning drawing – new revision
2022-07-18	107.398.114.500 PAAD207844	System drgs – new revision

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