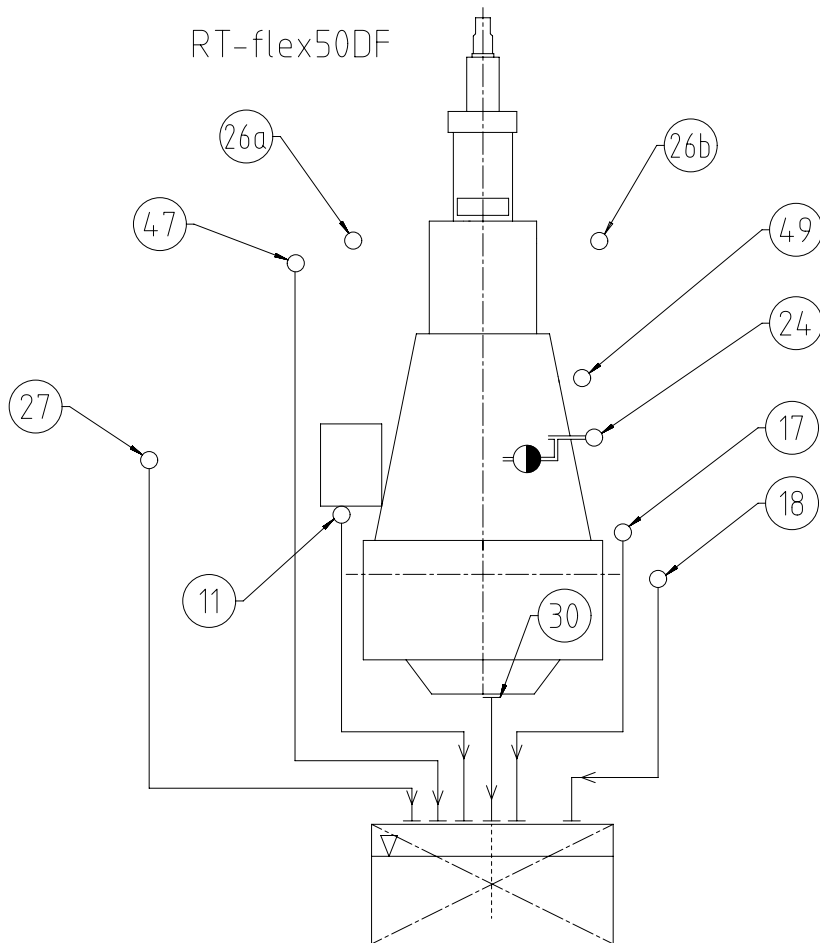


				EXECUTIONS			
OPTIONS	iCAT	WITH			X	X	
		WITHOUT	X	X			
	Turbocharger lubrication	INTERNAL	X		X		
		EXTERNAL		X		X	
		Net Weight					
		154	154	154	154		
		1	1	1	1		
		006	107.351.598.500	INSTRUCTION FOR FLUSHING Filling Instruction			
				107.351.598			
		1	1	1	1		
		005	107.402.236.500	LUBRICATING OIL DRAIN TANK			
				107.402.236			
		1	1	1	1		
		004	107.342.995.200	LUBRICATING OIL DRAIN TANK			
				107.342.995			
		154					
		-	1	-	1		
		003	PAAD245338	LUBRICATING OIL SYSTEM external turbocharger LO system			
				DAAD083642			
		1	1	-	-		
		002	PAAD310815	LUBRICATING OIL SYSTEM without iCAT			
				DAAD107842			
		-	-	1	1		
		001	PAAD154434	LUBRICATING OIL SYSTEM with iCAT			
				DAAD047717			
					0,001		
		Quantity PER ENGINE		SEQ NO	Material ID		
		Material Name		Standard or Drawing	Basic Material Material Standard		
		Dimension, Occ		Weight GR./NET			
		Free space for lic.		Q-Code XXXXXX	Main Drw. H		
		Standard ISO; JIS					
		Modif.		A EAAD087222 09.02.2017 B EAAD090034 08.07.2019 C EAAD095915 19.01.2021			
		Material ID		Number Drawn date Number Drawn date Number Drawn date			
		PAAD326438		Product 7RT-flex50DF			
		PAAD326437		LUBRICATING OIL SYSTEM			
		PAAD326436		Schmieroelsystem			
		PAAD326435					
		Units mm kg NX		Basic Material			
		Net Weight					
		SURFACE PROTECTION SEE GROUP 0344		Made 31.10.2014 mhu019 M.Hug			
		TOLERANCING PRINCIPLE ISO8015		Chkd 01.11.2014 bha009 Haag			
		GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd 01.11.2014 bha009 Haag			
		Scale -		Size A3 Page 1/1 Material ID			
		Design Group		Drawing ID DAAD055668 Rev. C			
		9722					

SPECIFICATION WHICH MUST BE MET

- (47) OUTLET- Servo system oil return (engine free end)
- Free flow by gravity to lubricating oil drain tank.
- (49) 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: 10-12 bar *)
*) A pressure control devise (e.g. a bypass line with a pressure regulating valve or pump flow adjustment, or a frequency converter to adjust the pump speed) is needed.
- Lubricating oil volume flow: according to GTD
- Lubricating oil cleanliness:
- Full flow filtered by a 35 micron (absolute sphere passing mesh) automatic self-cleaning filter
- Bypass flow of the automatic self-cleaning filter (only active during maintenance of the automatic self-cleaning filter) filtered by a 35 micron (absolute sphere passing mesh) filter.
- Offline cleaning of the lubricating oil in the drain tank by self-cleaning centrifugal separators.

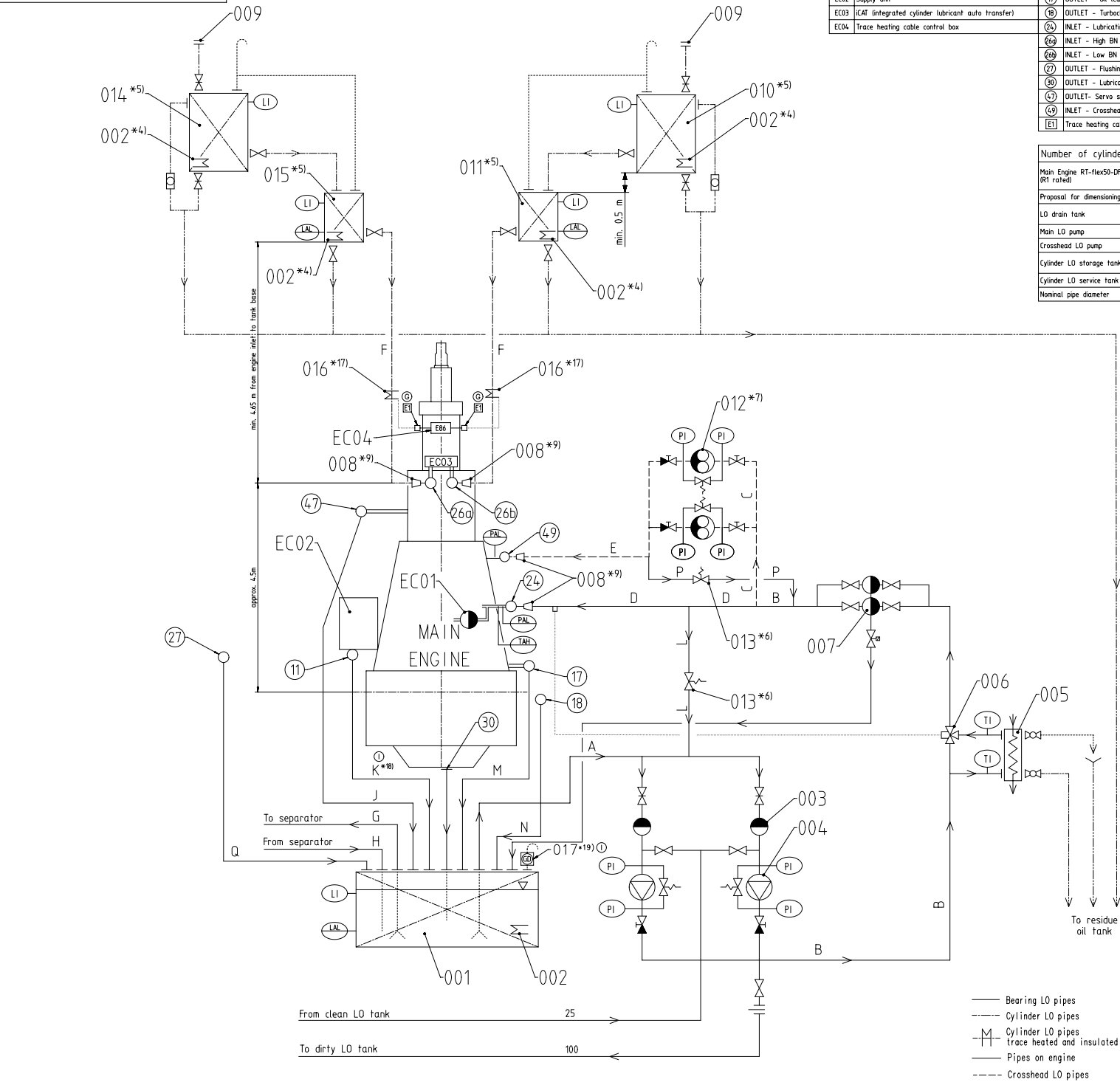
RT-flex50DF



- (11) OUTLET- Supply unit oil return
- Free flow by gravity to lubricating oil drain tank.
- (17) OUTLET - Oil leakage exhaust valve, oil return from driving end
- Free flow by gravity to lubricating oil drain tank
- (18) OUTLET - Turbocharger lubricating oil
- Must be not connected to other oil return lines.
- Pipe outlet above the oil level in the LO drain tank or drain pipe with venting holes above max. oil level to be installed.
- Connected to the lubricating oil drain tank, opposite to the main lubricating oil pump, i.e.
- on tank's forward end if main lubricating oil pump suction is on tank's aft end.
- on tank's aft end if main lubricating oil pump suction is on tank's forward end.
- on tank's forward or aft end if main lubricating oil pump suction is in middle of tank.
- (24) 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: 4-6 bar *)
*) A pressure control devise (e.g. a bypass line with a pressure regulating valve or pump flow adjustment, or a frequency converter to adjust the pump speed) is needed.
- Lubricating oil volume flow: according to GTD
- LO amount on engine side: mentioned in table 1 on page 2
- Lubricating oil cleanliness:
- Full flow filtered by a 50 micron (absolute sphere passing mesh) automatic self-cleaning filter.
- 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.
- Offline cleaning of the lubricating oil in the drain tank by self-cleaning centrifugal separators.
- (26a) INLET - High BN cylinder lubricating oil
- Cylinder lubricating oil temperature: 40⁺¹⁰₋₅ °C.
- Trace heating to be applied on the cylinder LO feed line on ship side. ①
- Cylinder lubricating oil static pressure: min. 0.4 bar.
- (26b) INLET - Low BN cylinder lubricating oil
- Cylinder lubricating oil temperature: 40⁺¹⁰₋₅ °C.
- Trace heating to be applied on the cylinder LO feed line on ship side. ①
- Cylinder lubricating oil static pressure: 0.4 bar.
- (27) OUTLET - Flushing oil from automatic filter
- Back-flushing oil to be returned to the lubricating oil drain tank.
- The back-flushing pipe must not be connected to other drain pipes.
- (30) OUTLET - Lubricating oil from bedplate
- Oil return via vertical oil drain to lubricating oil drain tank:
Vertical oil drain position must be within the permissible range as specified on the LO drain tank drawing
The shipyard is to inform the engine manufacturer of the final position.

1	016	PAAD308926	HEATING ELEMENT	10QTVR2-CT	DAAD106761												
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 XXXXX Standard ISO; JIS	Main Drw.										
Modif.	F	EAAD089872	19.10.2018	G	EAAD090374	08.07.2019	H	EAAD091970	29.06.2020	I	EAAD095915	19.01.2021					
Number		Drawn date		Number		Drawn date		Number		Drawn date		Number		Drawn date			
WIN GD			Product RT-flex50DF			LUBRICATING OIL SYSTEM with iCAT Schmieroelsystem											
Units			mm kg			NX			Basic Material			Net Weight 0,001					
SURFACE PROTECTION SEE GROUP 0344			Made 12.08.2014 mhu019 M.Hug			Scale -			Size A2			Page 1/3			Material ID PAAD154434		
TOLERANCING PRINCIPLE ISO8015			Chkd 13.08.2014 abr030 Brückl			Design Group			Drawing ID 9722			Rev. I			DAAD047717		
GENERAL TOLERANCES ACCORDING TO ISO2768-mK			Appd 13.08.2014 abr030 Brückl			7922											

SYSTEM PROPOSAL
System oil and cylinder LO supply



Pos.	ENGINE COMPONENTS *3)
EC01	Automatic filter
EC02	Supply unit
EC03	ICAT (integrated cylinder lubricant auto transfer)
EC04	Trace heating cable control box

Pos.	ENGINE CONNECTIONS *2)
①	OUTLET - Supply unit oil return
②	OUTLET - Oil leakage pipe exhaust valve driving end
③	OUTLET - Turbocharger lubricating oil *14) *15)
④	INLET - Lubricating oil
⑤	INLET - High BN cylinder lubricating oil *8)
⑥	INLET - Low BN cylinder lubricating oil *8)
⑦	OUTLET - Flushing oil from automatic filter *14)
⑧	OUTLET - Lubricating oil from bedplate
⑨	OUTLET - Servo system oil return (engine free end)
⑩	INLET - Crosshead lubricating oil
⑪	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 *10) *14)
008	Transition piece (adaptor) *9)
009	Deck connection
010	Low BN (grade1) cylinder lubricating oil storage tank *5)
011	Low BN (grade 1) cylinder lubricating oil service tank *5)
012	Crosshead lubricating oil pump *7)
013	Pressure regulating valve
014	High BN (grade 2) cylinder lubricating oil storage tank *5)
015	High BN (grade 2) cylinder lubricating oil service tank *5)
016	Electrical trace heating cable (detailed spec. are linked on page 1)
017	Gas detector *19) ①

Number of cylinders	5	6	7	8
Main Engine RT-flex50-DF (R1 rated)	power (kW) 7200	8640	10080	11520
	speed (rpm) 124			

Proposal for dimensioning *12)		
LO drain tank	capacity (m³)	For capacities refer to drawing "LO drain tank-Filling Guideline"
Main LO pump	capacity (m³/h)	refer to GTD
Crosshead LO pump	capacity (m³/h)	refer to GTD
Cylinder LO storage tank	capacity (m³)	Based on a feed rate of 1g/kWh (pulse)
Cylinder LO service tank *16)	capacity (m³)	0.5 0.5 0.6 0.7
Nominal pipe diameter	A DN 200	200 250 250

B	DN 150	200	200	200	
C	DN 150	150	200	200	
D	DN 125	125	150	150	
E	DN 125	125	150	150	
F	DN 32	32	32	32	
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					
J	DN 50	50	50	50	
K	DN 40	40	40	40	
L	DN 80	80	80	80	
M	DN 65	65	65	65	
N	DN 65	65	65	65	
P	DN 65	65	80	80	
Q	DN 20	20	20	20	

Cylinder	Volume
5	1272 l
6	1445 l
7	1618 l
8	1792 l

Cylinder	Volume
5	1272 l
6	1445 l
7	1618 l
8	1792 l

- Remarks:
- Air vent pipes 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.
 - *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 the pressure regulating valve can be omitted if one of the following conditions is fulfilled:
 - ① 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 valves.
 - The pump built-in safety valve is in any case mandatory and not to be used for pressure regulation (pure safety function).
 - *7) The LO pumps (pos. 004) and the crosshead LO pumps (pos. 012) are to be interlocked.
 - *8) The crosshead LO are not to be operated without the LO pumps.
 - *9) Switching between the different oil qualities (high BN and low BN) is done on engine side by ICAT "EC03".
 - *10) Installed as required (check with the "Pipe Connection Plan")
 - *11) 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 air blowing into the oil. Back-flushing oil must be treated.
 - ① *12) All capacities and the given diameters are valid for the mentioned rating including the integrated turbocharger lubrication, but excluding any possibly installed damper and PTO gears, and serve just as an example. To make the layout for the project specific rating please refer to D6730 "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.
 - *13) Mesh size according to pump supplier's recommendation.
 - *14) 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 and 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.
 - *15) The oil outlet in the LO drain tank must be above the max. oil level or as an alternative a drain pipe with venting holes above the max. oil level needs to be installed.
 - *16) The proposed cylinder LO services tank capacity takes into account a filling interval of 2 days based on the above mentioned feed rate.
 - *17) To be connected to the control box (EC04) on engine side.
 - ① *18) In case a separate fuel pump lubrication circuit is applied the pipe size can be reduced to DN25.
 - ① *19) Conditional, if requested by the flag state and/or class to achieve compliance. This must be installed in accordance with all associated requirements, e.g. maximum distance from the tank venting outlet connection.

- Bearing LO pipes
- - - Overflow/drain pipes
- - - Air vent pipes
- M - Cylinder LO pipes trace heated and insulated
- Pipes on engine
- - - Crosshead LO pipes
- Pipe connections
- Electrical interface connections

WINGSD

Manufacturer and Supplier

RT-flex50DF

LUBRICATING OIL SYSTEM with ICAT

Schmierölsystem

17.08.2014

19.07.2019

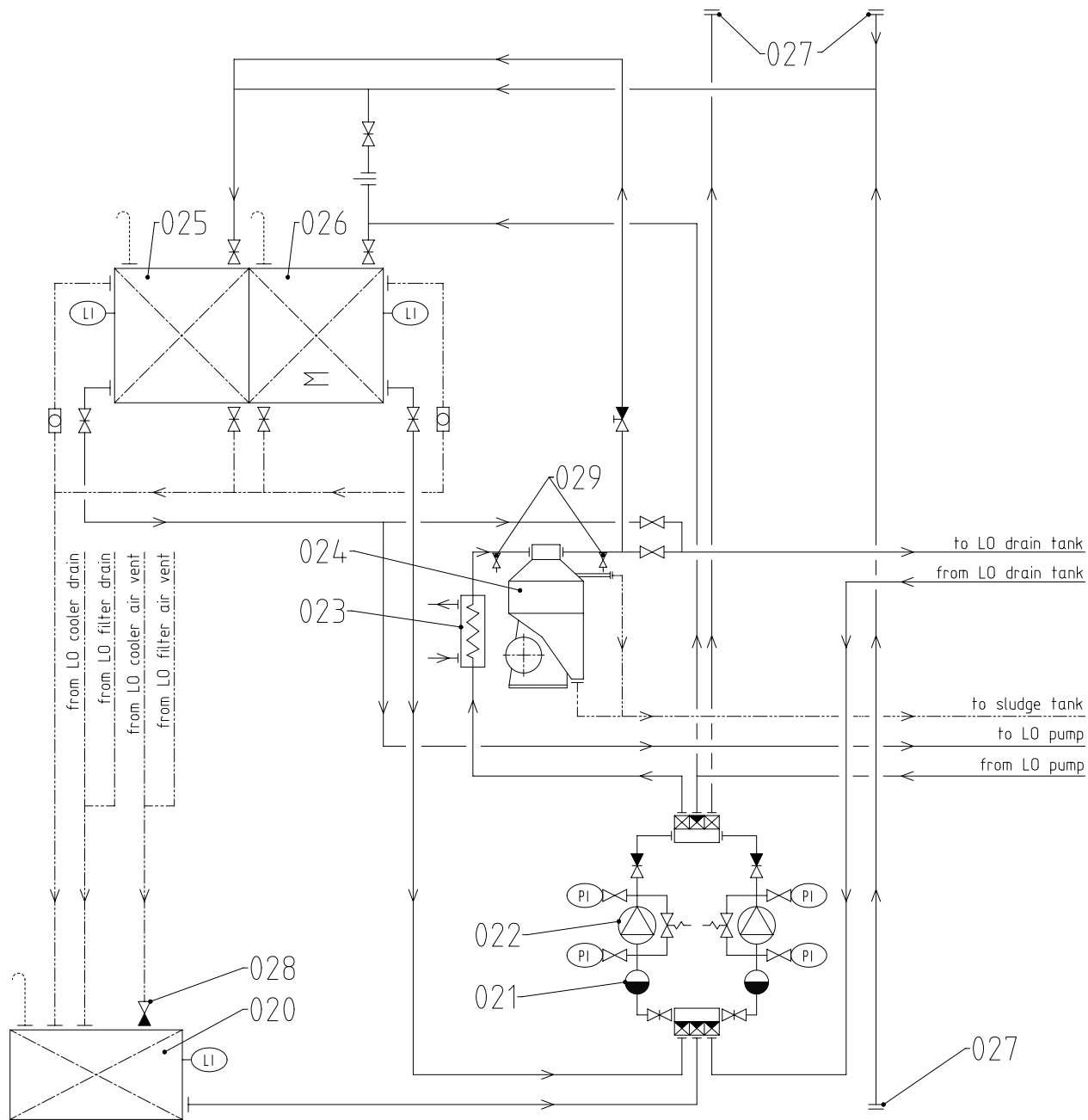
19.06.2020

19.01.2021

PAAD154434

DAAD047717

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)

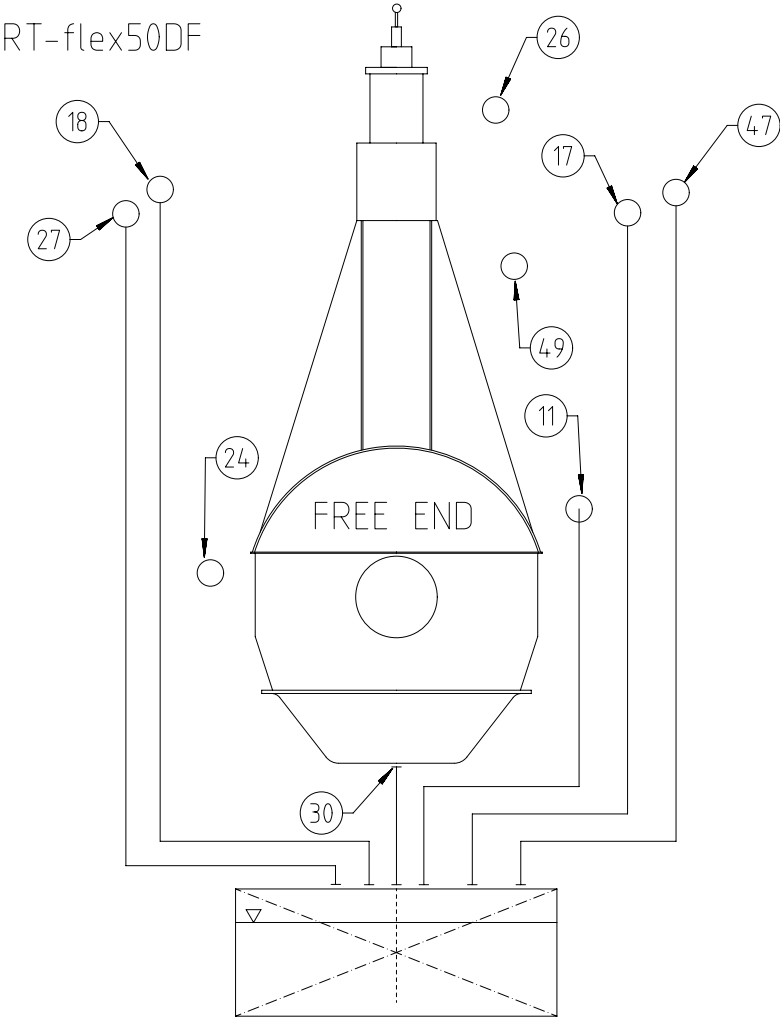
RT-flex50DF		Number of cylinders			
		5	6	7	8
Clean LO tank volume	(m³)	equal or bigger than LO drain tank volume			
Dirty LO tank volume	(m³)	equal or bigger than LO drain tank volume			
① LO separator *21)	(l/h)	990	1180	1380	1580
Residue oil tank volume	(m³)	Depending on ship's requirements			
Remarks:					
- 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.					
①	*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					

Free space for file		G-Code XXXXX		Main Drw.	
Modell		Standard ISO, JIS			
Number	Drawn date	Number	Drawn date	Number	Drawn date
EAAD089872	19.10.2018	EAAD090374	08.07.2019	EAAD091970	29.06.2020
Number	Drawn date	Number	Drawn date	Number	Drawn date
EAAD095595	19.01.2021				
Product RT-flex50DF		LUBRICATING OIL SYSTEM with iCAT Schmieroelsystem			
Units	mm kg	NX	Scale	Size	Page
MADE	12.08.2014	mhu019	M.Hug	AT	3/3
Chd	13.08.2014	abd330	Brückl	Design Group	
Appd	13.08.2014	abd330	Brückl	9722	DAAD047717
SURFACE PROTECTION SEE GROUP 0344		TOLERANCING PRINCIPLE ISO8015		GENERAL TOLERANCES ACCORDING TO ISO2768-mK	
Material ID PAAD154434		Net Weight 0,001		Rev. I	

SPECIFICATION which must be met

- 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: 10 - 12 bar *)
 - *) A pressure control device (e.g. a bypass line with a pressure regulating valve or pump flow adjustment, or a frequency converter to adjust the pump speed) is needed.
 - Lubricating oil volume flow: according to GTD
 - Lubricating oil cleanliness:
 - Full flow filtered by a 35 micron (absolute sphere passing mesh) automatic self-cleaning filter
 - Bypass flow of the automatic self-cleaning filter (only active during maintenance of the automatic self-cleaning filter) filtered by a 35 micron (absolute sphere passing mesh) filter.
 - Offline cleaning of the lubricating oil in the drain tank by self-cleaning centrifugal separators.

- OUTLET- Supply unit oil return
- Free flow by gravity to lubricating oil drain tank.
- OUTLET- Servo system oil return (engine driving end)
- Free flow by gravity to lubricating oil drain tank.
- OUTLET - Turbocharger lubricating oil
- Must be not connected to other oil return lines.
 - Pipe outlet above the oil level in the LO drain tank or a drain pipe with venting holes above the max. oil level to be installed.
 - Connected to the lubricating oil drain tank, opposite to the main lubricating oil pump, i.e.
 - on tank's forward end if main lubricating oil pump suction is on tank's aft end.
 - on tank's aft end if main lubricating oil pump suction is on tank's forward end.
 - on tank's forward or aft end if main lubricating oil pump suction is in middle of tank.



- 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: 4-5 bar *)
 - *) A pressure control device (e.g. a bypass line with a pressure regulating valve or pump flow adjustment, or a frequency converter to adjust the pump speed) is needed.
 - Lubricating oil volume flow: according to GTD
 - LO amount on engine side: mentioned in table 1 on page 2
 - Lubricating oil cleanliness:
 - Full flow filtered by a 35 micron (absolute sphere passing mesh) automatic self-cleaning filter.
 - Bypass flow of the automatic self-cleaning filter (only active during maintenance of the automatic self-cleaning filter) filtered by a 35 micron (absolute sphere passing mesh) filter.
 - Offline cleaning of the lubricating oil in the drain tank by self-cleaning centrifugal separators.
- INLET - Cylinder lubricating oil
- Cylinder lubricating oil temperature: 40⁺¹⁰₋₅ °C
 - Trace heating to be applied on the cylinder LO feed line on ship side (A)
 - Cylinder lubricating oil static pressure: min. 0.40 bar
- OUTLET - Flushing oil from automatic filter
- Back-flushing oil to be returned to the LO drain tank
 - The back-flushing oil return pipe must not be connected to other drain pipes
- OUTLET - Lubricating oil from bedplate
- Oil return via vertical oil drain to lubricating oil drain tank:
Vertical oil drain position must be within the permissible range as specified on the LO drain tank drawing
The shipyard is to inform the engine manufacturer of the final position.
- OUTLET- Servo system oil return (engine free end)
- Free flow by gravity to lubricating oil drain tank.

1	016	PAAD308926	HEATING ELEMENT	10QTVR2-CT	DAAD106761		
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 XXXXX Standard ISO; JIS	Main Drw.
Modif.	(A)	EAAD095915	19.01.2021				
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number
WIN GD Winterthur Gas & Diesel			Product RT-flex50DF		LUBRICATING OIL SYSTEM without iCAT Schmieroelsystem		
Units	mm kg	NX		Basic Material	Net Weight 0,001		
SURFACE PROTECTION SEE GROUP 0344		Made	26.10.2018	Sudant Deogade	Scale	-	Size A2
TOLERANCING PRINCIPLE ISO8015		Chkd	01.07.2019	www008 Wang	Design Group	1/3	Material ID PAAD310815
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	02.07.2019	mhu019 Hug	7222	Drawing ID DAAD107842	Rev. A

SYSTEM PROPOSAL - System oil and cylinder LO supply

Pos.	ENGINE COMPONENTS *3)
EC01	Automatic filter
EC02	Supply unit
EC03	Trace heating cable control box

Pos.	ENGINE CONNECTIONS *2)
(11)	OUTLET- Supply unit oil return
(17)	OUTLET- Servo system oil return (engine driving end)
(18)	OUTLET - Turbocharger lubricating oil *12) *13)
(24)	INLET - Lubricating oil
(26)	INLET - Cylinder lubricating oil
(27)	OUTLET - Flushing oil from automatic filter *12)
(30)	OUTLET - Lubricating oil from bedplate
(47)	OUTLET- Servo system oil return (engine free end)
(49)	INLET - Crosshead lubricating oil
(E1)	Trace heating cable control box connection

Pos.	SYSTEM COMPONENTS *1)
001	Lubricating oil drain tank (sump tank) (A)
002	Heating device *4)
003	Suction strainer *15) (A)
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, 35 micron, with backflushing oil treatment *7) *12)
008	Transition piece (adaptor) *9)
009	Deck connection
010	Grade 1 Cylinder lubricating oil storage tank *5)
011	Grade 1 Cylinder lubricating oil service tank *5)
012	Pressure regulating valve *6)
015	Crosshead lubricating oil pump *8)
016	Electrical trace heating cable (detailed spec. is linked on page 1)
017	Three-way valve, manually or remotely operated
018	Grade 2 Cylinder lubricating oil storage tank *5) *17)
019	Grade 2 Cylinder lubricating oil service tank *5) *17)
020	Gas detector *18)

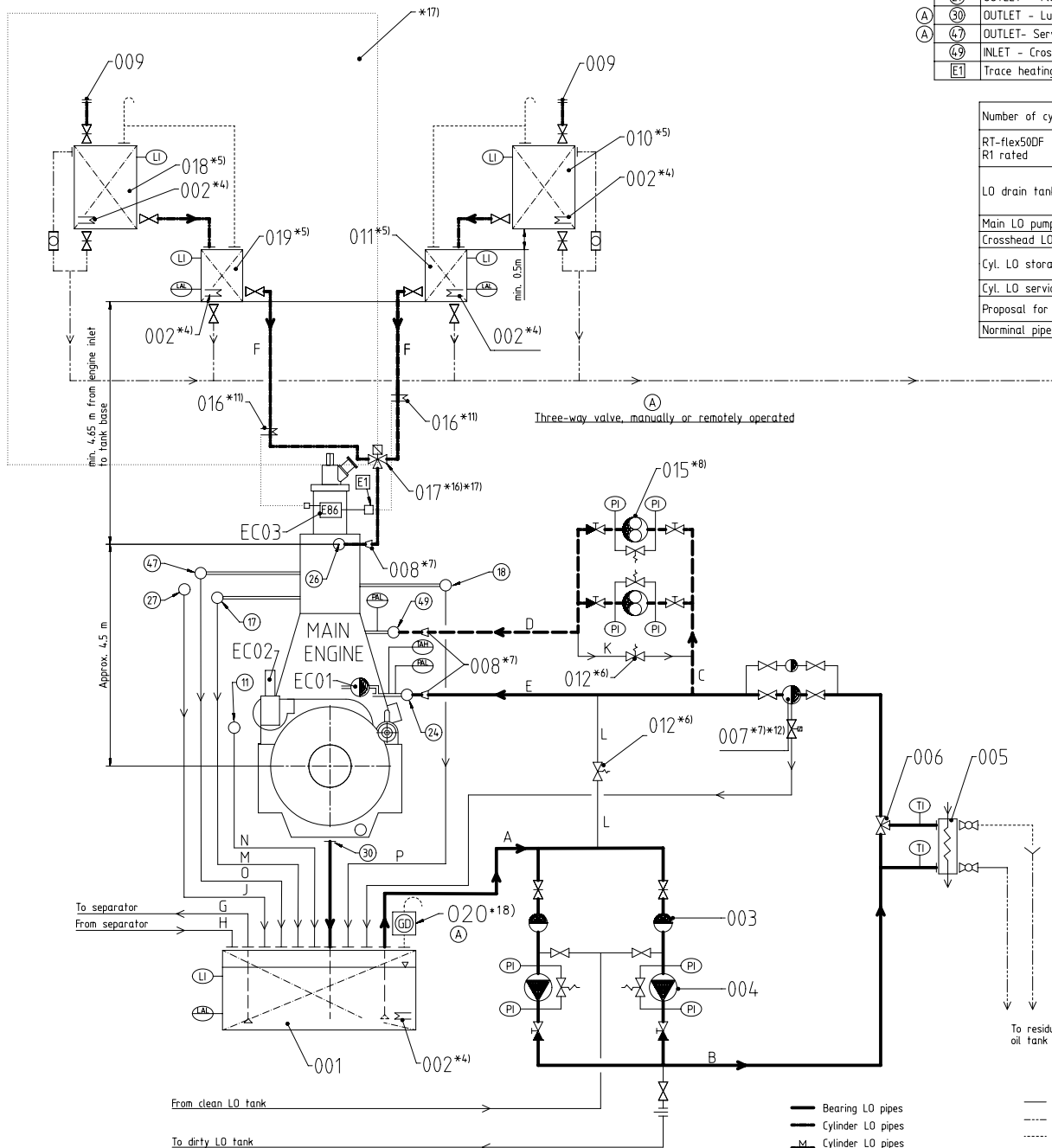
Number of cylinders		5	6	7	8	
RT-flex50DF R1 rated	power (kW)	7200	8640	10080	1152	
	speed (rpm)	124				
LO drain tank		(m³)	For capacities refer to drawing "LO drain tank-Filling Guideline"			
Main LO pump	capacity	(m³/h) refer to GTD				
Crosshead LO pump	capacity					
Cyl. LO storage tank	capacity	(m³)	based on a feed rate of 1g/kWh (pulse)			
Cyl. LO service tank *14)	capacity	(m³)	0.5	0.5	0.6	0.7
Proposal for pipe dimensioning *10)						
Nominal pipe diameter		A	DN 200	200	250	250

G	The pipe diameters for LO separator are sized acc. to the effective throughput capacity of the separator and according to the separator manufacturer's recommendations.					
H						
J	DN	20	20	20	20	20
K	DN	65	65	80	80	80
L	DN	80	80	80	80	80
M	DN	65	65	65	65	65
N	DN	40	40	40	40	40
O	DN	50	50	50	50	50
P	DN	65	65	65	65	65

Table 1: LO content on engine side	
Cylinder	Volume
5	1272 l
6	1445 l
7	1618 l
8	1792 l

Remarks:

- Air vent pipes 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.
- *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 valves
 - The pump built-in safety valve is in any case mandatory and not to be used for pressure regulation (pure safety function).
- *7) 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 air blowing into the oil. Back-flushing oil must be treated.
- *8) The LO pumps (pos. 004) and the crosshead LO pumps (pos. 015) are to be interlocked. The crosshead LO are not to be operated without the LO pumps.
- *9) Installed as required (check with the "Pipe Connection Plan")
- *10) All capacities and the given diameters are valid for the mentioned rating including the integrated turbocharger lubrication, but excluding any possibly installed damper and PTO gears, and service just as an example. To make the layout for the project specific rating please refer to DG730 "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.
- *11) To be connected to the control box (EC03) on engine side.
- *12) 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.
- *13) The oil outlet in the LO drain tank must be above the max. oil level or as an alternative a drain pipe with venting holes above the max. oil level needs to be installed.
- *14) The proposed cylinder LO services tank capacity takes into account a filling interval of 2 days based on the above mentioned feed rate.
- *15) Mesh size according to pump suppliers recommendation.
- *16) 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 BNU) after the change-over.
- *17) Optional, only to be installed if two different cylinder lubrication oil grades instead of a single grade cylinder lubricating oil is selected (e.g. for commercial reasons).
- *18) Conditional, if requested by the flag state and/or class to achieve compliance. This must be installed in accordance with all associated requirements, e.g. maximum distance from the tank venting outlet connection.

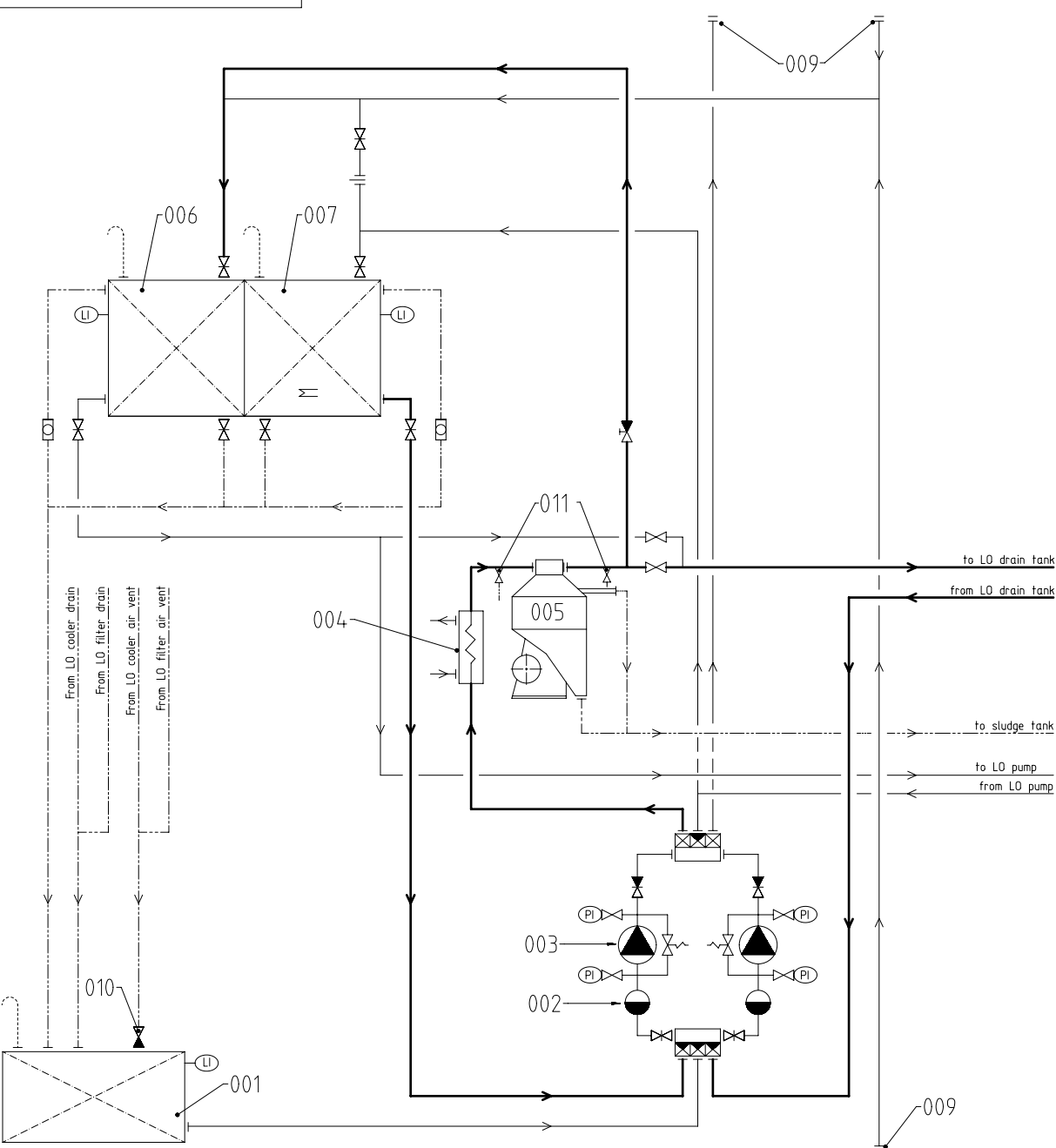


- Bearing LO pipes
- Cylinder LO pipes
- Overflow/drain pipes
- Air vent pipes
- Crosshead LO pipes
- Pipe connections to the engine
- Electrical interface connection

SURFACE PROTECTION SEE GROUP 0344		TOLERANCING PRINCIPLE ISO8015		GENERAL TOLERANCES ACCORDING TO ISO2768-mK	
Chd	01.07.2019	WWS008	Wang	Design Group	02.07.2019
Appd	02.07.2019	mhu019	Hug	Design Group	02.07.2019

WINGD		Wärthner Gas & Diesel	
Units	mm kg	NX	Basic Material
Scale	-	-	-
Size	A1	2/3	Page
Material	PAAD310815		
Net Weight	0,001		
Material	PAAD310815		
Design	DAAD107842		
Rev.	A		

SYSTEM PROPOSAL - LO treatment system



Pos.	SYSTEM COMPONENTS *1)
001	Residue oil tank
002	Suction strainer *15)
003	Lubricating oil pump one for transfer and separator service
004	Lubricating oil heater with relief valve and temperature control
005	Self-cleaning centrifugal separator
006	Clean lubricating oil tank
007	Dirty lubricating oil tank
009	Deck connection
010	Float non-return valve
011	LO sampling cock *19)

RT-flex50DF		Number of cylinders			
		5	6	7	8
Clean LO tank volume	(m³)	equal or bigger than LO drain tank volume			
Dirty LO tank volume	(m³)	equal or bigger than LO drain tank volume			
LO separator *20)	(l/h)	990	1180	1380	1580
Residue oil tank volume	(m³)	Depending on ship's requirements			

Remark:

- 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' recommendation

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

*15) Mesh size according to pump suppliers recommendation.

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

*20) 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).

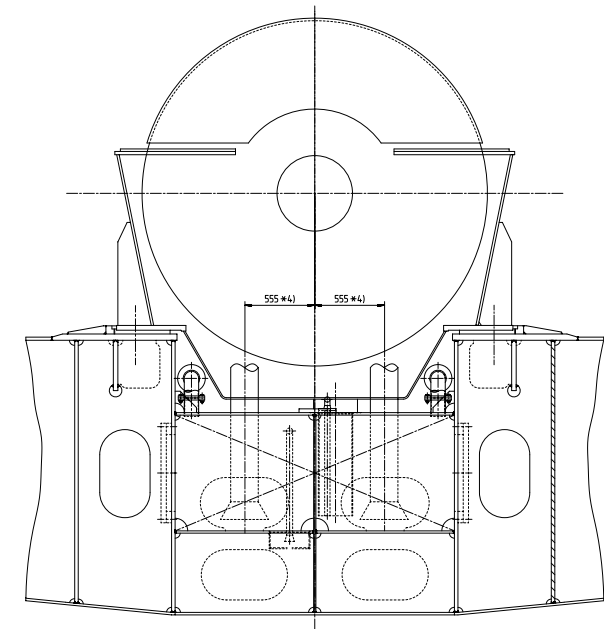
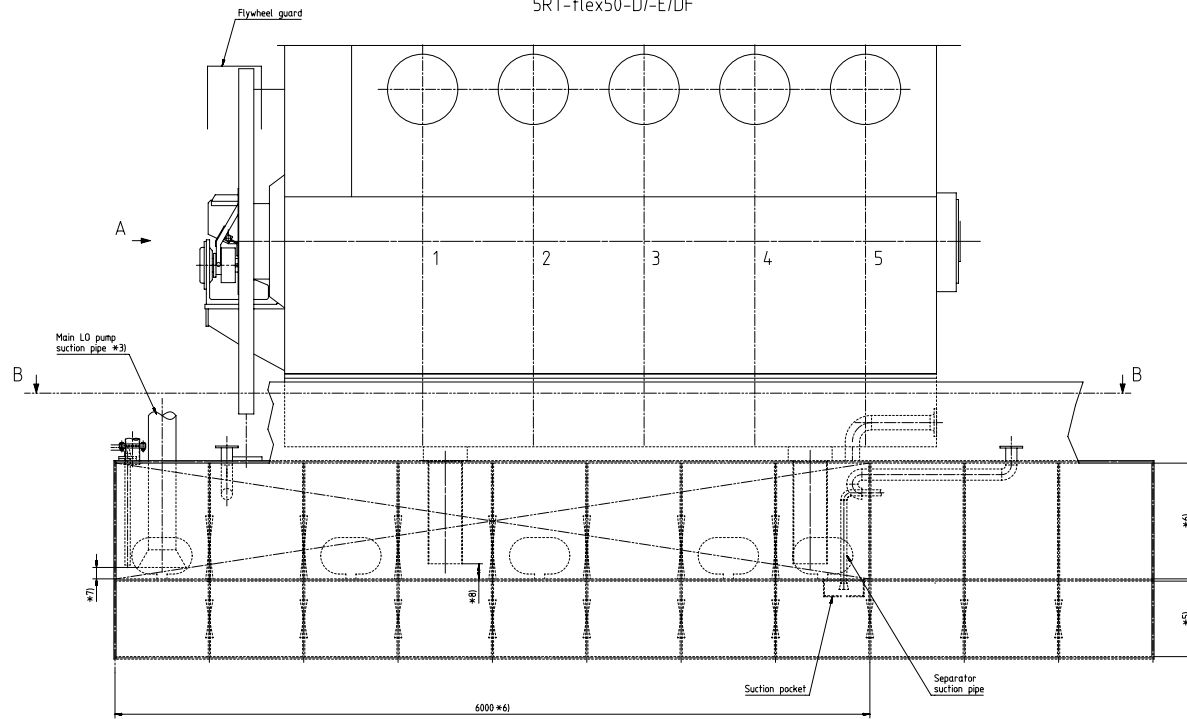
— Main separating piping
— Transfer / dirty LO pipes
- - - Overflow / drain pipes
..... Air vent pipes

Modell: Free space for ID		G-Code: XXXXX Standard: ISO, JIS		Main Drw.	
EAAD095915	19.01.2021				
Number	Drawn date	Number	Drawn date	Number	Drawn date
WINGO Wärmer Gas & Diesel		Product RT-flex50DF		LUBRICATING OIL SYSTEM without iCAT Schmierölsystem	
Units	mm kg	NX	Basic Material	Size	Page 3/3
Made	26.10.2018	Sudant	Deogade	Scale	-
Chd	01.07.2019	wna008	Wang	Design Group	9722
Appd	02.07.2019	mtu019	Hug	Drawing ID	DAAD107842
SURFACE PROTECTION SEE GROUP 0344		Material ID		PAAD310815	
TOLERANCING PRINCIPLE ISO8015		Rev.		A	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK					

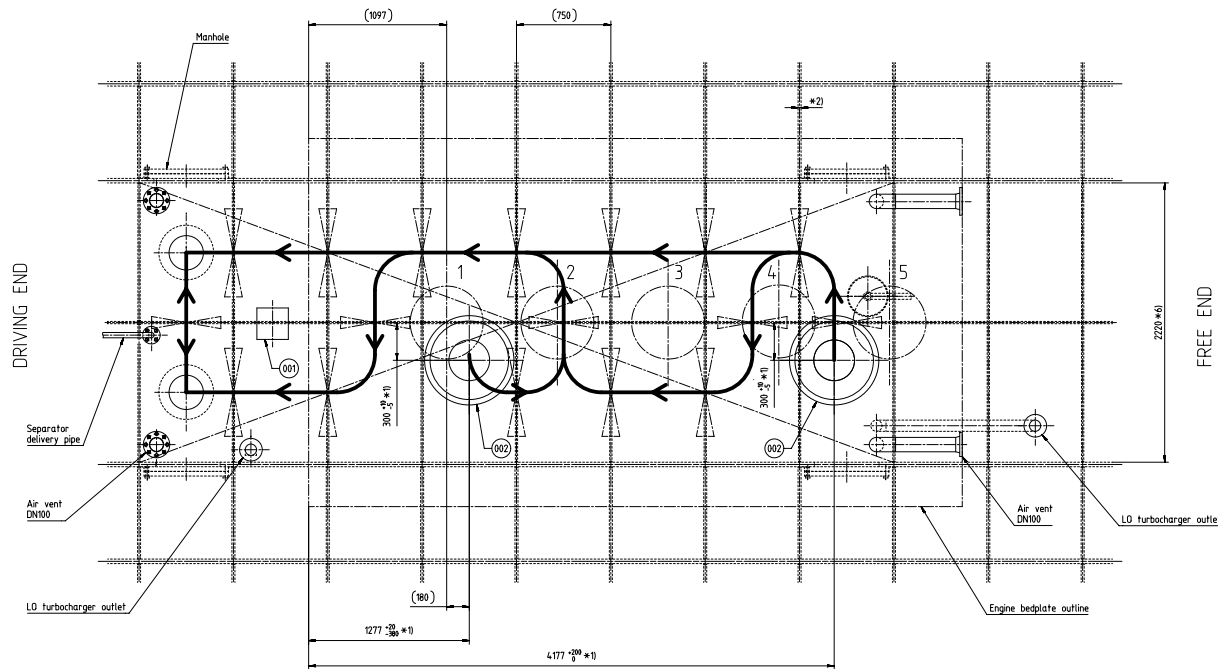
Copyright Wärmer Gas & Diesel Ltd. All rights reserved. By taking possession of this drawing the recipient recognizes and honours these rights. Neither the whole nor any part of this drawing may be used in any way for construction, fabrication, marketing or any other purpose nor copied in any way nor made accessible to third parties without the previous written consent of Wärmer Gas & Diesel Ltd.

SRT-flex50-D/-E/DF

A (DRIVING END)



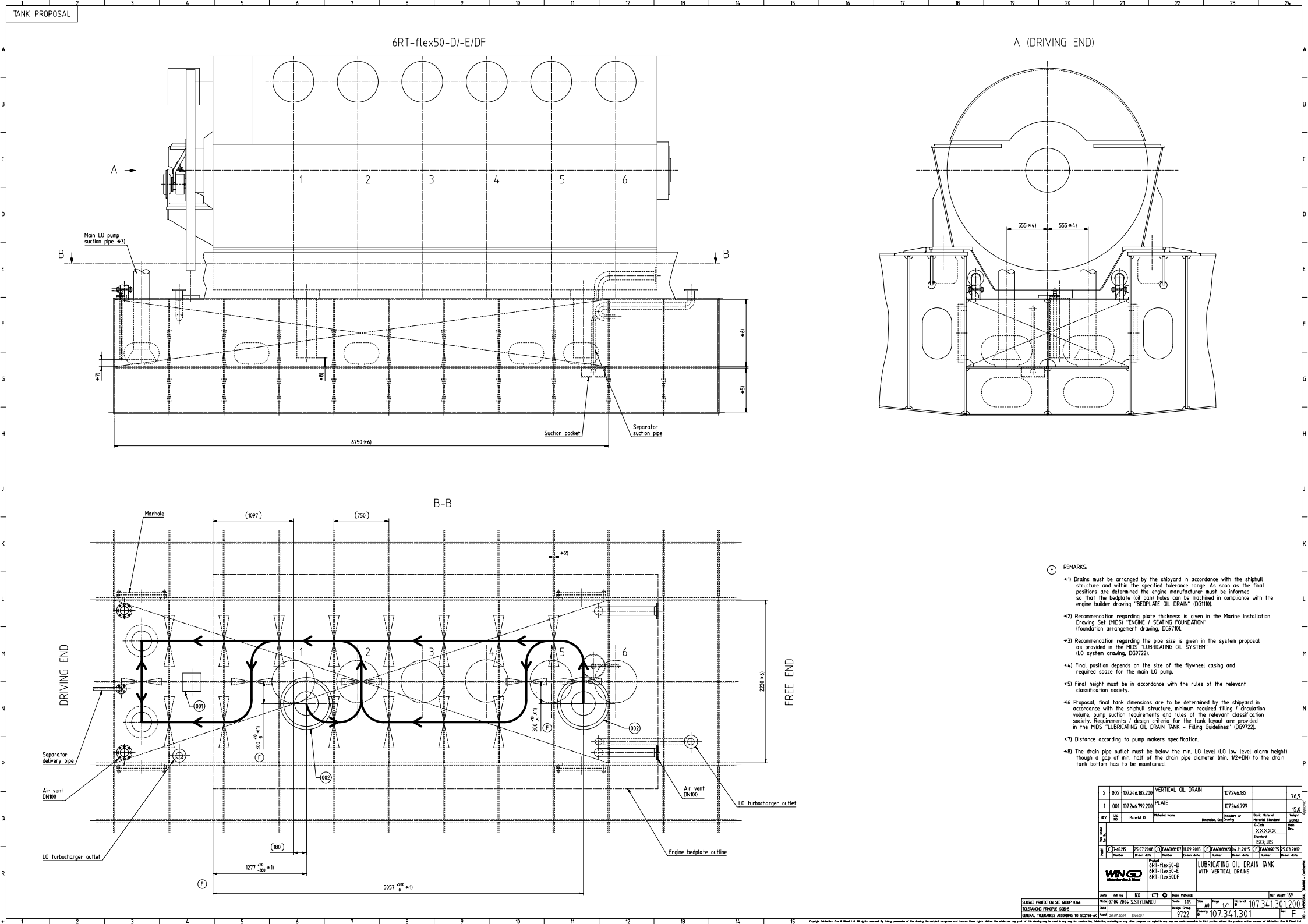
B-B

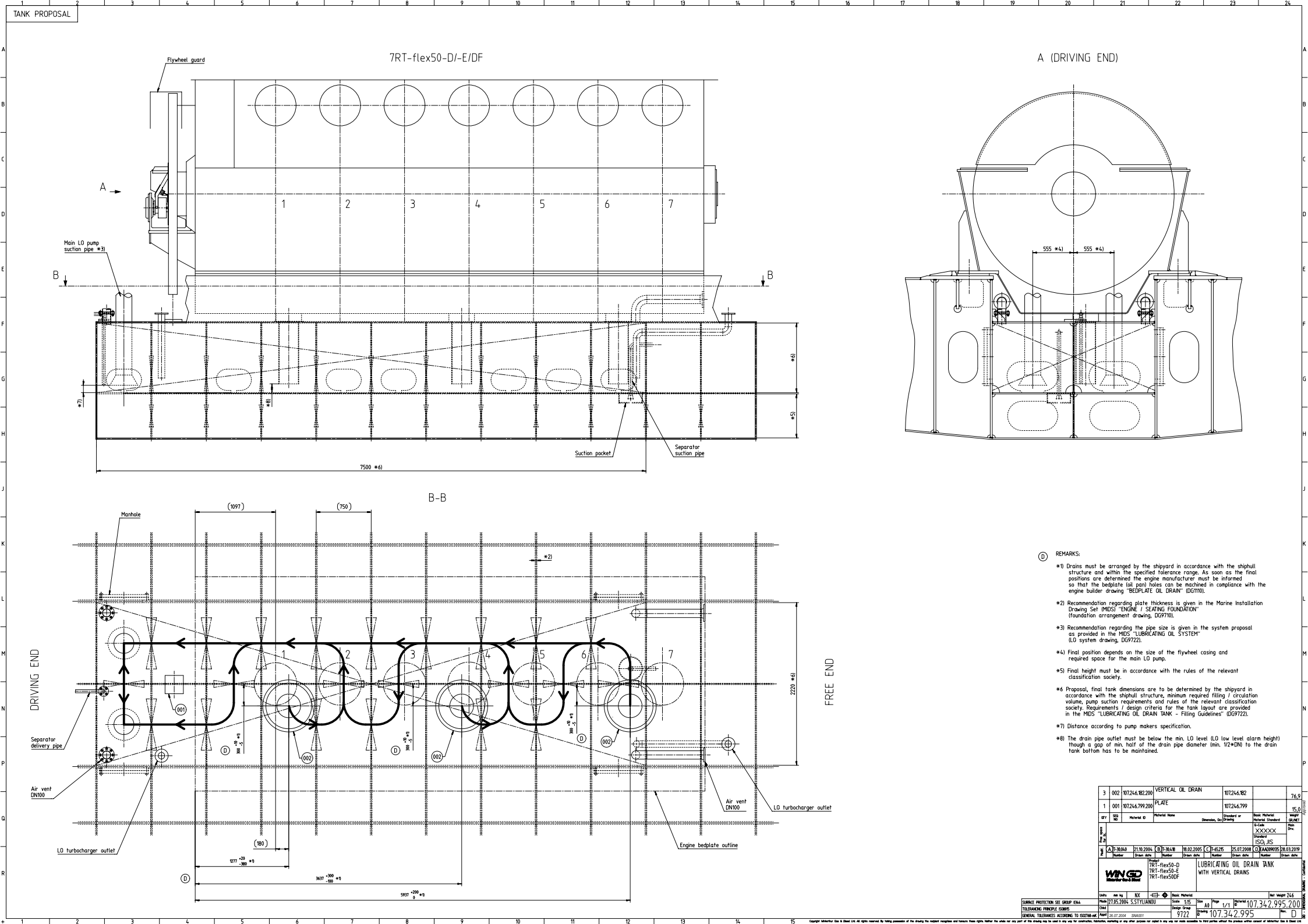


REMARKS:

- *1) Drains must be arranged by the shipyard in accordance with the ship hull 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) holes can be machined in compliance with the engine builder drawing "BEDPLATE OIL DRAIN" (DG1110).
- *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 ship hull 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.

2	002	107246.982.200	VERTICAL OIL DRAIN	107246.982		76.0
1	001	107246.799.200	PLATE	107246.799		15.0
QTY	NO	Material ID	Material Name	Drawing No	Standard or Drawing	Basic Material
1	001	107246.799.200	PLATE	107246.799	1-Code	107246.799
1	002	107246.982.200	VERTICAL OIL DRAIN	107246.982	2-Code	107246.982
1	003	107246.982.200	VERTICAL OIL DRAIN	107246.982	3-Code	107246.982
1	004	107246.982.200	VERTICAL OIL DRAIN	107246.982	4-Code	107246.982
1	005	107246.982.200	VERTICAL OIL DRAIN	107246.982	5-Code	107246.982
1	006	107246.982.200	VERTICAL OIL DRAIN	107246.982	6-Code	107246.982
1	007	107246.982.200	VERTICAL OIL DRAIN	107246.982	7-Code	107246.982
1	008	107246.982.200	VERTICAL OIL DRAIN	107246.982	8-Code	107246.982
1	009	107246.982.200	VERTICAL OIL DRAIN	107246.982	9-Code	107246.982
1	010	107246.982.200	VERTICAL OIL DRAIN	107246.982	10-Code	107246.982
1	011	107246.982.200	VERTICAL OIL DRAIN	107246.982	11-Code	107246.982
1	012	107246.982.200	VERTICAL OIL DRAIN	107246.982	12-Code	107246.982
1	013	107246.982.200	VERTICAL OIL DRAIN	107246.982	13-Code	107246.982
1	014	107246.982.200	VERTICAL OIL DRAIN	107246.982	14-Code	107246.982
1	015	107246.982.200	VERTICAL OIL DRAIN	107246.982	15-Code	107246.982
1	016	107246.982.200	VERTICAL OIL DRAIN	107246.982	16-Code	107246.982
1	017	107246.982.200	VERTICAL OIL DRAIN	107246.982	17-Code	107246.982
1	018	107246.982.200	VERTICAL OIL DRAIN	107246.982	18-Code	107246.982
1	019	107246.982.200	VERTICAL OIL DRAIN	107246.982	19-Code	107246.982
1	020	107246.982.200	VERTICAL OIL DRAIN	107246.982	20-Code	107246.982
1	021	107246.982.200	VERTICAL OIL DRAIN	107246.982	21-Code	107246.982
1	022	107246.982.200	VERTICAL OIL DRAIN	107246.982	22-Code	107246.982
1	023	107246.982.200	VERTICAL OIL DRAIN	107246.982	23-Code	107246.982
1	024	107246.982.200	VERTICAL OIL DRAIN	107246.982	24-Code	107246.982
1	025	107246.982.200	VERTICAL OIL DRAIN	107246.982	25-Code	107246.982
1	026	107246.982.200	VERTICAL OIL DRAIN	107246.982	26-Code	107246.982
1	027	107246.982.200	VERTICAL OIL DRAIN	107246.982	27-Code	107246.982
1	028	107246.982.200	VERTICAL OIL DRAIN	107246.982	28-Code	107246.982
1	029	107246.982.200	VERTICAL OIL DRAIN	107246.982	29-Code	107246.982
1	030	107246.982.200	VERTICAL OIL DRAIN	107246.982	30-Code	107246.982
1	031	107246.982.200	VERTICAL OIL DRAIN	107246.982	31-Code	107246.982
1	032	107246.982.200	VERTICAL OIL DRAIN	107246.982	32-Code	107246.982
1	033	107246.982.200	VERTICAL OIL DRAIN	107246.982	33-Code	107246.982
1	034	107246.982.200	VERTICAL OIL DRAIN	107246.982	34-Code	107246.982
1	035	107246.982.200	VERTICAL OIL DRAIN	107246.982	35-Code	107246.982
1	036	107246.982.200	VERTICAL OIL DRAIN	107246.982	36-Code	107246.982
1	037	107246.982.200	VERTICAL OIL DRAIN	107246.982	37-Code	107246.982
1	038	107246.982.200	VERTICAL OIL DRAIN	107246.982	38-Code	107246.982
1	039	107246.982.200	VERTICAL OIL DRAIN	107246.982	39-Code	107246.982
1	040	107246.982.200	VERTICAL OIL DRAIN	107246.982	40-Code	107246.982
1	041	107246.982.200	VERTICAL OIL DRAIN	107246.982	41-Code	107246.982
1	042	107246.982.200	VERTICAL OIL DRAIN	107246.982	42-Code	107246.982
1	043	107246.982.200	VERTICAL OIL DRAIN	107246.982	43-Code	107246.982
1	044	107246.982.200	VERTICAL OIL DRAIN	107246.982	44-Code	107246.982
1	045	107246.982.200	VERTICAL OIL DRAIN	107246.982	45-Code	107246.982
1	046	107246.982.200	VERTICAL OIL DRAIN	107246.982	46-Code	107246.982
1	047	107246.982.200	VERTICAL OIL DRAIN	107246.982	47-Code	107246.982
1	048	107246.982.200	VERTICAL OIL DRAIN	107246.982	48-Code	107246.982
1	049	107246.982.200	VERTICAL OIL DRAIN	107246.982	49-Code	107246.982
1	050	107246.982.200	VERTICAL OIL DRAIN	107246.982	50-Code	107246.982
1	051	107246.982.200	VERTICAL OIL DRAIN	107246.982	51-Code	107246.982
1	052	107246.982.200	VERTICAL OIL DRAIN	107246.982	52-Code	107246.982
1	053	107246.982.200	VERTICAL OIL DRAIN	107246.982	53-Code	107246.982
1	054	107246.982.200	VERTICAL OIL DRAIN	107246.982	54-Code	107246.982
1	055	107246.982.200	VERTICAL OIL DRAIN	107246.982	55-Code	107246.982
1	056	107246.982.200	VERTICAL OIL DRAIN	107246.982	56-Code	107246.982
1	057	107246.982.200	VERTICAL OIL DRAIN	107246.982	57-Code	107246.982
1	058	107246.982.200	VERTICAL OIL DRAIN	107246.982	58-Code	107246.982
1	059	107246.982.200	VERTICAL OIL DRAIN	107246.982	59-Code	107246.982
1	060	107246.982.200	VERTICAL OIL DRAIN	107246.982	60-Code	107246.982
1	061	107246.982.200	VERTICAL OIL DRAIN	107246.982	61-Code	107246.982
1	062	107246.982.200	VERTICAL OIL DRAIN	107246.982	62-Code	107246.982
1	063	107246.982.200	VERTICAL OIL DRAIN	107246.982	63-Code	107246.982
1	064	107246.982.200	VERTICAL OIL DRAIN	107246.982	64-Code	107246.982
1	065	107246.982.200	VERTICAL OIL DRAIN	107246.982	65-Code	107246.982
1	066	107246.982.200	VERTICAL OIL DRAIN	107246.982	66-Code	107246.982
1	067	107246.982.200	VERTICAL OIL DRAIN	107246.982	67-Code	107246.982
1	068	107246.982.200	VERTICAL OIL DRAIN	107246.982	68-Code	107246.982
1	069	107246.982.200	VERTICAL OIL DRAIN	107246.982	69-Code	107246.982
1	070	107246.982.200	VERTICAL OIL DRAIN	107246.982	70-Code	107246.982
1	071	107246.982.200	VERTICAL OIL DRAIN	107246.982	71-Code	107246.982
1	072	107246.982.200	VERTICAL OIL DRAIN	107246.982	72-Code	107246.982
1	073	107246.982.200	VERTICAL OIL DRAIN	107246.982	73-Code	107246.982
1	074	107246.982.200	VERTICAL OIL DRAIN	107246.982	74-Code	107246.982
1	075	107246.982.200	VERTICAL OIL DRAIN	107246.982	75-Code	107246.982
1	076	107246.982.200	VERTICAL OIL DRAIN	107246.982	76-Code	107246.982
1	077	107246.982.200	VERTICAL OIL DRAIN	107246.982	77-Code	107246.982
1	078	107246.982.200	VERTICAL OIL DRAIN	107246.982	78-Code	107246.982
1	079	107246.982.200	VERTICAL OIL DRAIN	107246.982	79-Code	107246.982
1	080	107246.982.200	VERTICAL OIL DRAIN	107246.982	80-Code	107246.982
1	081	107246.982.200	VERTICAL OIL DRAIN	107246.982	81-Code	107246.982
1	082	107246.982.200	VERTICAL OIL DRAIN	107246.982	82-Code	107246.982
1	083	107246.982.200	VERTICAL OIL DRAIN	107246.982	83-Code	107246.982
1	084	107246.982.200	VERTICAL OIL DRAIN	107246.982	84-Code	107246.982
1	085	107246.982.200	VERTICAL OIL DRAIN	107246.982	85-Code	107246.982
1	086	107246.982.200	VERTICAL OIL DRAIN	107246.982	86-Code	107246.982
1	087	107246.982.200	VERTICAL OIL DRAIN	107246.982	87-Code	107246.982
1	088	107246.982.200	VERTICAL OIL DRAIN	107246.982	88-Code	107246.982
1	089	107246.982.200	VERTICAL OIL DRAIN	107246.982	89-Code	107246.982
1	090	107246.982.200	VERTICAL OIL DRAIN	107246.982	90-Code	107246.982
1	091	107246.982.200	VERTICAL OIL DRAIN	107246.982	91-Code	107246.982
1	092	107246.982.200	VERTICAL OIL DRAIN	107246.982	92-Code	107246.982
1	093	107246.982.200	VERTICAL OIL DRAIN	107246.982	93-Code	107246.982
1	094	107246.982.200	VERTICAL OIL DRAIN	107246.982	94-Code	107246.982
1	095	107246.982.200	VERTICAL OIL DRAIN	107246.982	95-Code	107246.982
1	096	107246.982.200	VERTICAL OIL DRAIN	107246.982	96-Code	107246.982
1	097	107246.982.200	VERTICAL OIL DRAIN	107246.982	97-Code	107246.982
1	098	107246.982.200	VERTICAL OIL DRAIN	107246.982	98-Code	107246.982
1	099	107246.982.200	VERTICAL OIL DRAIN	107246.982	99-Code	107246.982
1	100	107246.982.200	VERTICAL OIL DRAIN	107246.982	100-Code	107246.982





TANK PROPOSAL

7RT-flex50-D/-E/DF

A (DRIVING END)

B-B

C-C

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 (oil pan) holes can be machined in compliance 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, DG710).
- *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 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" (DG722).
- *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.

No.	Material ID	Material Name	Quantity	Unit	Weight
3	002	VERTICAL OIL DRAIN	107246.82	m	76.0
1	001	PLATE	107246.799	m²	15.0

Item No.	Material ID	Material Name	Quantity	Unit	Weight
1	001	PLATE	107246.799	m²	15.0
2	002	VERTICAL OIL DRAIN	107246.82	m	76.0

Rev.	Date	Description	By	Check
1	27.05.2004	S.T.YLIANU		

WIND

LUBRICATING OIL DRAIN TANK WITH VERTICAL DRAINS

Scale: 1:15

Sheet: 1/1

Total weight: 76.0 kg

Net weight: 76.0 kg

GURANCE PROTECTION SEE GROUP 03A

TOLERANCE PRINCIPLE ISO 2768

DRAWING NUMBER: 107342.995

DATE: 27.05.2004

DESIGNER: S.T.YLIANU

CHECKED: S.T.YLIANU

APPROVED: S.T.YLIANU

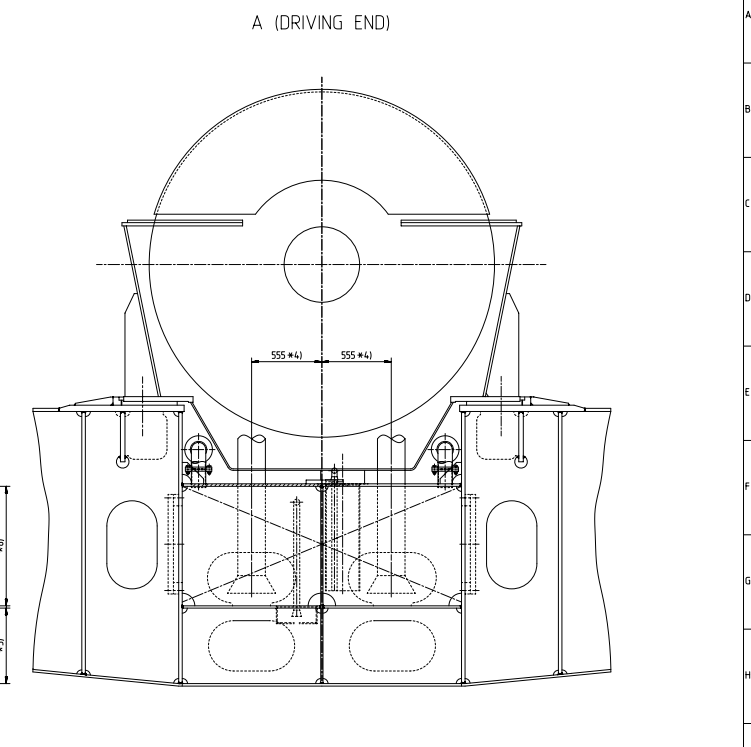
SCALE: 1:15

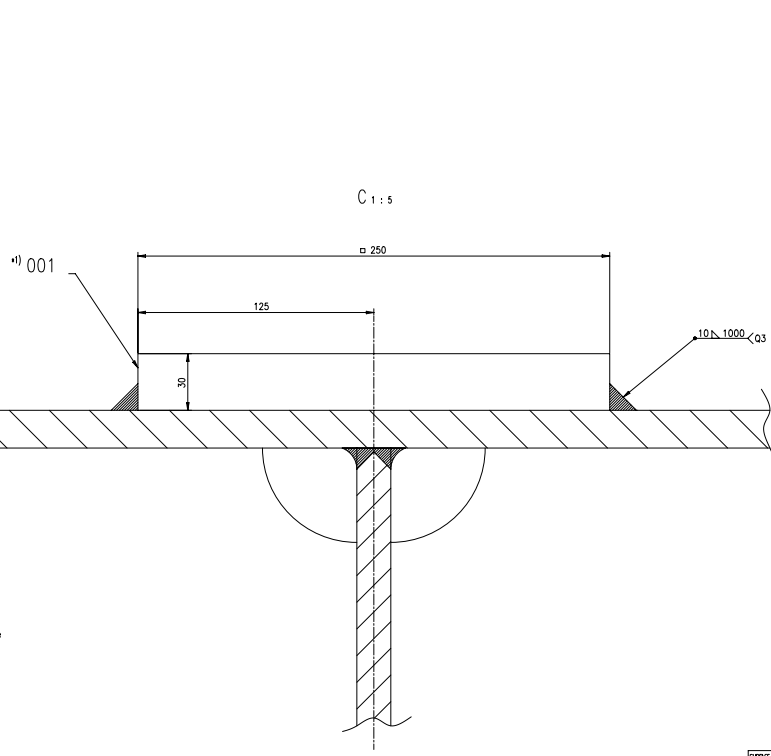
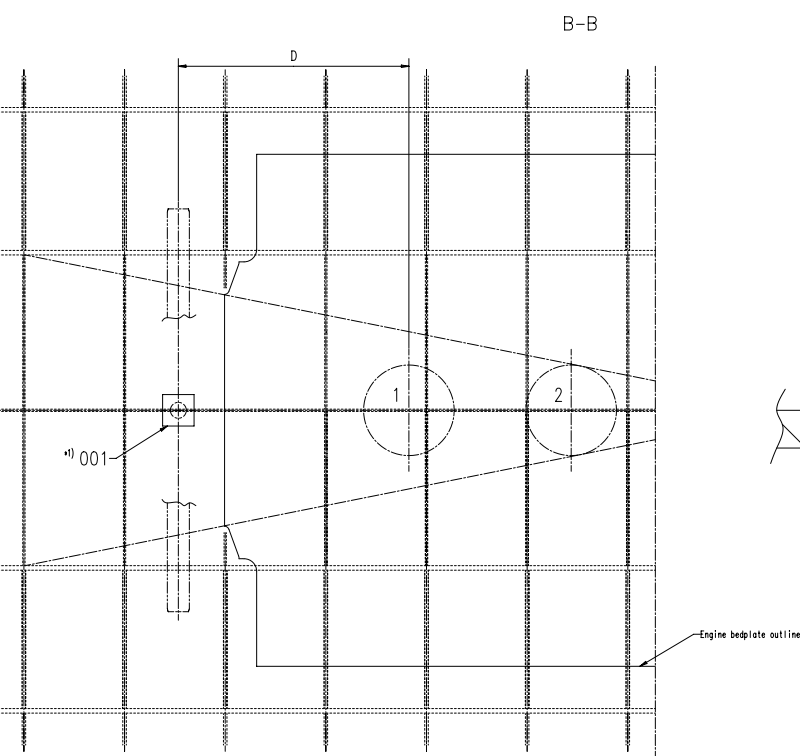
SHEET: 1/1

TOTAL WEIGHT: 76.0 kg

NET WEIGHT: 76.0 kg

Copyright Vector Gas & Steel Ltd. All rights reserved by Vector Gas & Steel Ltd. No part of this drawing may be used or reproduced without written permission from Vector Gas & Steel Ltd. Any other company or person who uses this drawing without written permission from Vector Gas & Steel Ltd. shall be liable for all consequences thereof.



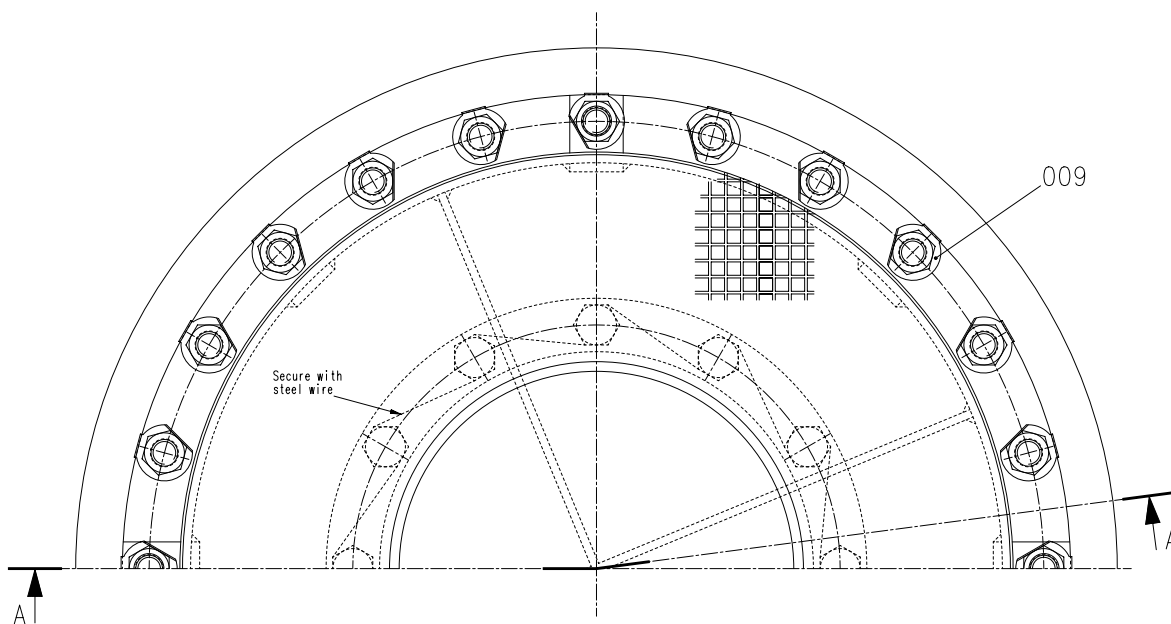
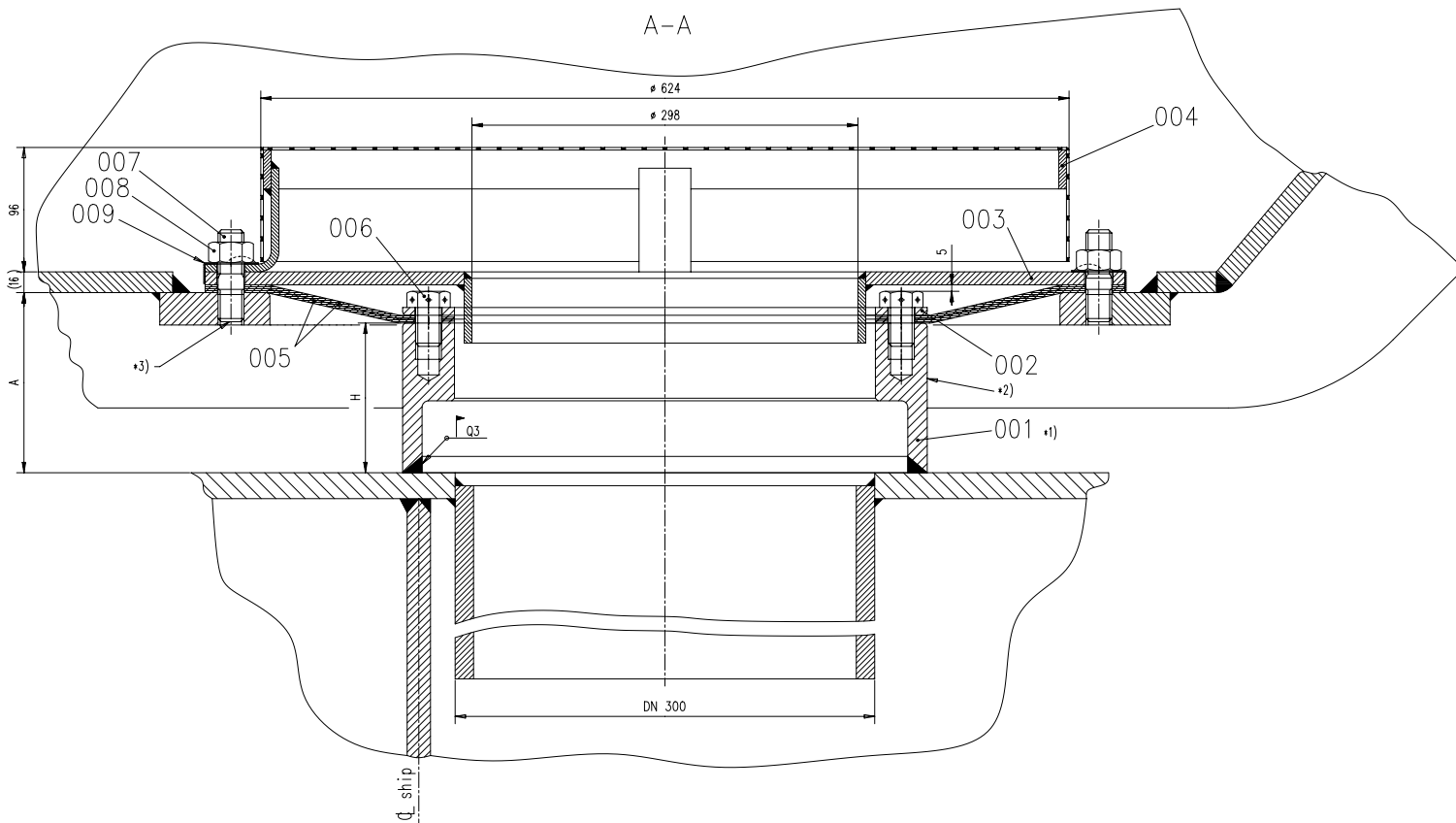


ENGINE TYPE	D	E
RT-fl ex50-D/DF	1387	165
X82-B	2395	460
X35-B	1015	124
X40-B	1170	172
X52/X52DF/X52DF-1,0/X52DF-2,1	1630	325
X62-B/X62DF/X62DF-1,1/X62DF-2,1	1888	343
X72-B/X72DF/X72DF-1,1&1,2/X72DF-2,1&2,2	2131	370
X82-2,0/X82DF-1,0	2395	460
X92-B-/X92DF	2677	334

REMARKS:

*1) 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.

[illegible]



REMARKS:

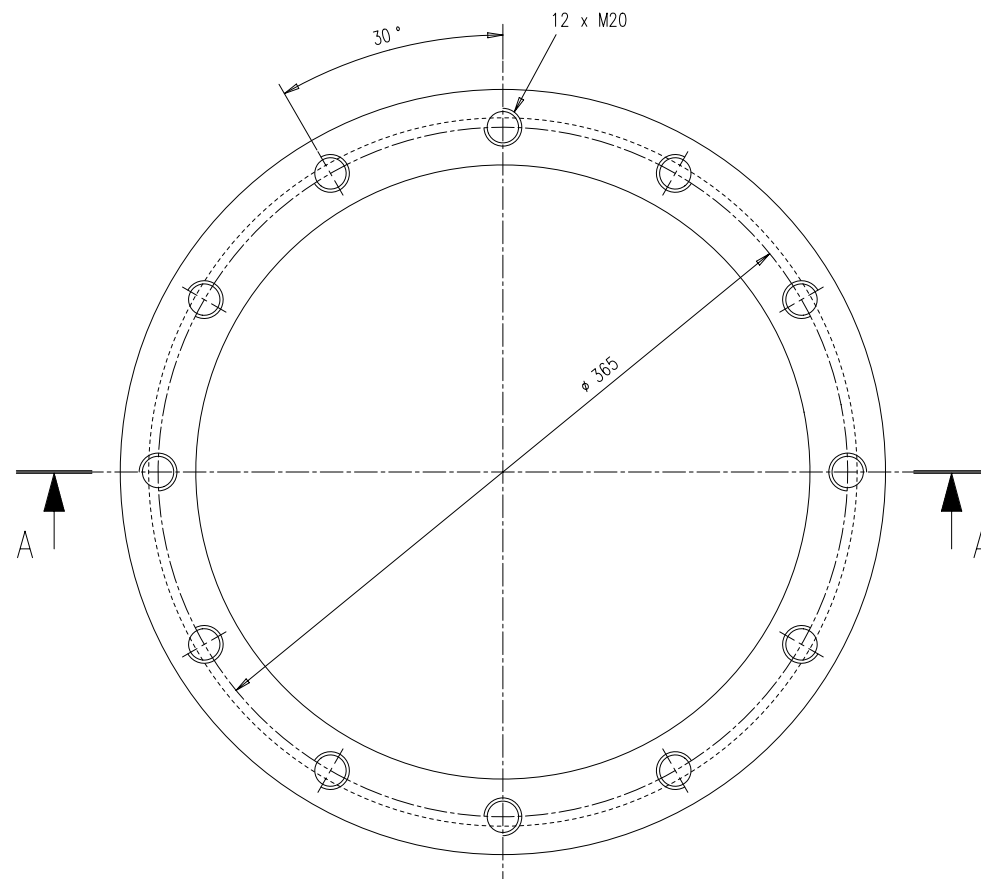
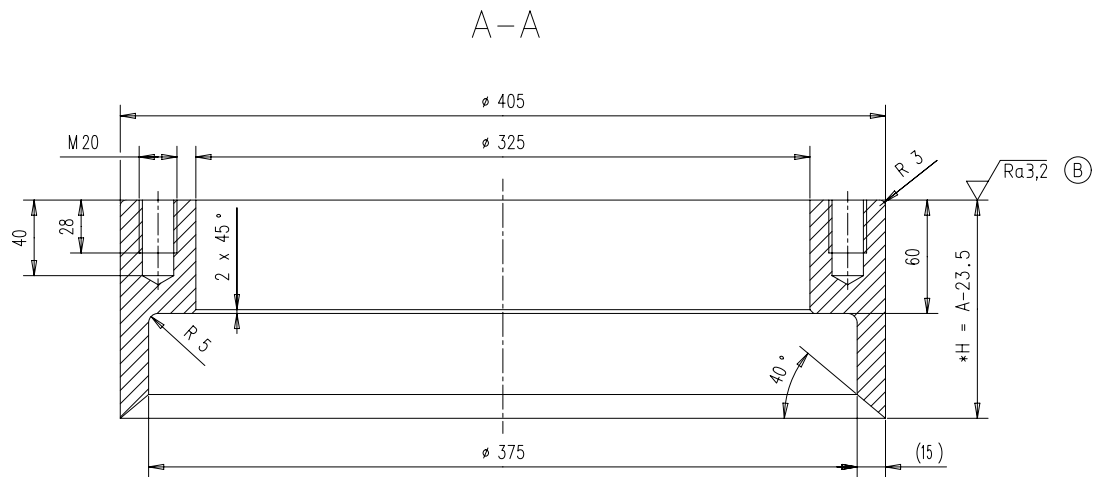
- *1) To be aligned after engine is in final position.
- *2) Pos. 001, 002, 005 and 006 to be pre-assembled prior to alignment. After alignment the Pos. 001 (flange) can be welded in place.
- *3) Driven in oil tight with jointing compound.

A	To be measured after alignment of the engine
H	A-23.5mm

Items 001 to 009 are yard delivery

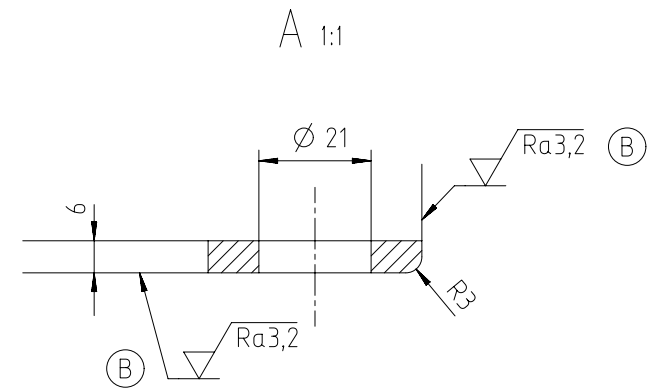
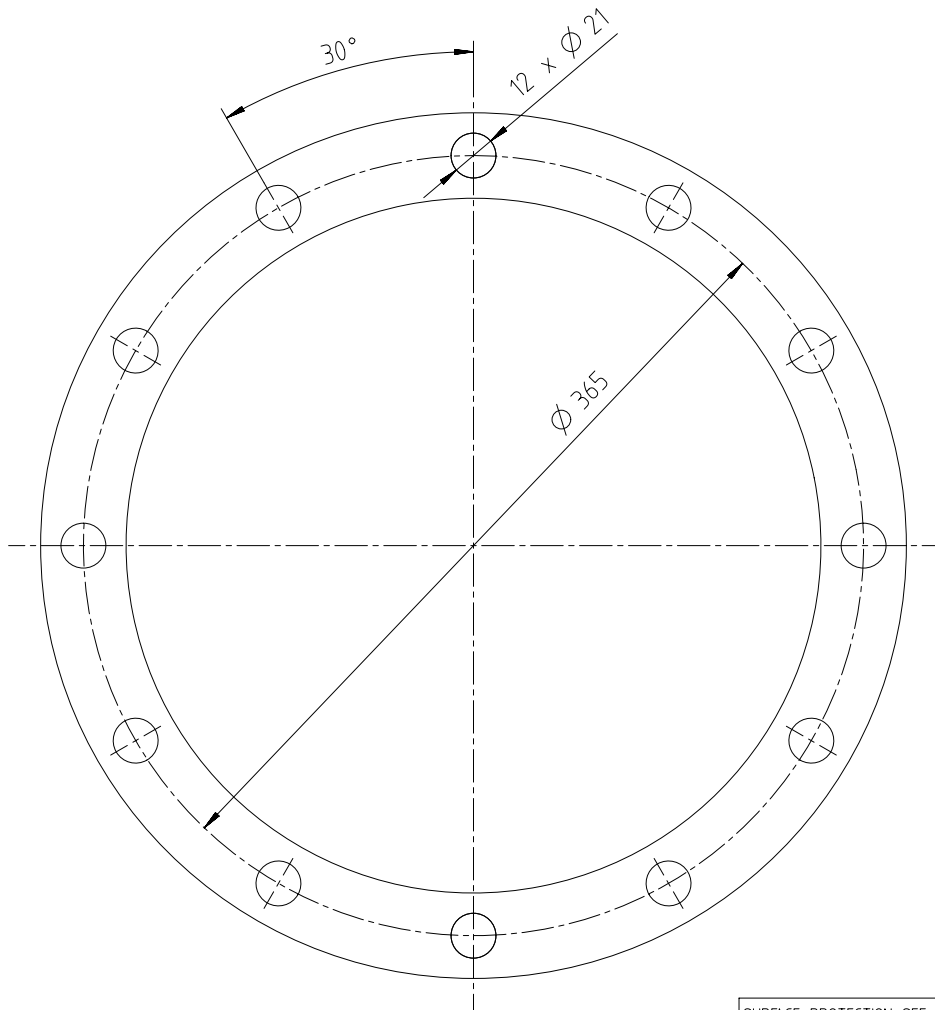
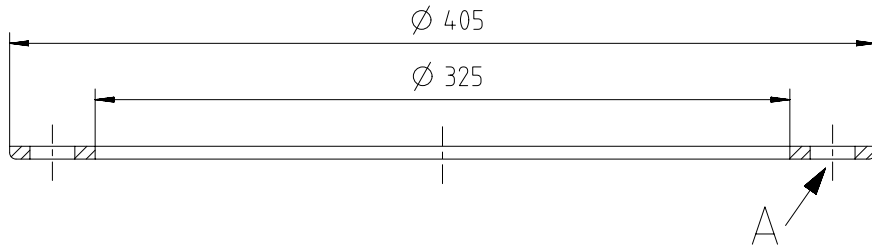
24	009	015.507.360.910	TAB WASHER	21	DIN 93	Steel Zn 5 bk	0,1
24	008	015.201.012.510	HEXAGON NUT	M20	ISO 4032	8	0,064
24	007	015.101.214.271	STUD	M20x4,5		8,8	0,17
12	006	015.151.374.201	HEXAGON HEAD SCREW	M20x30		8,8	0,12
2	005	107.246.190.001	RUBBER GASKET		107.246.190	NER 70 Sh	1,2
1	004	107.049.681.200	OIL STRAINER		107.049.681		8,3
1	003	107.246.187.200	COVER		107.246.187		26,6
1	002	107.246.186.001	RING		107.246.186	W-FU-235-JR	2,0
1	001	107.246.183.001	WELDING FLANGE		107.246.183	W-FU-235-JR	28,0
QTY	SEQ. NO.	Material ID	Material Name	Dimension, Qty	Standard or Drawing	Basic Material Material: Standard	Weight GR/NET
						Q-Code XXXXXX	Man. Drw.
						Standard ISO, JIS	

Mod.	17.08.1995	10.07.1998	25.01.1999	20.11.2019			
Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
Product W-25				VERTICAL OIL DRAIN ASSEMBLY DRAWING Delablauf vertikal			
Units mm kg NX				Basic Material			
Scale 1:2				Size A1 Page 1/1			
Design Group				Material ID 107.246.182.200			
Drawing ID 9722				Rev. D			
Appd 06.02.1996 MLL/D11 LUTH							
SURFACE PROTECTION SEE GROUP 0344							
TOLERANCING PRINCIPLE ISO8015							
GENERAL TOLERANCES ACCORDING TO ISO2768-mK							



Ⓑ $\sqrt{Ra_{12,5}}$ (✓) SHARP EDGES REMOVED
*For dimension <H> see drawing 1-107.246.182

Free space for lic.		Q-Code		Main Drw.	
XXXXXX		Standard		ISO; JIS	
Modif.	EAAD014378	10.07.1998	Ⓑ EAAD091567	18.11.2019	
Number		Drawn date	Number	Drawn date	
Product		W-25		WELDING FLANGE	
WIN GD		Winterthur Gas & Diesel		Anschweisflansch	
Units	mm kg	NX	Basic Material	W-FU-235-JR	Net Weight 28
SURFACE PROTECTION SEE GROUP 0344		Made	21.08.1995 A. Horsfjord	Scale	1:2
TOLERANCING PRINCIPLE ISO8015		Chkd		Size	A2
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	17.10.1995 MLU011 Lüthi	Page	1/1
		9722		Material ID	107.246.183.001
				Drawing ID	107.246.183
				Rev.	B

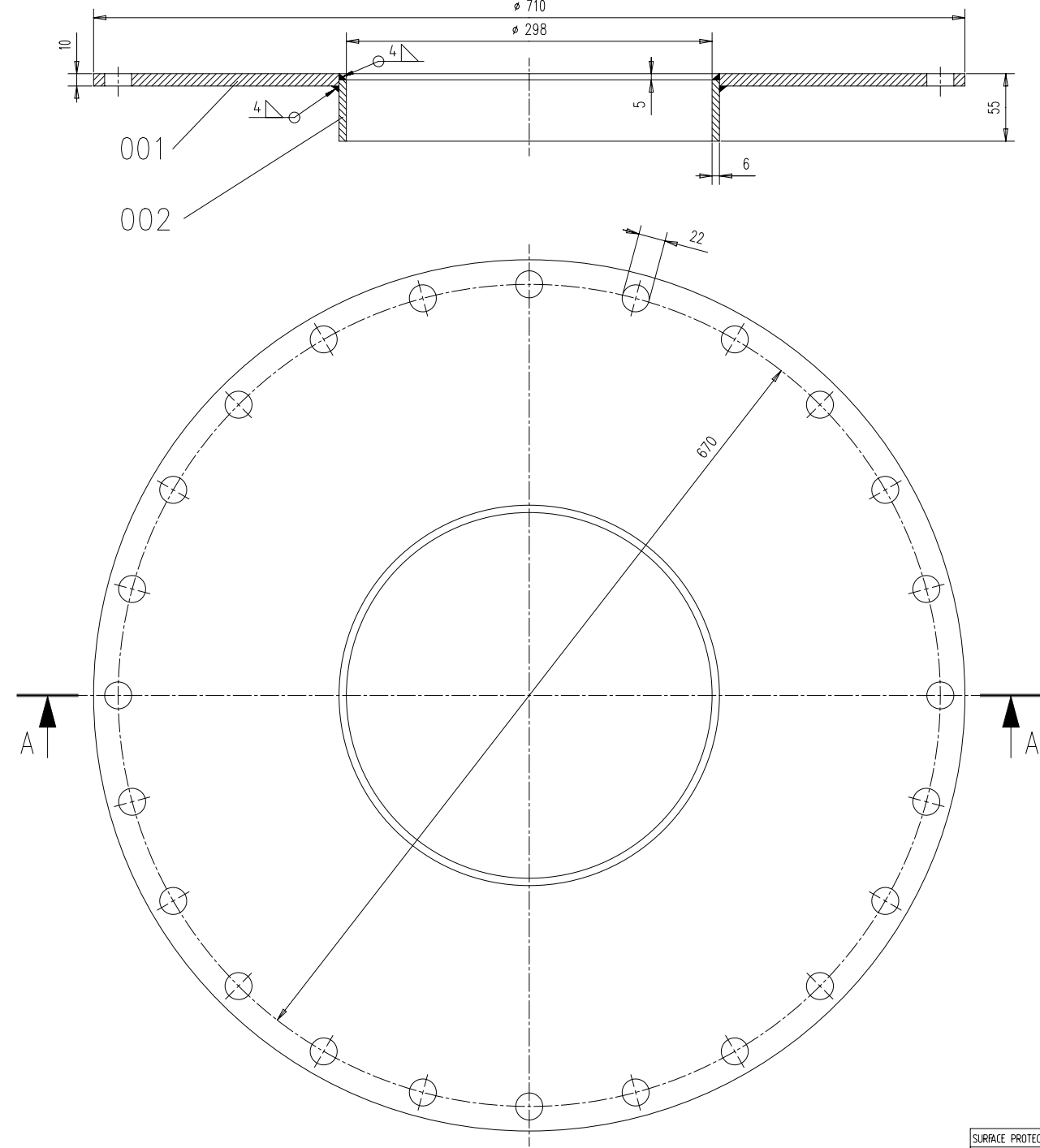


SHARP EDGES REMOVED


Free space for lic.	Q-Code XXXXXX							Main Drw.		
	Standard ISO; JIS									
Modif.	A	EAAD014378	10.07.1998	B	EAAD091567	18.11.2019				
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
WIN GD Winterthur Gas & Diesel		Product W-2S		RING Ring						
Units	mm kg	NX	Basic Material		W-FU-235-JR				Net Weight 2	
SURFACE PROTECTION SEE GROUP 0344		Made	21.08.1995 A. Horsfjord		Scale	1:2.5	Size	A3	Page	1/1
TOLERANCING PRINCIPLE ISO8015		Chkd			Design Group	9722		Material ID	107.246.186.001	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	17.10.1995 MLU011 Lüthi		Drawing ID	107.246.186		Rev.	B	

A-A

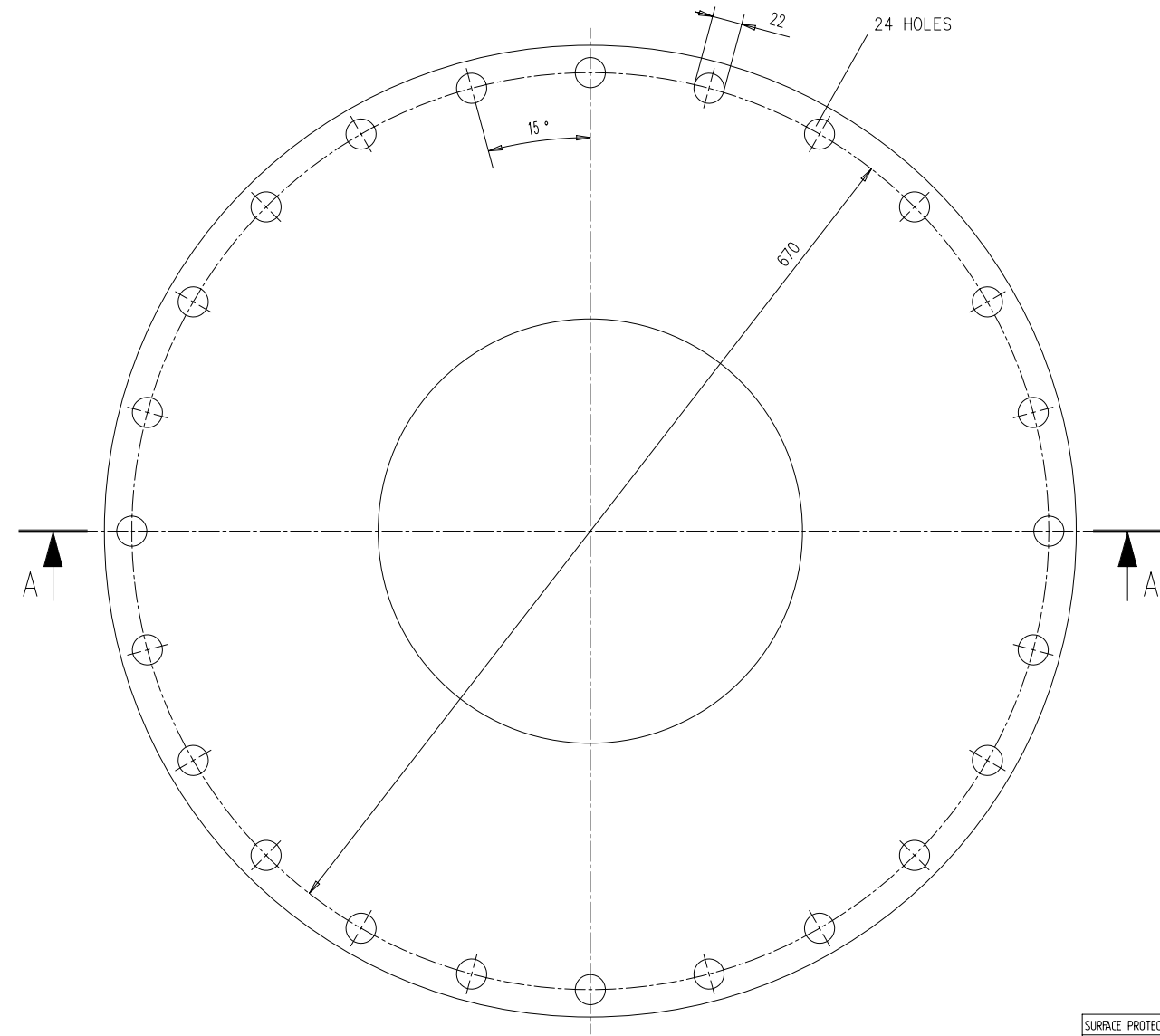
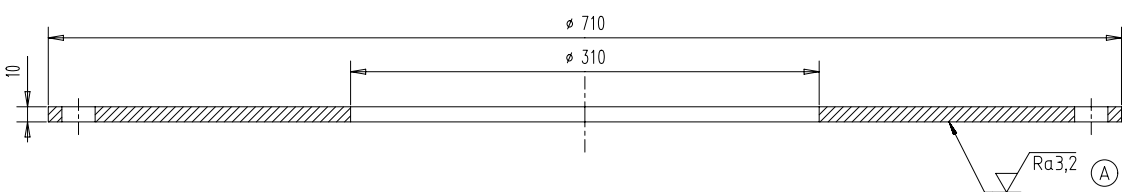
ø 710
ø 298



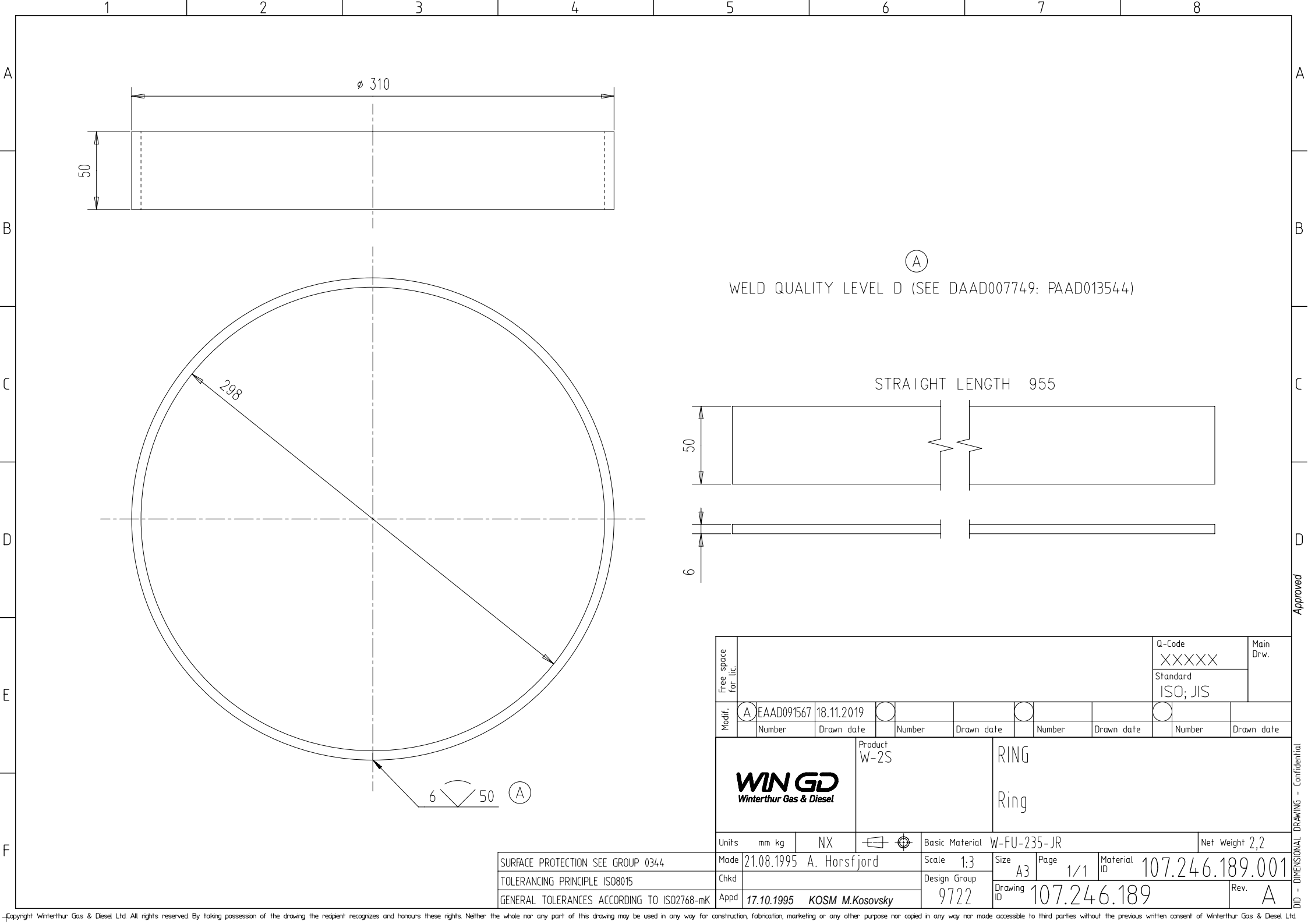
(A) WELD QUALITY LEVEL D (SEE DAAD007749; PAAD013544)

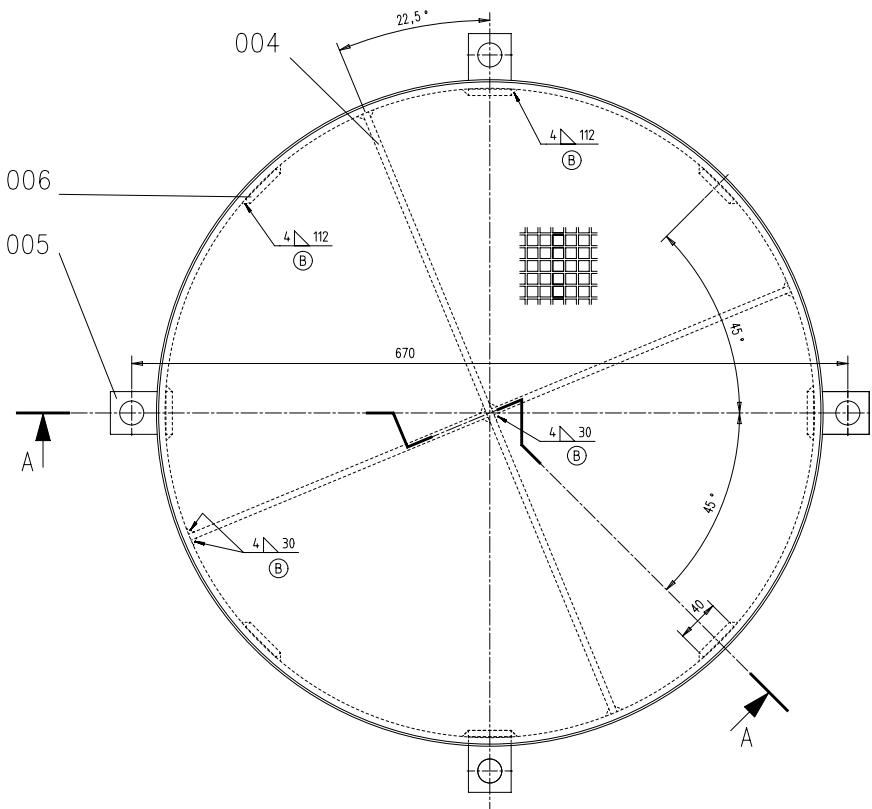
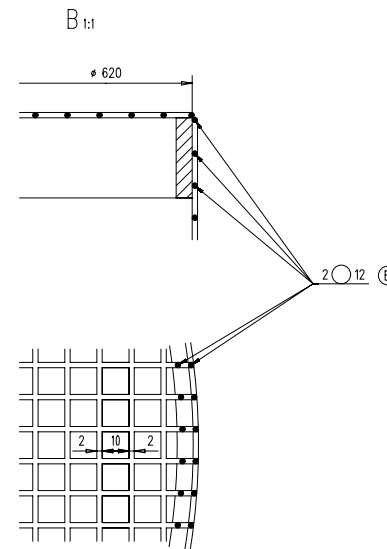
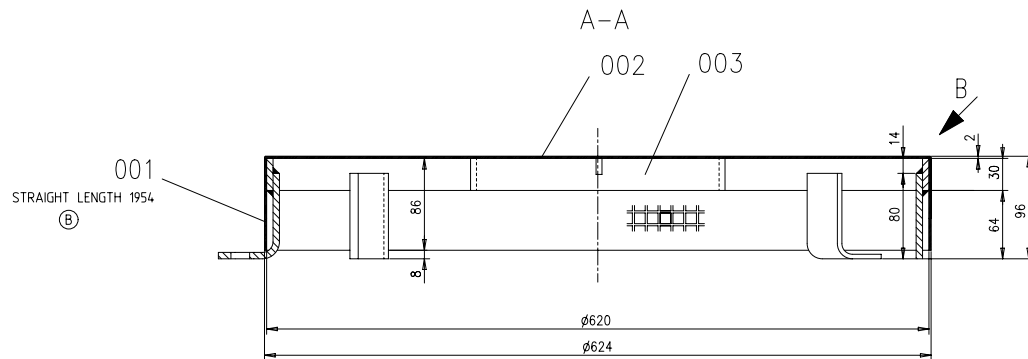
1	002	107.246.189.001	RING		107.246.189	W-FU-235-JR	2,2
1	001	107.246.188.001	PLATE		107.246.188	W-FU-235-JR	24,4
QTY	SEQ NO	Material ID	Material Name		Standard or Drawing	Basic Material Material Standard	Weight GR./NET
Free space for lic.						Q-Code	Main Drw.
						XXXXXX	
						Standard ISO; JIS	
Modif.	A	EAAD091567	18.11.2019				
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number
WIN GD Winterthur Gas & Diesel			Product W-2S		COVER Deckel		
Units	mm kg	NX				Basic Material	Net Weight 26,6
Made	21.08.1995 A. Horsfjord		Scale 1:2.5		Size A2	Page 1/1	Material ID 107.246.187.200
Chkd			Design Group 9722		Drawing ID 107.246.187		Rev. A
Appd	17.10.1995 MLU011 Lüthi						

A-A



Free space for lic.	Q-Code XXXXXX Standard ISO; JIS						Main Drw.					
Modif.	A	EAAD091567	18.11.2019									
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date				
WIN GD Winterthur Gas & Diesel			Product W-2S		PLATE Blech							
Units	mm kg	NX	Basic Material W-FU-235-JR		Net Weight 24,4							
SURFACE PROTECTION SEE GROUP 0344			Made	21.08.1995 A. Horsfjord	Scale	1:2.5	Size	A2	Page	1/1	Material ID	107.246.188.001
TOLERANCING PRINCIPLE ISO8015			Chkd		Design Group		9722	Drawing ID	107.246.188		Rev.	A
GENERAL TOLERANCES ACCORDING TO ISO2768-mK			Appd	17.10.1995 MLU011 Lütthi								



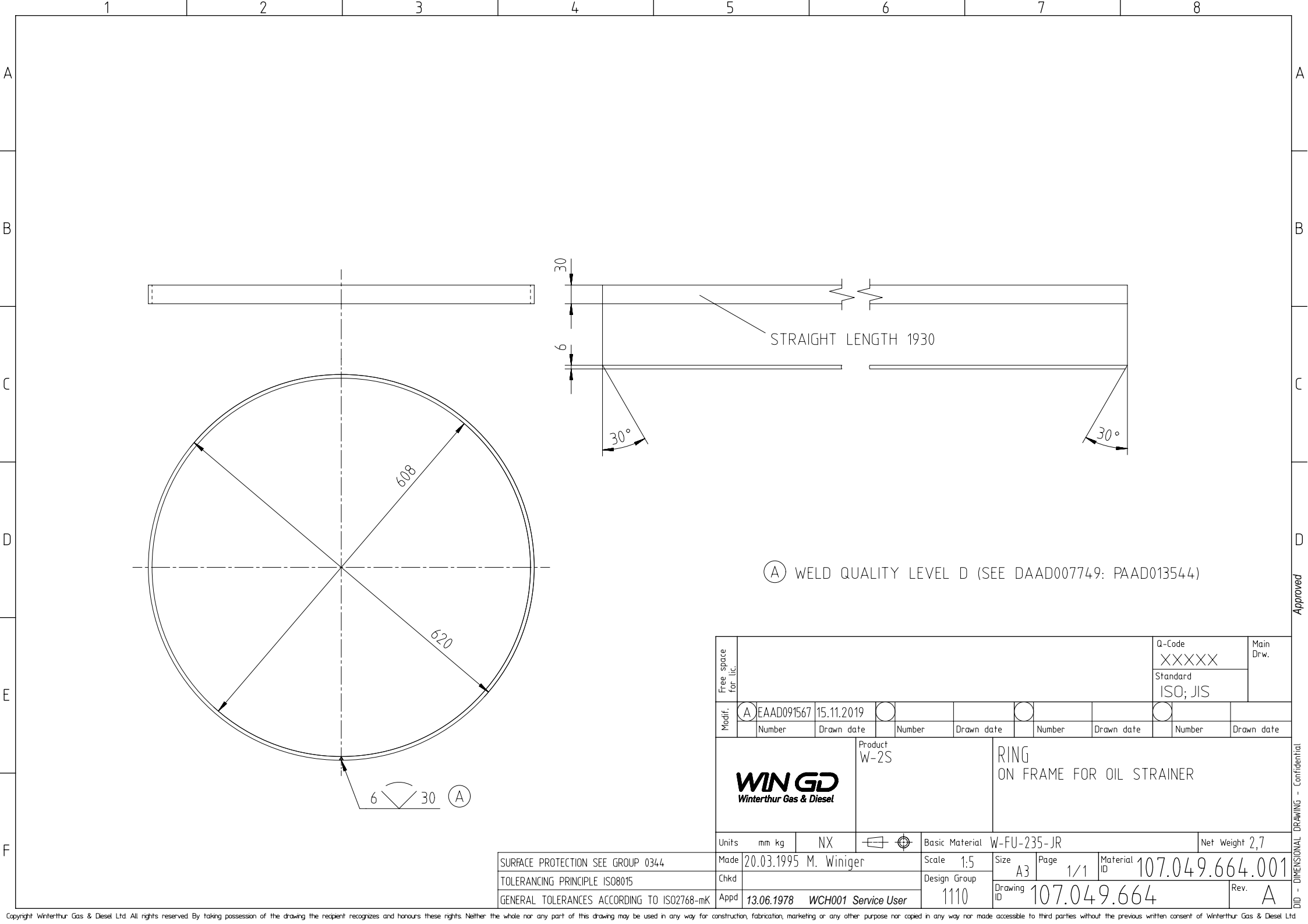


ROUGH CLEANED

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

4	006	107.049.681.006	FLAT BAR	107.049.681	W-FU-235-JR	0,15
4	005	107.049.665.001	HOLDER	107.049.665	W-FU-235-JR	0,24
2	004	107.049.666.001	FLAT BAR	107.049.666	W-FU-235-JR	0,85
1	003	107.049.664.001	RING	107.049.664	W-FU-235-JR	2,7
1	002	107.049.681.002	PERFORATED SHEET	107.049.681	W-FU-235-JR	1,4
1	001	107.049.681.001	PERFORATED SHEET	107.049.681	W-FU-235-JR	0,9
QTY	SEQ. NO.	Material ID	Material Name	Standard or Drawing	Basic Material	Weight GR./NET
					Q-Code XXXXXX	Man. Drw.
					Standard ISO	
Mod.	A EAAD028037 04.02.2002		B EAAD091567 19.11.2019			
	Number	Drawn date	Number	Drawn date	Number	Drawn date

WINGO Winkelmann Gas & Diesel		Product W-2S	OIL STRAINER		Net Weight 8,3
Units mm kg NX		Scale 1:2,5	Size A1	Page 1/1	Material ID 107.049.681.200
Made 19.06.1978 S.NATALI		Design Group 9722	Drawing ID 107.049.681	Rev. B	
SURFACE PROTECTION SEE GROUP 0344		TOLERANCING PRINCIPLE ISO8015		GENERAL TOLERANCES ACCORDING TO ISO2768-mK	
Chd		Appd 19.06.1978 WCH001 Service User			



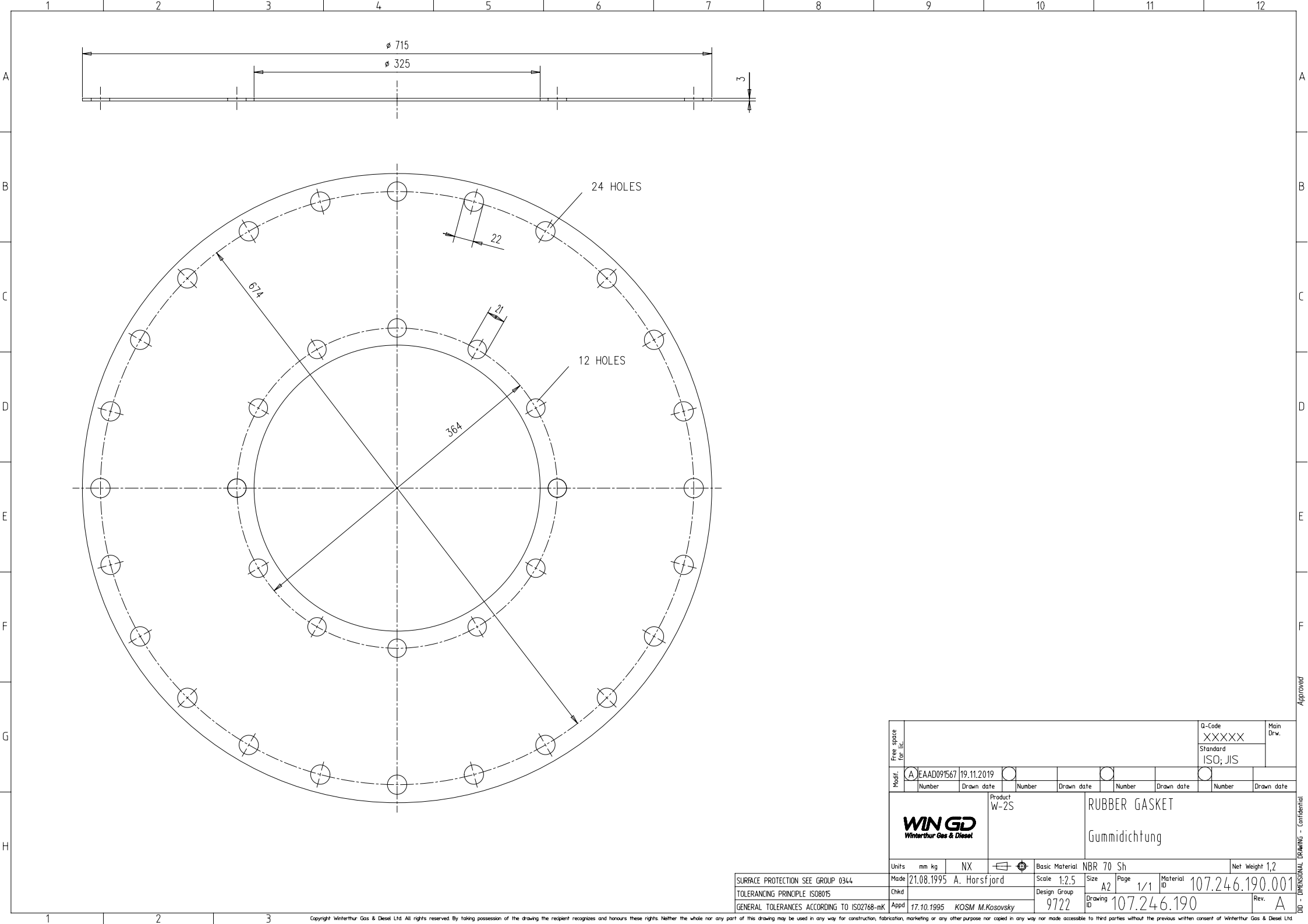
Ⓐ WELD QUALITY LEVEL D (SEE DAAD007749: PAAD013544)

Free space for lic.								Q-Code XXXXX	Main Drw.
								Standard ISO; JIS	
Modif.	Ⓐ	EAAD091567	15.11.2019	⊙		⊙		⊙	
	Number	Drawn date		Number	Drawn date		Number	Drawn date	
WIN GD Winterthur Gas & Diesel		Product W-2S		RING ON FRAME FOR OIL STRAINER					
		Units mm kg NX		Basic Material W-FU-235-JR		Net Weight 2,7			
SURFACE PROTECTION SEE GROUP 0344		Made 20.03.1995 M. Winiger		Scale 1:5		Size A3	Page 1/1	Material 107.049.664.001	
TOLERANCING PRINCIPLE ISO8015		Chkd		Design Group 1110		Drawing ID 107.049.664		Rev. A	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd 13.06.1978 WCH001 Service User							

A		1		2		3		4		A			
B		SURFACE PROTECTION SEE GROUP 03/4.4 TOLERANCING PRINCIPLE ISO8015 GENERAL TOLERANCES ACCORDING TO ISO2768-mK										B	
C		<div><div><div><div><div><div></div><div>300.5</div><div>7</div><div>300.5</div></div></div><div><div><div></div><div>30</div><div></div></div><div><div><div></div><div>15</div><div></div></div><div><div><div></div><div>15</div><div></div></div></div></div><div><div><div></div><div>608</div><div></div></div><div><div><div></div><div>6</div><div></div></div></div></div></div></div></div></div>										C	
D												D	
E		<div><div><div><div><div>Modif.</div><div>A</div><div>EAAD091567</div><div>15.11.2019</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div><div>Free space for lic.</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div><div>Q-Code</div><div>XXXXXX</div><div>Standard</div><div>ISO; JIS</div><div>Main Drw.</div><div></div></div></div></div></div>										E	
F		<div><div><div><div><div><div><div><div><div><div></div><div>WIN GD</div><div>Winterthur Gas & Diesel</div></div></div><div><div>Product</div><div>W-2S</div><div>FLAT BAR</div></div></div></div><div><div>Units</div><div>mm kg</div><div>NX</div><div><div><div></div><div></div></div></div><div><div>Basic Material</div><div>W-FU-235-JR</div><div>Net Weight 0,85</div></div></div><div><div>Made</div><div>20.03.1995 M. Winiger</div><div>Scale 1:1</div><div>Size A4</div><div>Page 1/1</div><div>Material 107.049.666.001</div></div><div><div>Chkd</div><div></div><div>Design Group 1110</div><div>Drawing ID 107.049.666</div><div>Rev. A</div></div><div><div>Appd</div><div>13.06.1978 WCH001 Service User</div><div></div><div></div><div></div></div></div></div></div></div></div>										F	
		1		2		3		4					

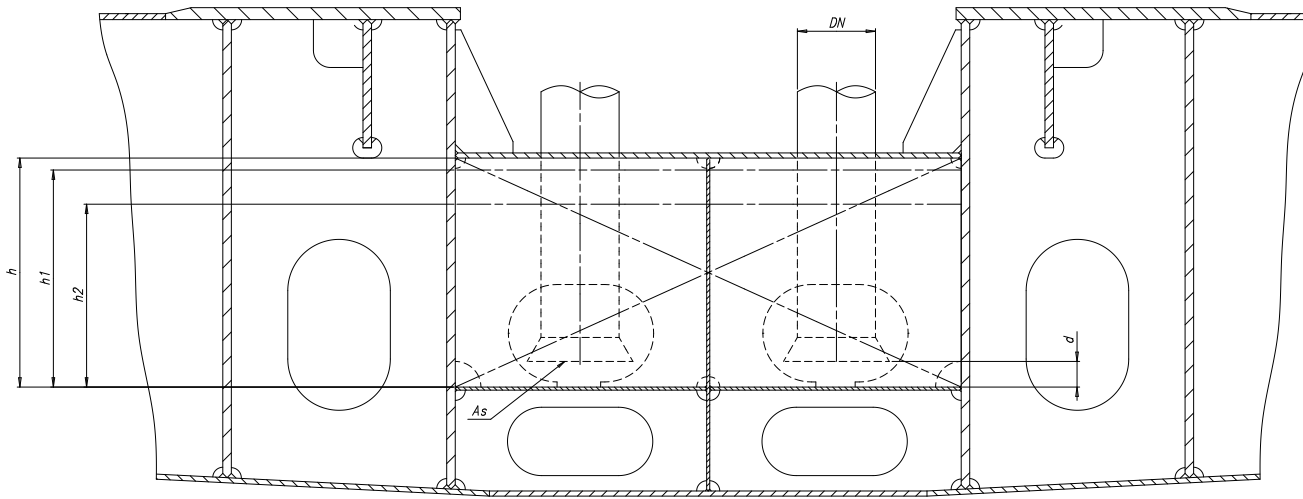


WIN GD
Winterthur Gas & Diesel

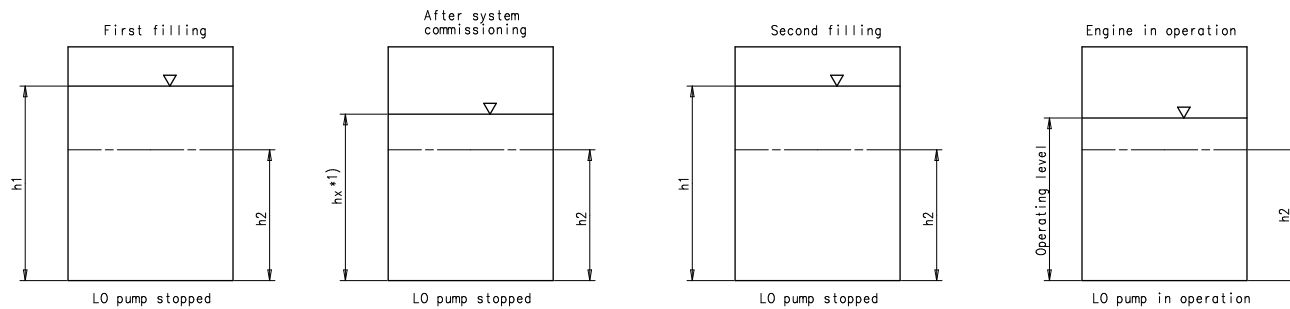


Free space for file		Q-Code XXXXXX Standard ISO; JIS						Main Drw.	
		A		EAAD091567		19.11.2019			
Modif.		Number		Drawn date		Number		Drawn date	
WIN GD Winterthur Gas & Diesel		Product		W-2S		RUBBER GASKET			
						Gummidichtung			
Units		mm kg		NX		Basic Material		NBR 70 Sh	
								Net Weight 1,2	
SURFACE PROTECTION SEE GROUP 0344		Made		21.08.1995 A. Horsfjord		Scale 1:2.5		Size A2	
TOLERANCING PRINCIPLE ISO8015		Chkd				Design Group		Page 1/1	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd		17.10.1995 KOSM M.Kosovsky		9722		Drawing ID 107.246.190	
								Rev. A	

RT-flex50-D/50DF



LO DRAIN TANK - FILLING PROCESS



Specifications that need to be met:

Dimensioning guidelines and capacities for tank design

No. of cylinders			5	6	7	8	
B	h	Recommended total tank height	(mm)	acc. to installation requirements			
		Recommended total tank volume: 105% *5)	(m3)	9	11	12	14
B	h1	Recommended filling level	(mm)	acc. to installation requirements			
		Recommended volume: 100% *5)	(m3)	9	10	12	14
	h2	Low-level alarm	(mm)	*2)			
		Volume	(m3)				
B	Vr	Min. retention volume *3)	(m3)	6	7	8	9
	d	Distance between suction pipe and bottom of tank	(mm)	*4)			
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.

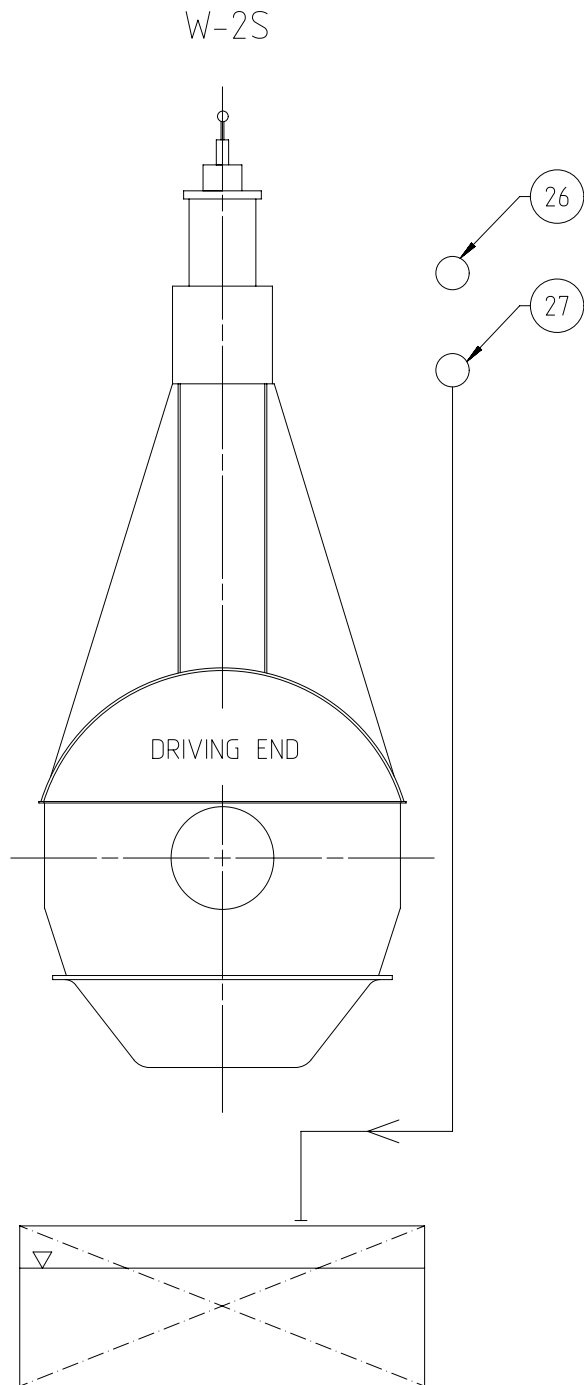
Minimum inclination angles comply with the rules of classification societies:

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) To be maintained during engine operation (LO pump suction without LO drain back-flow (emergency case) is ensured for at least 3 minutes).
- *4) 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: $d = DN/4 + 40$, $d = \text{min. } 80 \text{ mm}$.
- *5) 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.

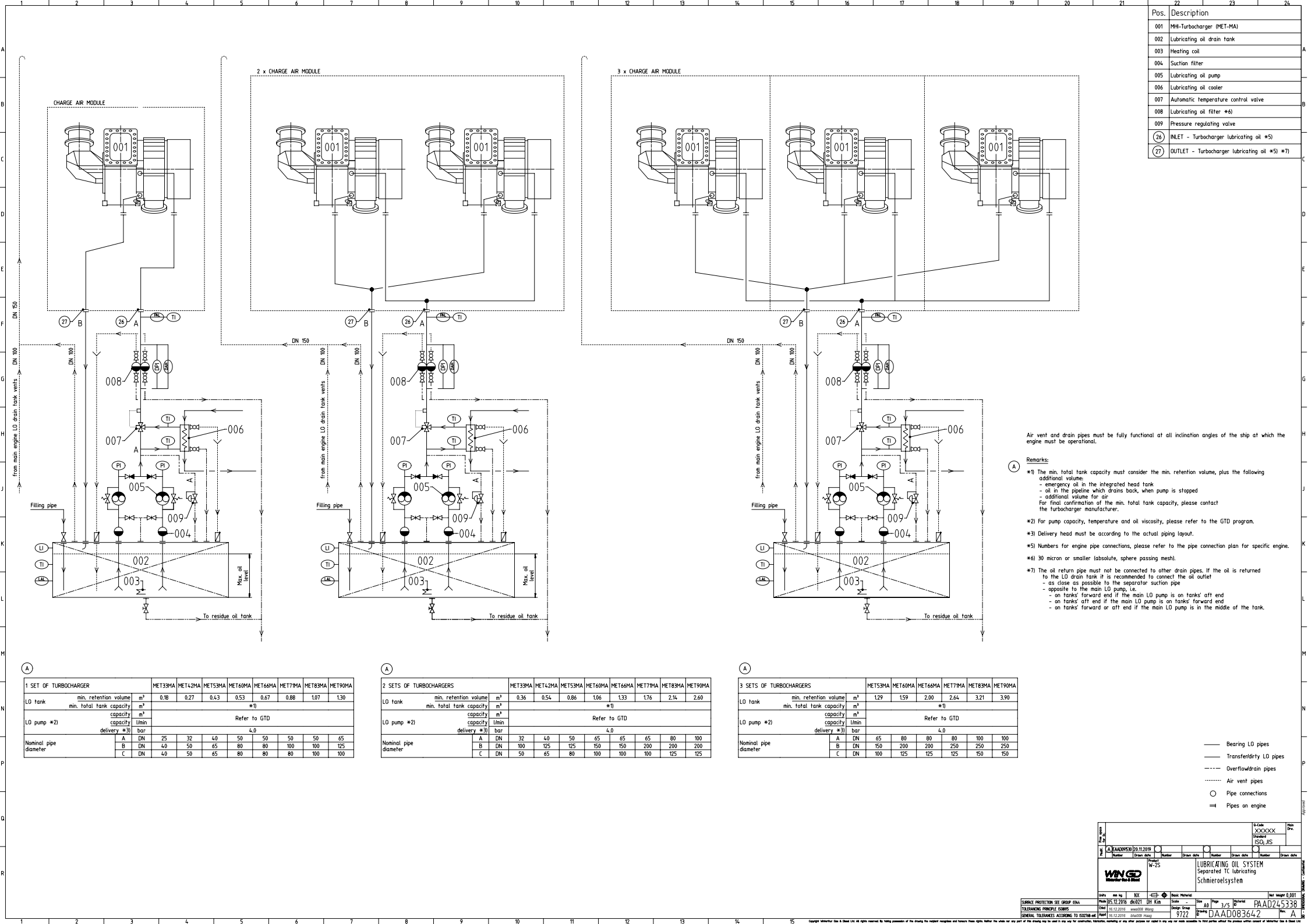
Mod. 1: Free space for I.C.		Q-Code XXXXX Standard ISO JIS		Min. Drw.	
(A) EAAD086020 15.07.2015		(B) EAAD086531 06.04.2016			
Number	Drawn date	Number	Drawn date	Number	Drawn date
WIN G Winterthur Gas & Diesel		Product W-50		LUBRICATING OIL DRAIN TANK FILLING GUIDELINE	
Units	mm kg	IDE	Basic Material	Net Weight	0,001
Mode	08.07.2008	W. WROBLEWSKI	Scale 1:25	Size A1	Page 1/1
TOLERANCING PRINCIPLE	ISO8015	Design Group	9722	Material ID	107.402.236.500
GENERAL TOLERANCES ACCORDING TO	ISO2768-mK	Appd 25.07.2008	WWR001 Wroblewski	Drawing ID	107.402.236
				Rev.	B



SPECIFICATION which must be met

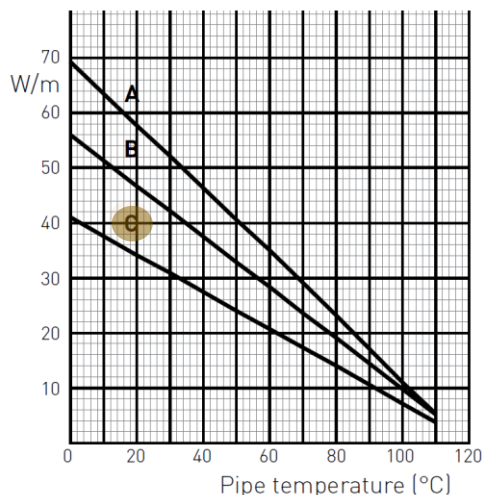
- 26 INLET - Turbocharger lubricating oil
- Lubricating oil temperature:
 - ABB: 30 ~ 85 °C
 - MHI: 35 ~ 50 °C
 - Lubricating oil pressure
 - ABB: 0.8 ~ 2.5 bar
 - MHI: 0.6 ~ 1.5 bar
 - Lubricating oil volume flow: according to the turbocharger maker's recommendation
 - Lubricating oil cleanliness:
 - 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.

Free space for lic.	Q-Code XXXXX								Main Drw.					
	Standard ISO; JIS													
Modif.	A	EAAD091530	20.11.2019											
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date						
				Product W-2S		LUBRICATING OIL SYSTEM Separated TC lubricating Schmieroelsystem								
Units	mm kg	NX		Basic Material		Net Weight 0,001								
SURFACE PROTECTION SEE GROUP 0344				Made	05.12.2016 dki021 DH Kim		Scale	-	Size	A3	Page	1/5	Material ID	PAAD245338
TOLERANCING PRINCIPLE ISO8015				Chkd	16.12.2016 wwa008 Wang		Design Group		9722		Drawing ID	DAAD083642		
GENERAL TOLERANCES ACCORDING TO ISO2768-mK				Appd	16.12.2016 bha009 Haag						Rev.	A		



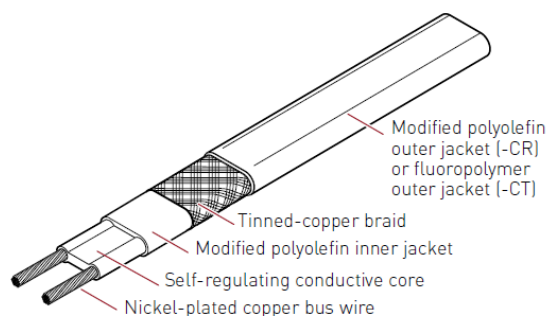
Self-Regulating Heating Cable 10QTVR2-CT

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	PAAD308926		
Chkd	24.10.2018	R. Leutwyler	Design Group	Drawing ID		DAAD106761		Rev	A
Appd	24.10.2018	W. Östreicher	0009						

MIDS - WinGD-RT-flex50DF - LUBRICATING-OIL-SYSTEM (DG9722)

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2017-02-24	DRAWING SET	First web upload
2017-05-29	DAAD047717	System drawing - new revision
2018-05-24	DAAD047717	System drawing - new revision
2019-07-18	DAAD048208 DAAD086314 DAAD055668 DAAD086317 DAAD109763 DAAD030730 DAAD030737 DAAD030739	Main, system and tank drgs – new revision
	DAAD107842	System drg without iCAT - added
2020-09-21	DAAD048208 DAAD047717 107.246.182 107.246.183 107.246.186 107.246.187 107.246.188 107.246.189 107.049.681 107.049.664 107.049.666 107.049.665 107.246.190 DAAD083642	System and tank assembly drgs – new revision
2021-05-04	DAAD048208 DAAD086314 DAAD055668 DAAD086317 DAAD047717 DAAD107842 107.246.799	Main and system drgs – new revision
		Hydraulic jack plate position 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.