



SEQ NO	QTY	Item ID	Item Name	Dimension	Standard-ID	Basic Material	Net Weight
001	1	PAAD381280	LUBRICATING OIL SYSTEM				0.001
002	1	PTAA058055	LUBRICATING OIL DRAIN TANK				165
003	1	107.341.455.500	INSTRUCTION FOR FLUSHING				0.001
004	1	PAAD178480	LUBRICATING OIL DRAIN TANK				0.001

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Prod	5 X52-S2.0										
Change History											
	A	sde101	mhu019	06.04.2023	CNAA003525	Drawing update				4	3
	-	npa101	mhu019	05.04.2023	CNAA003511	New MainDesign				-	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis			Activity Code	E	C

<div> <div>WIN GD</div> <div>Winterthur Gas &amp; Diesel</div> </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 PTAA058056		BOM Page/s 01/01







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.	X52-S2.0								
Change History									
	B	npa101	mhu019	10.07.2023	CNA003997	Drawing Updated	4 3		
	A	sde101	mhu019	07.07.2022	CNA002160	Drawing Updated	4 3		
	-	dki021	mhu019	30.04.2021	EAAD787496	-	- -		
	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						
Bill Of Material			Dimension						
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			[m] [kg]				0		
			Main Design		Design Group		9722	Q-Code	X X M
			Qty per		A4	Item ID	PAAD381280		BOM Page/s
							01/01		

## (38)

25

25

2

30

(33)

(34)

(39)

[illegible]

GENERAL TOLERANCES ACCORDING TO ISO2768-mk

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A2	Item ID	PAAD381280	Drawing Page/s	1/3
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### SYSTEM PROPOSAL

System oil and cylinder LO supply

Pos.	ENGINE COMPONENTS *17)	Pos.	SYSTEM COMPONENTS *1)
EC01	Trace heating cable control box	23	OUTLET - Lubricating oil from bedplate
		25	INLET - Lubricating oil
		27	OUTLET - Turbocharger lubricating oil *9) *14) *15)
		30	INLET - Crosshead lubricating oil
		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
		E1	Trace heating cable control box connection
		001	Lubricating oil drain tank (sump tank)
		002	Heating device
		003	Suction strainer *12)
		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 *13) *14)
		008	Transition piece (adapter) *7)
		009	Deck connection
		010	Low BN cylinder lubricating oil storage tank *4)
		011	Low BN cylinder lubricating oil service tank *4)
		012	Three-way valve, manually or remotely operated *6)
		013	Pressure regulating valve
		014	High BN cylinder lubricating oil storage tank *4)
		015	High BN cylinder lubricating oil service tank *4)
		016	Crosshead lubricating oil pump *8)
		017	Electrical trace heating cable (detailed spec. is linked on page 1)

Number of cylinders		5	6	7	8
Main engine XS2-S2.0 RI rated	power (kW)	7500	9000	10500	12000
	speed (rpm)	120			

Proposal for dimensioning *11)		For capacities refer to drawing "LO drain tank-Filling Guideline"			
LO drain tank	capacity (m³)	refer to GTD			
Main LO pump	capacity (m³/h)	refer to GTD			
Cyl. LO storage tank	capacity (m³)	Based on a feed rate of 1g/kWh (pulse)			
Cyl. LO service tank *16)	capacity (m³)	0.7	0.8	0.9	1.0
Crosshead LO pump	capacity (m³/h)	refer to GTD			
Nominal pipe diameter	A DN	200	250	250	250
	B DN	200	200	200	200
	C DN	100	100	125	125
	D DN	80	80	100	100
	E DN	150	200	200	200
	F DN	20	20	20	20
	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.			
	K1 DN	65	65	80	80
	K2 DN	80	80	80	80
	L DN	80	80	80	80
	M DN	65	65	65	65
N DN	50	50	50	50	
O DN	65	65	65	65	
P DN	32	32	32	40	

Cylinder	Volume
5	1455 l
6	1665 l
7	1873 l
8	2029 l

Min. 4,8 m from engine inlet to tank base

Approx. 5,2 m

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) Optional heating coil

\*4) The cylinder LO service tank with metering 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.

\*5) The bypass line with the 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).

\*6) 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 BN) after the change-over.

\*7) Installed as required (check with the "Pipe Connection Plan")

\*8) The LO pumps (pos. 004) and the crosshead LO pumps (pos. 016) are to be interlocked so that the crosshead LO pumps never can run alone.

\*9) The pipe diameter varies depending on the installed TC type. Project-specific values are provided in the relevant pipe connection plan of DG8020. As rough guidance please observe the following values:  
K1: Pipe diameter for engines equipped with ABB Turbocharger  
K2: Pipe diameter for engines equipped with HET Turbocharger

\*10) 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.

\*12) Mesh size according to pump suppliers recommendation.

\*13) 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.

\*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 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.

\*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 delivered by the engine manufacturer, i.e. already equipped on engine side.

\*18) To be connected to the control box (EC01) on engine side.

From clean LO tank

To dirty LO tank

To separator

From separator

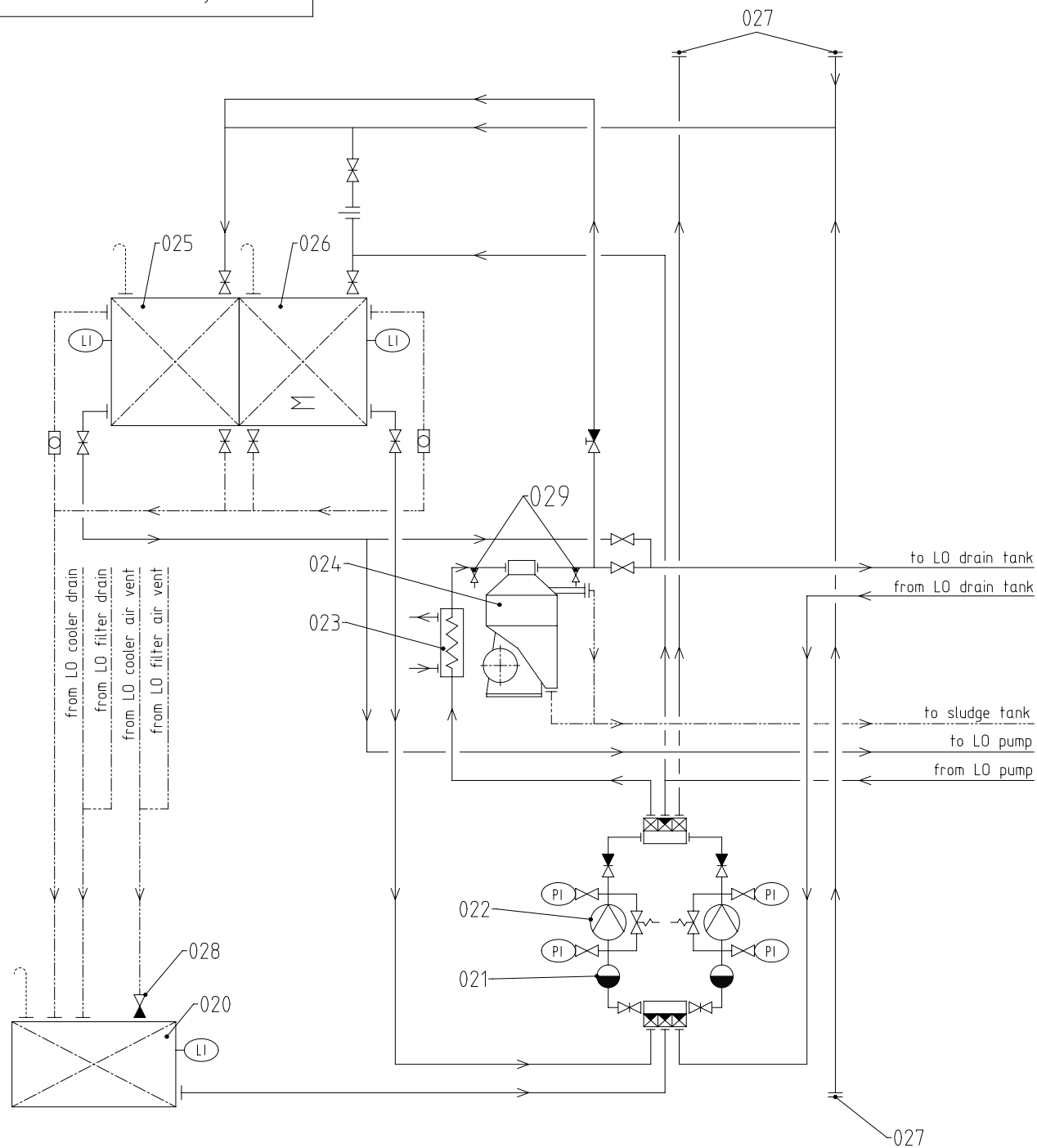
To residue oil tank

Legend:

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



## SYSTEM PROPOSAL - LO treatment system



Pos.	SYSTEM COMPONENTS *1)
020	Residue oil tank
021	Suction strainer *12)
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)

X52-S2.0			Number of cylinders			
			5	6	7	8
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)	1020	1230	1430	1640
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.

\*12) Mesh size according to pump suppliers recommendation.

\*20) Recommended position for LO sampling to check LO quality / treatment efficiency.

- 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
001	1	107.246.799.200	PLATE			15
002	2	PAAD381278	VERTICAL OIL DRAIN			75

Prod.	X52-S2.0 X52DF-S1.0		X52DF-S2.0								
Change History											
	B	sjo101	mhu019	10.11.2023	CNAA004295	Drawing updated				4	3
	A	sde101	mhu019	19.01.2022	CNAA001373	drawing updated				4	3
	-	dki021	mhu019	30.04.2021	EAAD787496	-				-	-
	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Approved	Activity Code		E	C

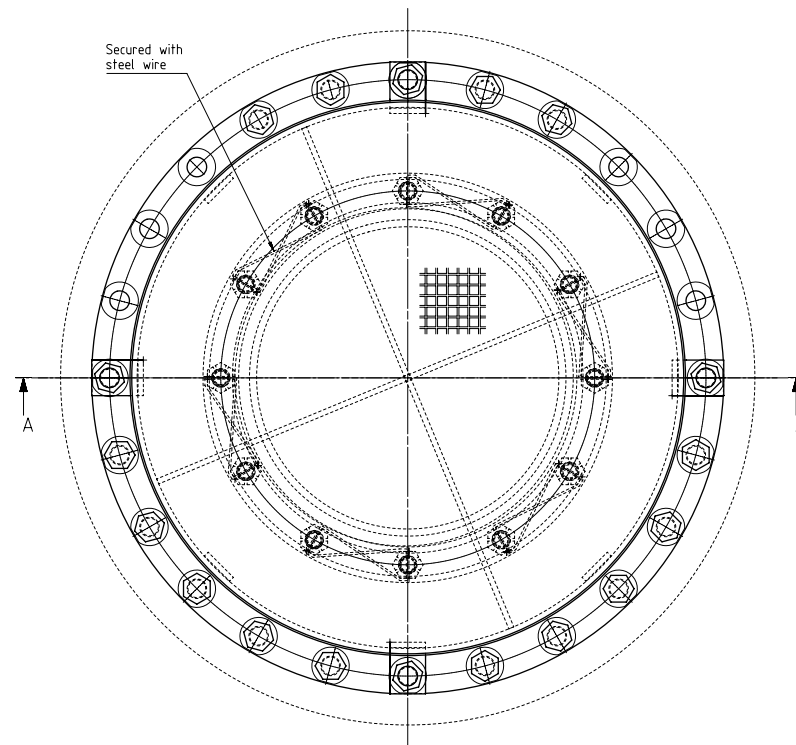
<b>Bill Of Material</b>	Dimension				
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	Main Design	Design Group 9722		Q-Code X X M	Standard WDS
	Qty per	A4	Item ID	PAAD381279	BOM Page/s 01/01







\*4) No specific quality level required.  
Oil tight is fundamental.

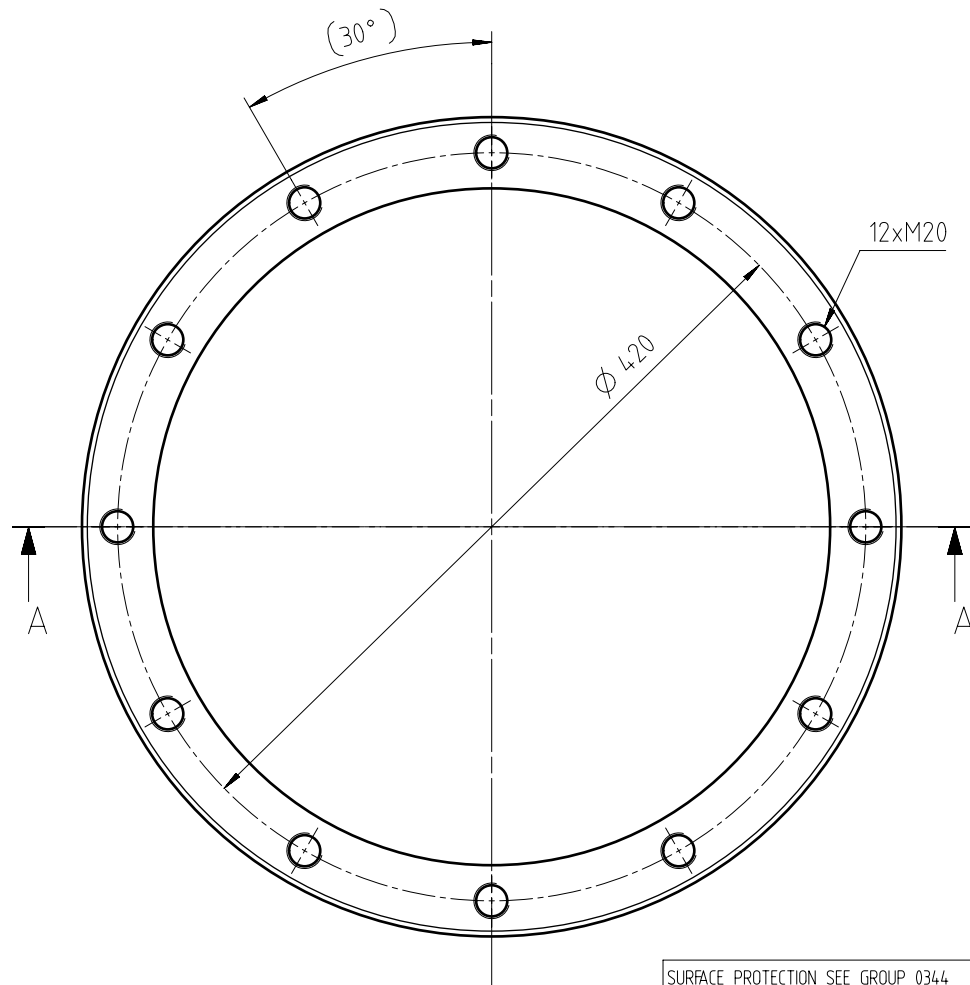
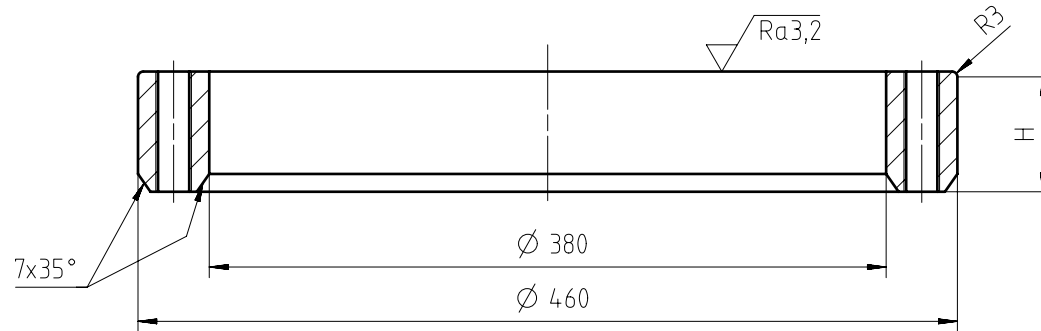
A	To be measured after alignment of the engine
H	A - 45 mm



24	008	015.07.360.910	TAB WASHER	21	DN 93	Steel Zn 5 bk	0,1
24	008	015.15.1044.261	HEXAGON HEAD SCREW M20x40		ISO 4017	8.8	0,155
12	006	015.15.1374.201	HEXAGON HEAD SCREW M20x30			8.8	0,12
2	005	PAAD104.199	RUBBER GASKET		DAAD032827	NBR Perbunan	1,5
1	004	PAAD381274	OIL STRAINER		DAAD143410		8,3
1	003	PAAD104.189	COVER		DAAD032819		24,9
1	002	PAAD104.051	RING		DAAD032783	W-FU-235-JR	29,0
1	001	PAAD104.868	WELDING FLANGE		DAAD032919	W-FU-235-JR	29,0
QTY	SEQ NO	Material ID	Material Name	Dimension, Qty	Standard or Drawing	Basic Material Material Standard	Weight GR/NET
						Q-Code XXXXXX Standard ISO, JIS	Main Dim.
Model							
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number
			Product W-25 VERTICAL OIL DRAIN Oelablauf vertikal				
Units	mm kg	NX		Basic Material			Net Weight 75
Made	30.04.2021	dkk021	DH.Kim	Scale 1:3	Size A1	Page 1/1	Material ID PAAD381278
Chkd	30.04.2021	jal101	Pickup	Design Group	9722	Drawing ID DAAD143415	Rev. -
Appd	30.04.2021	mhv019	Hung				

(B)

SECTION A-A



$\sqrt{Ra12,5}$  (✓) SHARP EDGES REMOVED

H depends on chock thickness

H = A - 45 mm

for the relation of A see Drawing DAAD033160

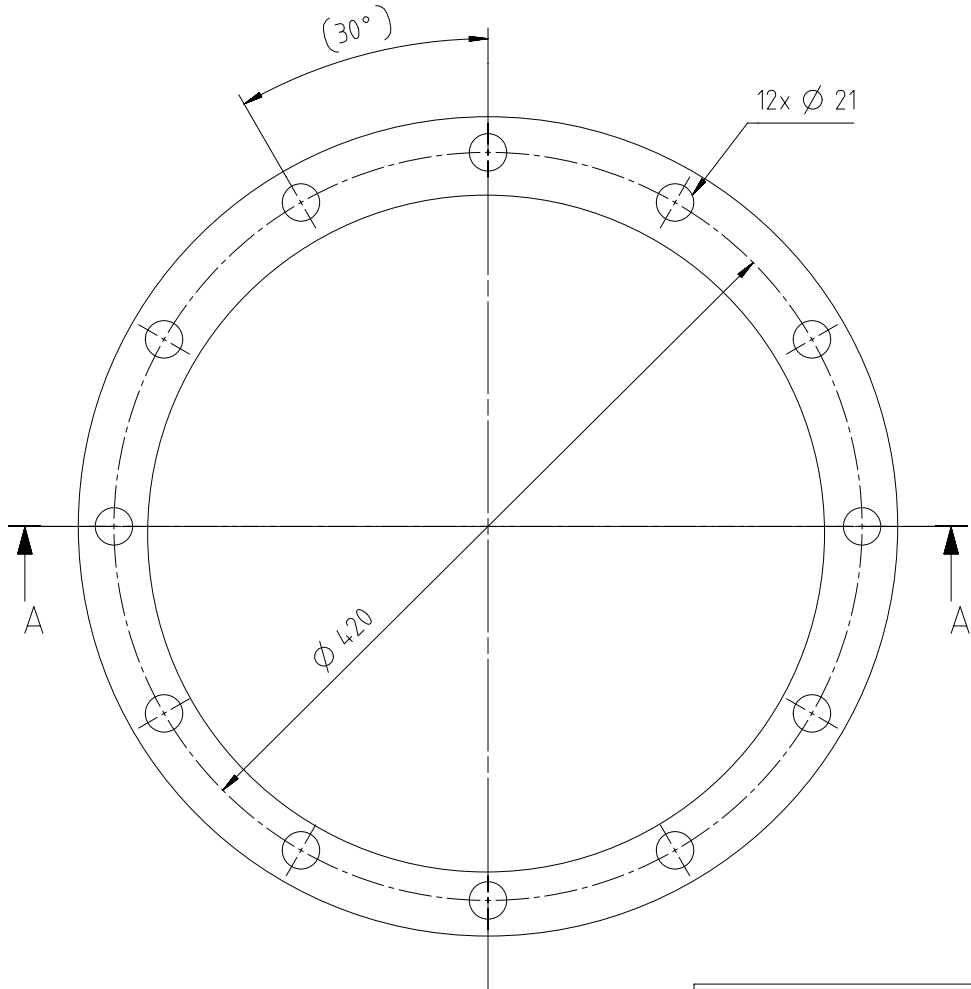
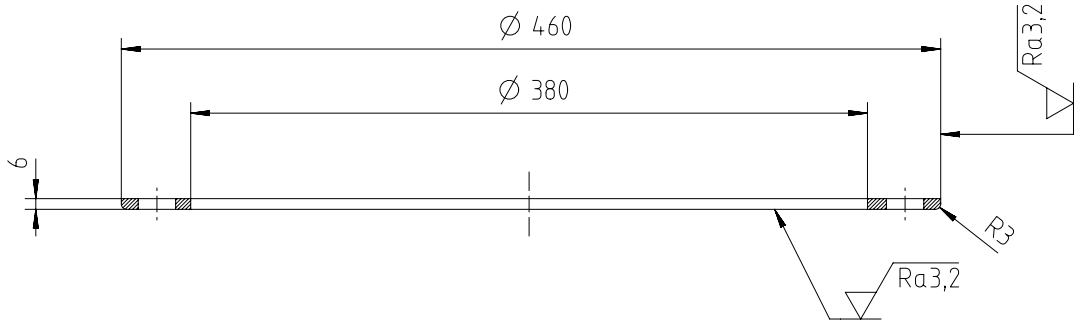
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	Number	Drawn date		Number	Drawn date		Number	Drawn date		Number
WIN GD Winterthur Gas & Diesel		Product W-2S		WELDING FLANGE Anschweisssflansch						
Units	mm kg	NX		Basic Material		W-FU-235-JR			Net Weight 29	
SURFACE PROTECTION SEE GROUP 0344		Made	05.11.2012 asex06 A.Sekulic		Scale	1:3		Size	A3	
TOLERANCING PRINCIPLE ISO8015		Chkd	03.12.2012 mhu019 Hug		Design Group	9720		Page	1/1	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	03.12.2012 wwr001 Wroblewski		Drawing ID	DAAD032919			Rev.	B

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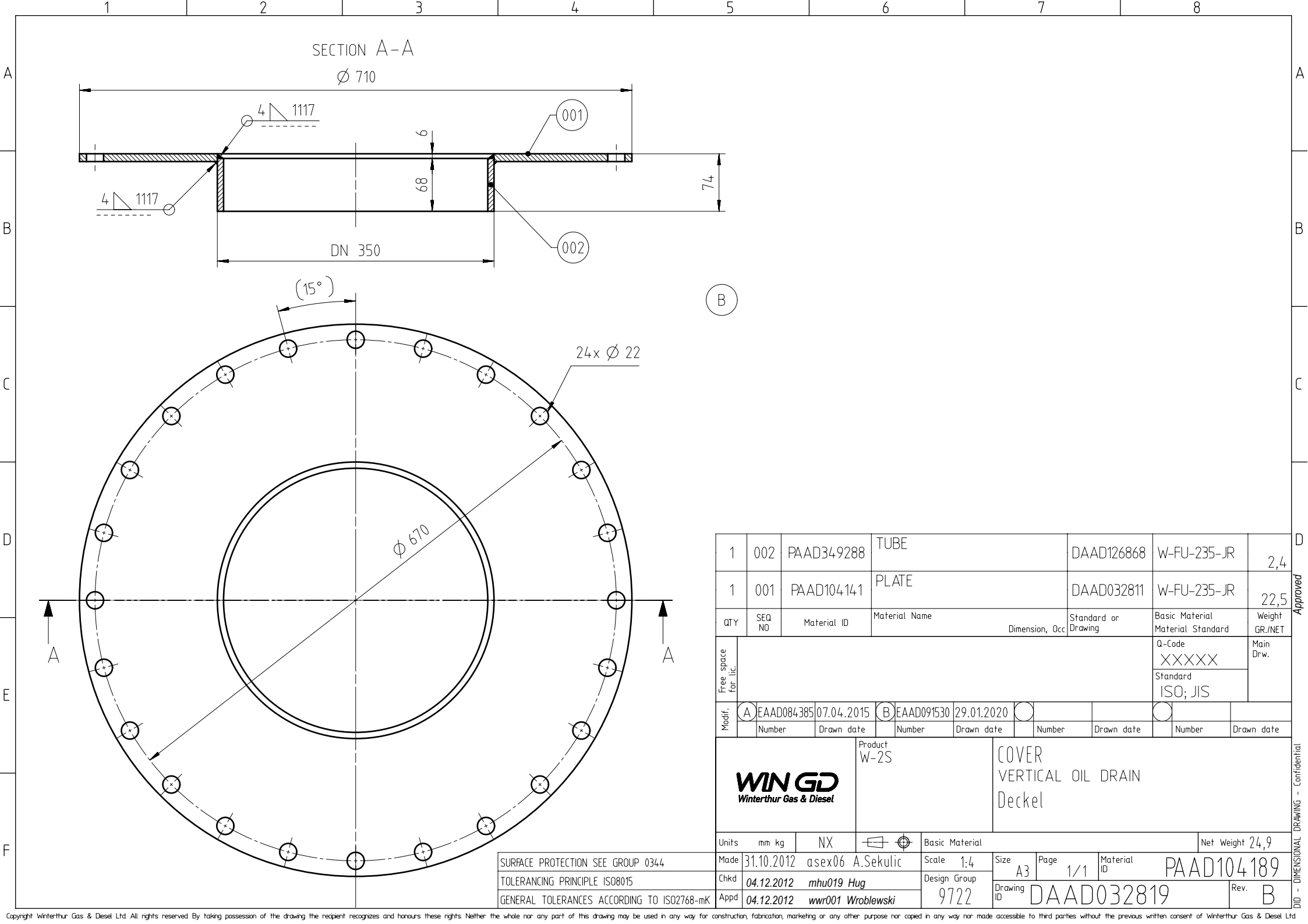
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SECTION A-A



✓ Ra 12,5 ( ✓ ) SHARP EDGES REMOVED

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<b>WIN GD</b> Winterthur Gas & Diesel		Product W-2S		RING					
				Ring					
Units	mm kg	NX		Basic Material	W-FU-235-JR				Net Weight 2,4
SURFACE PROTECTION SEE GROUP 0344		Made	30.10.2012	asex06	A.Sekulic	Scale	1:3	Size	A3
TOLERANCING PRINCIPLE ISO8015		Chkd	03.12.2012	mhu019	Hug	Design Group	1/1		Material ID
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	03.12.2012	wwr001	Wroblewski	9722	Drawing ID	DAAD032783	
								Rev.	B



(B)

SECTION A-A

Ø 710

DN 350

Ra3,2

(15°)

24 x Ø 22

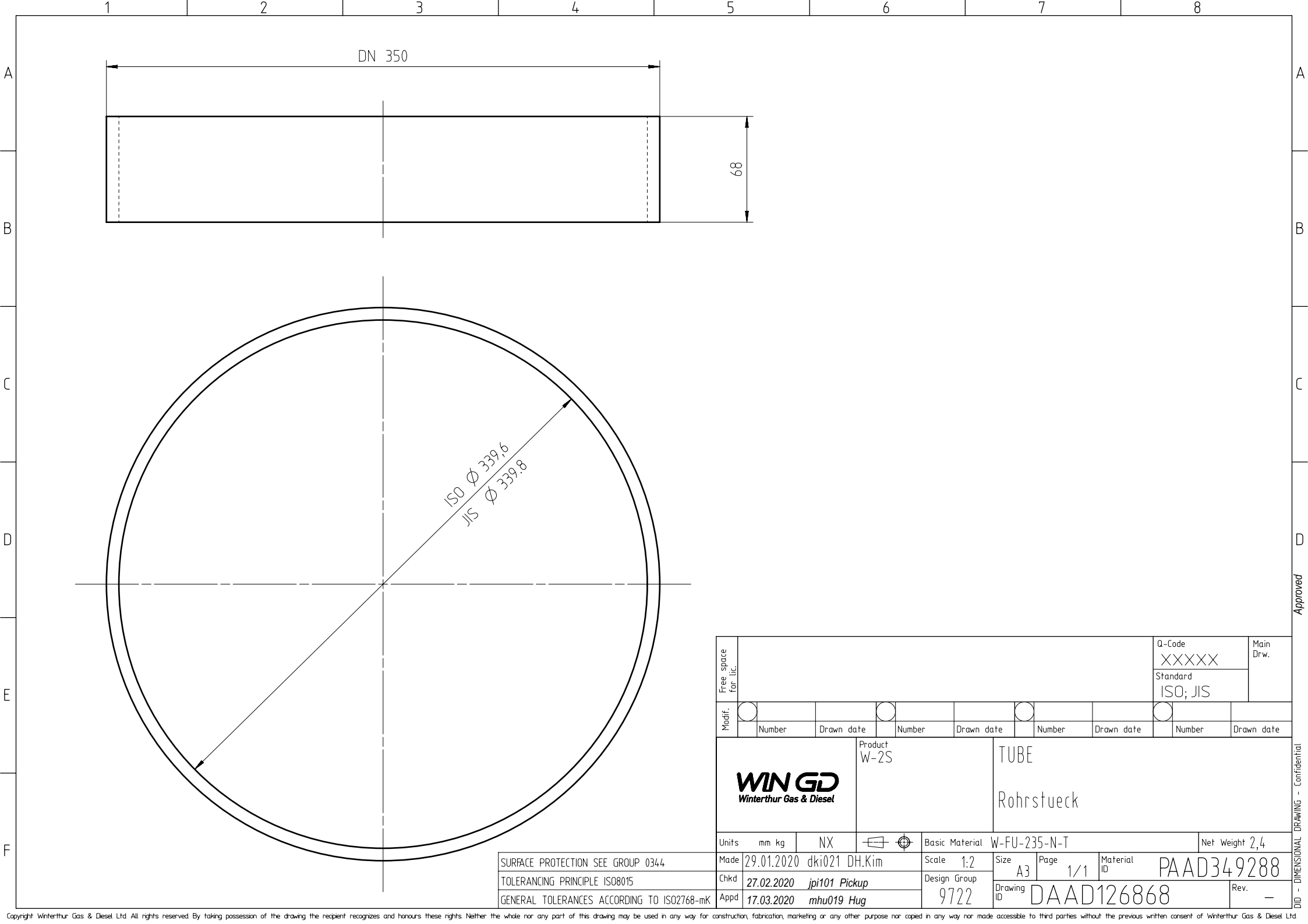
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
✓ Ra12,5 ( ✓ ) SHARP EDGES REMOVED

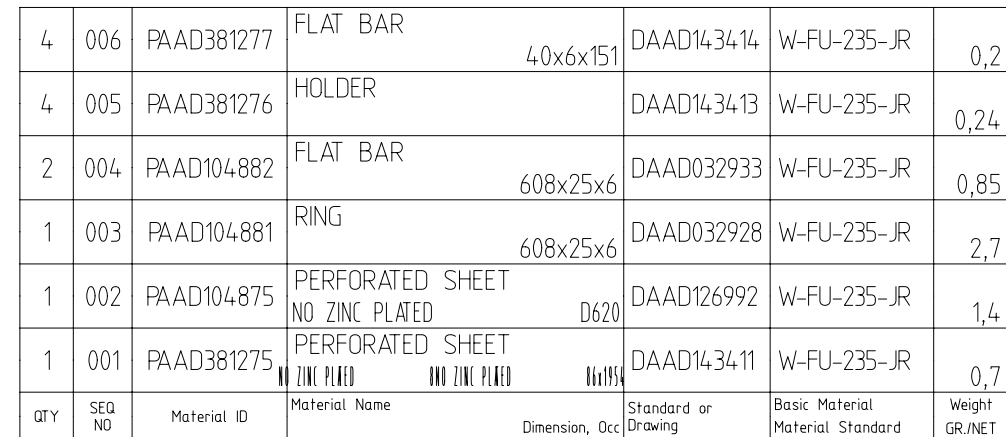
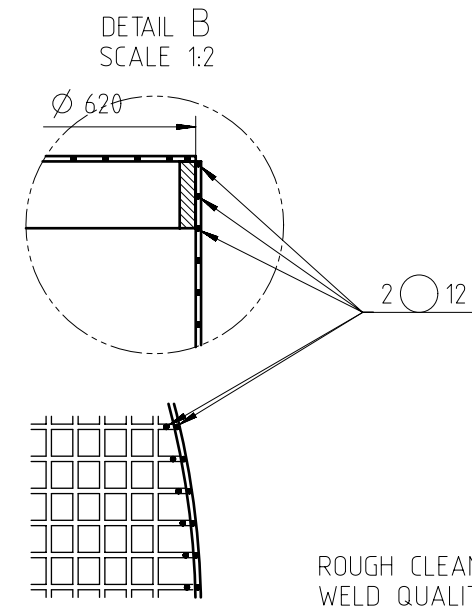
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		Number	Drawn date		Number	Drawn date		Number	Drawn date	
<b>WIN GD</b> Winterthur Gas & Diesel		Product W-2S		PLATE  Blech						
Units	mm kg	NX				Basic Material W-FU-235-JR		Net Weight 22,5		
Made	31.10.2012 asex06 A.Sekulic		Scale 1:4		Size A3	Page 1/1	Material ID PAAD104141			
Chkd	03.12.2012 mhu019 Hug		Design Group 9720		Drawing ID DAAD032811		Rev. B			
Appd	03.12.2012 wwr001 Wroblewski									

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

UID - DIMENSIONAL DRAWING - Confidential



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								Standard	
							ISO; JIS		
Modif.	○			○			○		
	Number	Drawn date		Number	Drawn date		Number	Drawn date	
<b>WIN GD</b> <i>Winterthur Gas &amp; Diesel</i>			Product W-2S		TUBE  Rohrstueck				
Units	mm kg	NX			Basic Material	W-FU-235-N-T			Net Weight 2,4
Made	29.01.2020 dki021 DH.Kim				Scale 1:2	Size A3	Page 1/1	Material ID	PAAD349288
Chkd	27.02.2020 jpi101 Pickup				Design Group 9722	Drawing ID DAAD126868			Rev. —
Appd	17.03.2020 mhu019 Hug								



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		Standard ISO; JIS	

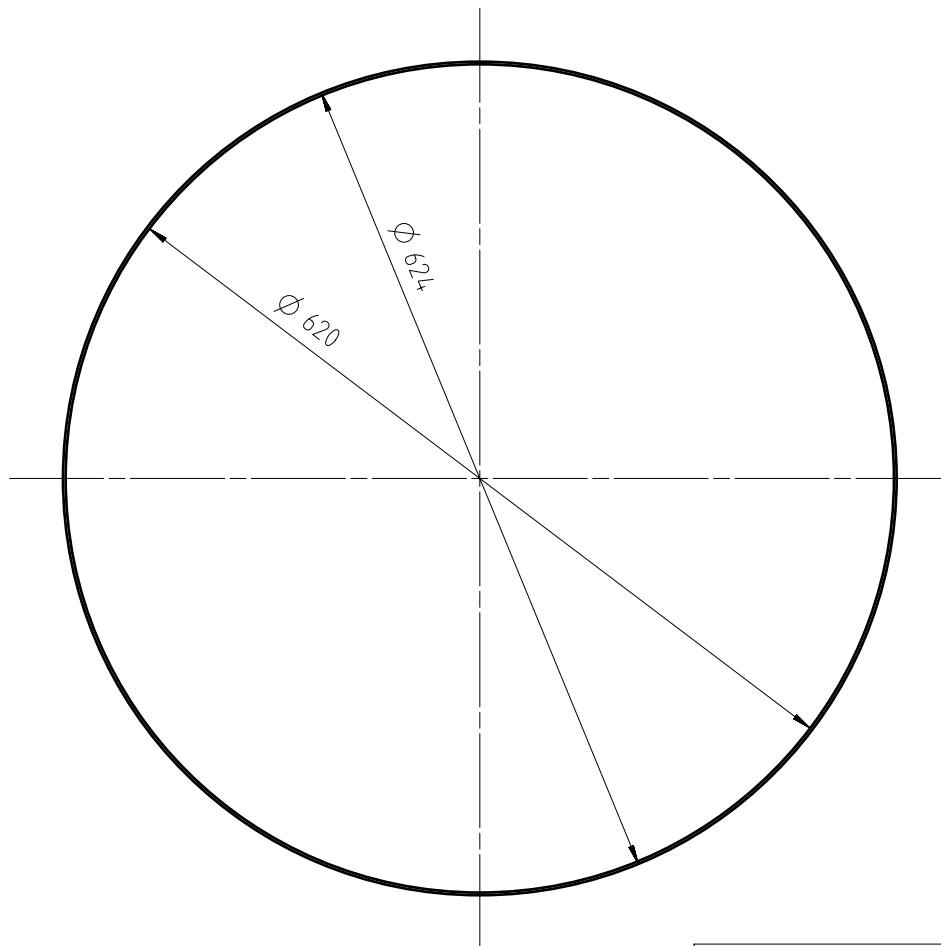
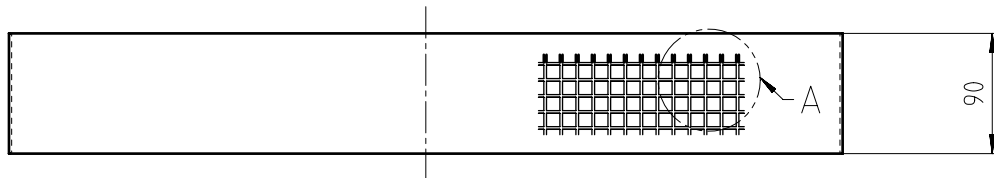
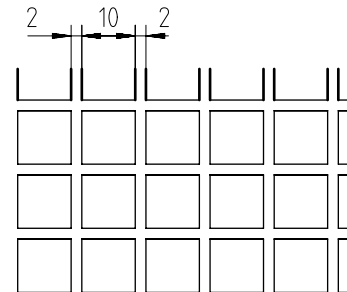
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
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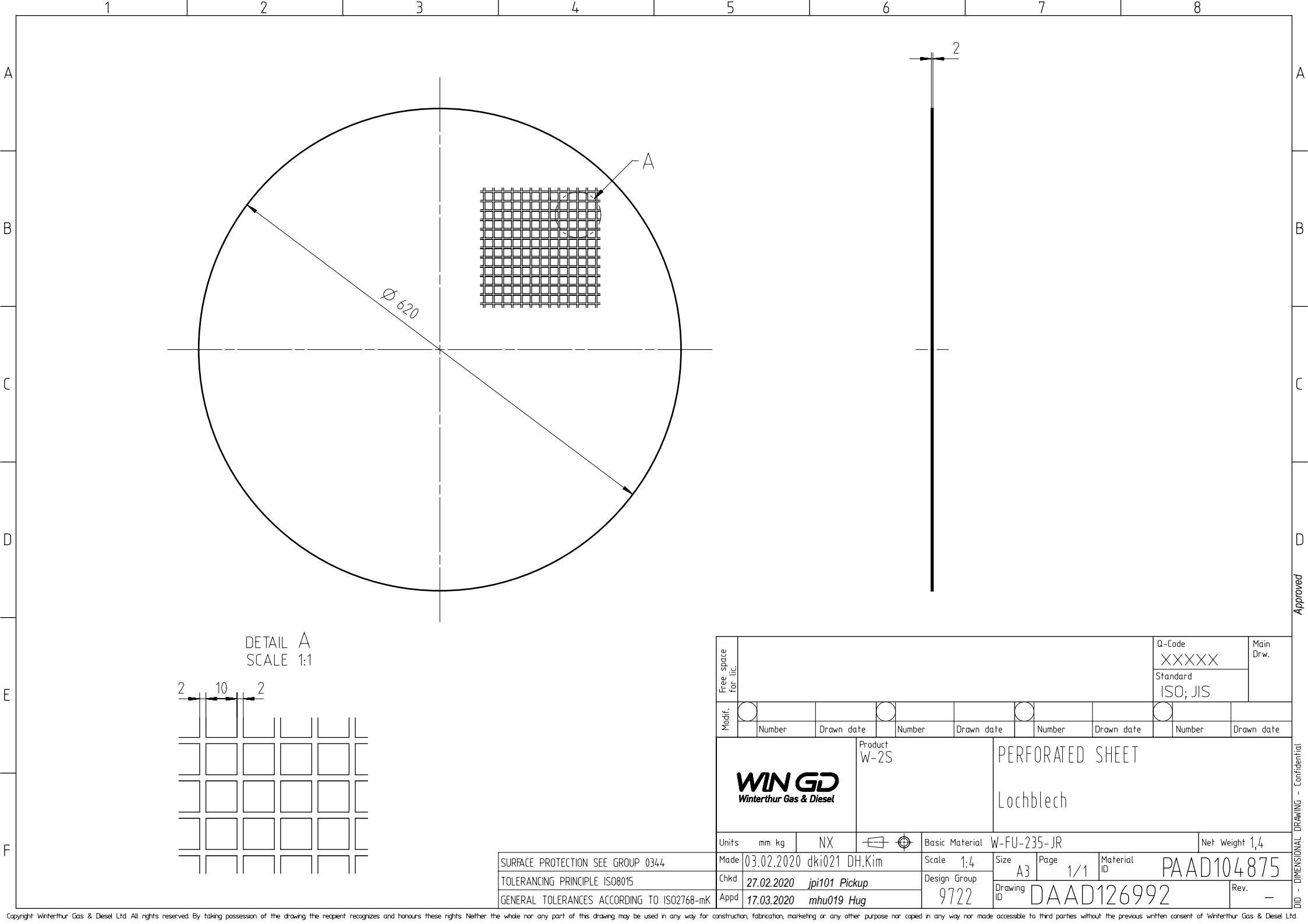
Units	mm kg	NX		Basic Material	Net Weight 8,3
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GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	30.04.2021	mhu019 Hug								

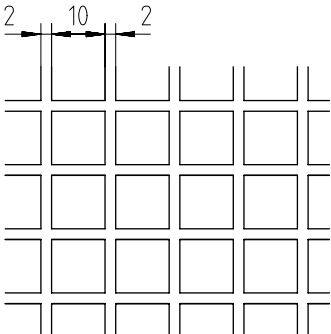
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Units	mm kg	NX			Basic Material		W-FU-235-JR		Net Weight 0,7	
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										Rev. -

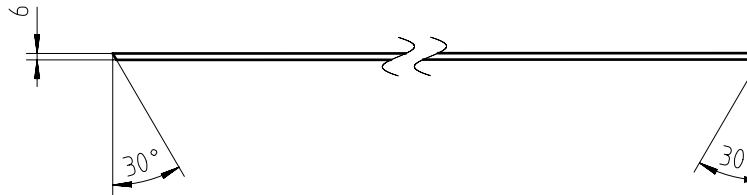
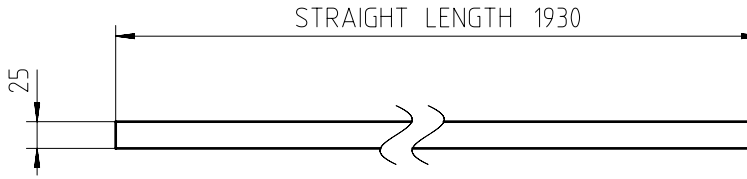
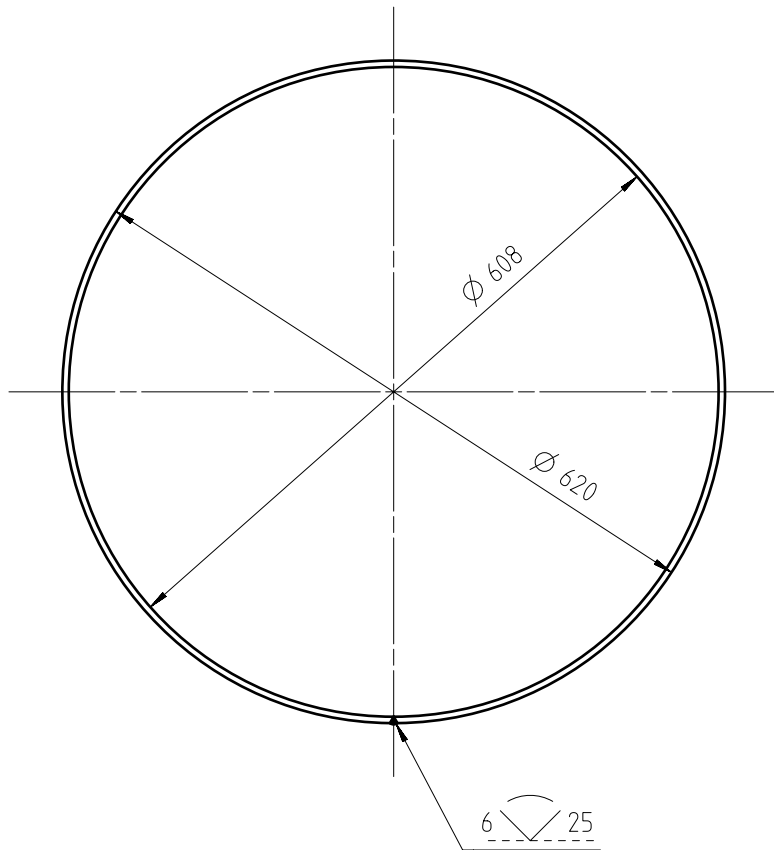
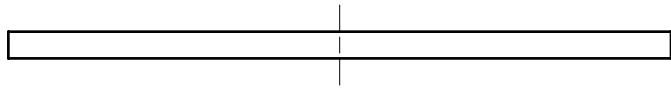




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SCALE 1:1



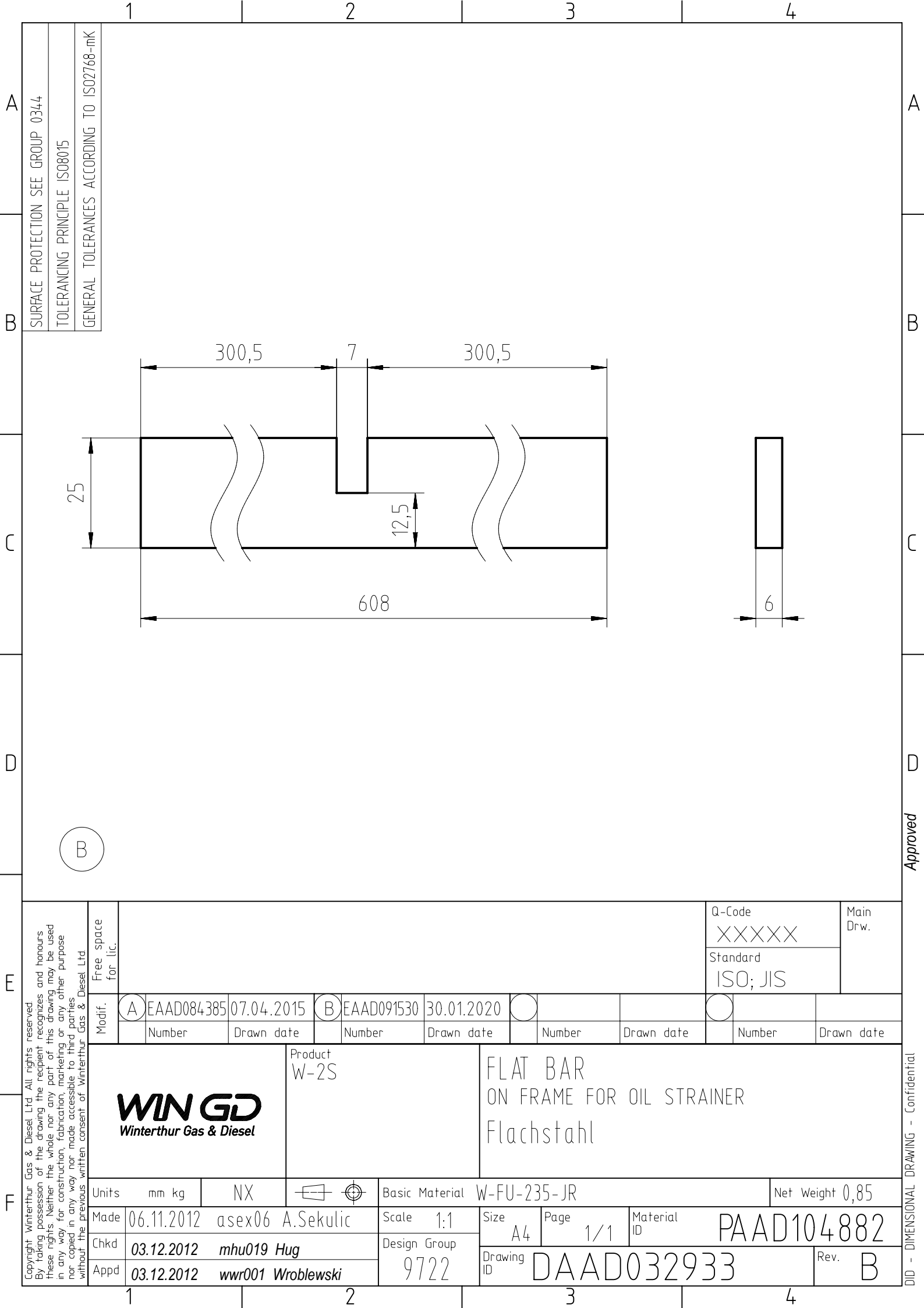
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<b>WIN GD</b> Winterthur Gas & Diesel			Product W-2S		PERFORATED SHEET  Lochblech						
Units	mm kg	NX		Basic Material W-FU-235-JR				Net Weight 1,4			
Made	03.02.2020 dki021 DH.Kim			Scale	1:4	Size	A3	Page	1/1	Material ID	PAAD104875
Chkd	27.02.2020 jpi101 Pickup			Design Group 9722		Drawing ID	DAAD126992				Rev. —
Appd	17.03.2020 mhu019 Hug										

B



Free space for lic.								Q-Code XXXXX	Main Drw.	
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Modif.	A	EAAD084385	07.04.2015	B	EAAD091530	30.01.2020				
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 Winterthur Gas & Diesel		Product W-2S		RING  Ring						
Units	mm kg	NX			Basic Material		W-FU-235-JR		Net Weight 2,7	
SURFACE PROTECTION SEE GROUP 0344		Made	06.11.2012 asex06 A.Sekulic		Scale 1:5		Size A3	Page 1/1	Material ID PAAD104881	
TOLERANCING PRINCIPLE ISO8015		Chkd	03.12.2012 mhu019 Hug		Design Group 9722		Drawing ID DAAD032928		Rev. B	
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	03.12.2012 wwr001 Wroblewski							






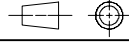
SURFACE PROTECTION SEE GROUP 03/44

TOLERANCING PRINCIPLE ISO8015

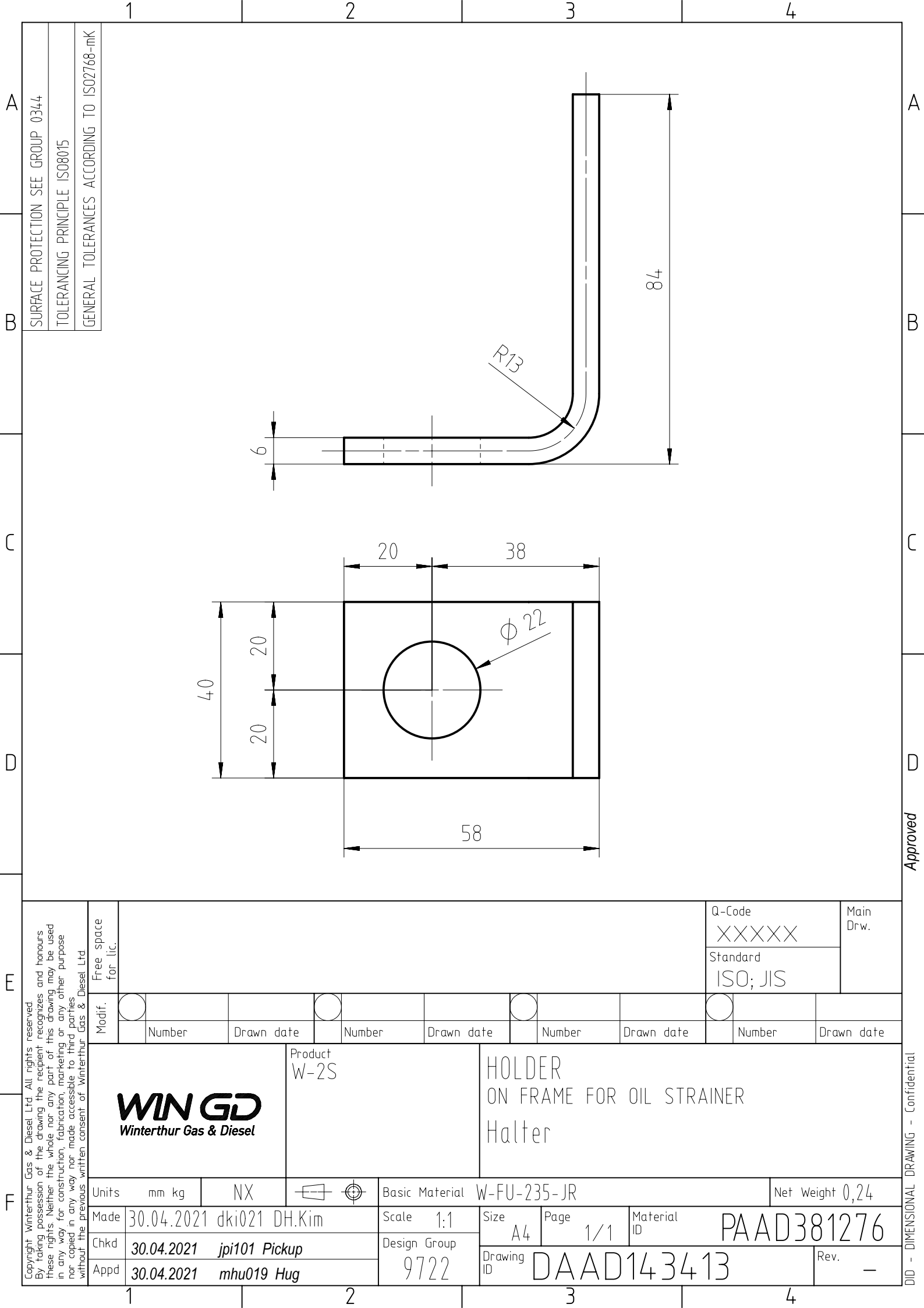
GENERAL TOLERANCES ACCORDING TO ISO2768-mK

B

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Free space for lic.	Q-Code XXXXXX						Main Drw.					
	Standard ISO; JIS											
Modif.	A	EAAD084385	07.04.2015	B	EAAD091530	30.01.2020						
		Number	Drawn date		Number	Drawn date		Number	Drawn date		Number	Drawn date
 Winterthur Gas & Diesel			Product W-2S			FLAT BAR ON FRAME FOR OIL STRAINER Flachstahl						
Units	mm kg	NX				Basic Material W-FU-235-JR					Net Weight 0,85	
Made	06.11.2012 asex06 A.Sekulic			Scale 1:1		Size A4	Page 1/1	Material ID	PAAD104882			
Chkd	03.12.2012 mhu019 Hug			Design Group		Drawing ID DAAD032933			Rev. B			
Appd	01.12.2012 wwr001 Wroblewski			9722								

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SURFACE PROTECTION SEE GROUP 03/44  
TOLERANCING PRINCIPLE ISO8015  
GENERAL TOLERANCES ACCORDING TO ISO2768-mK

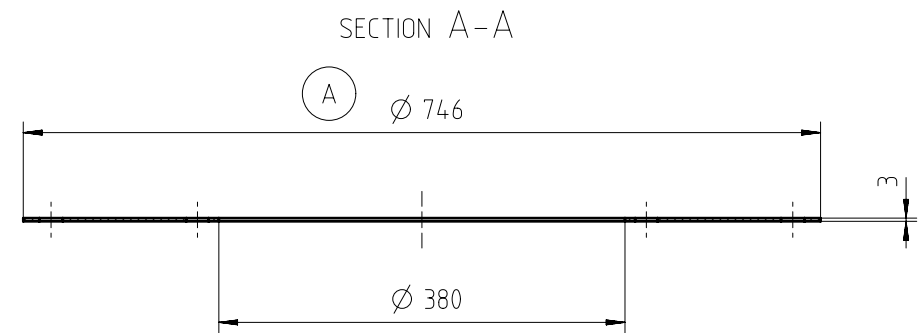
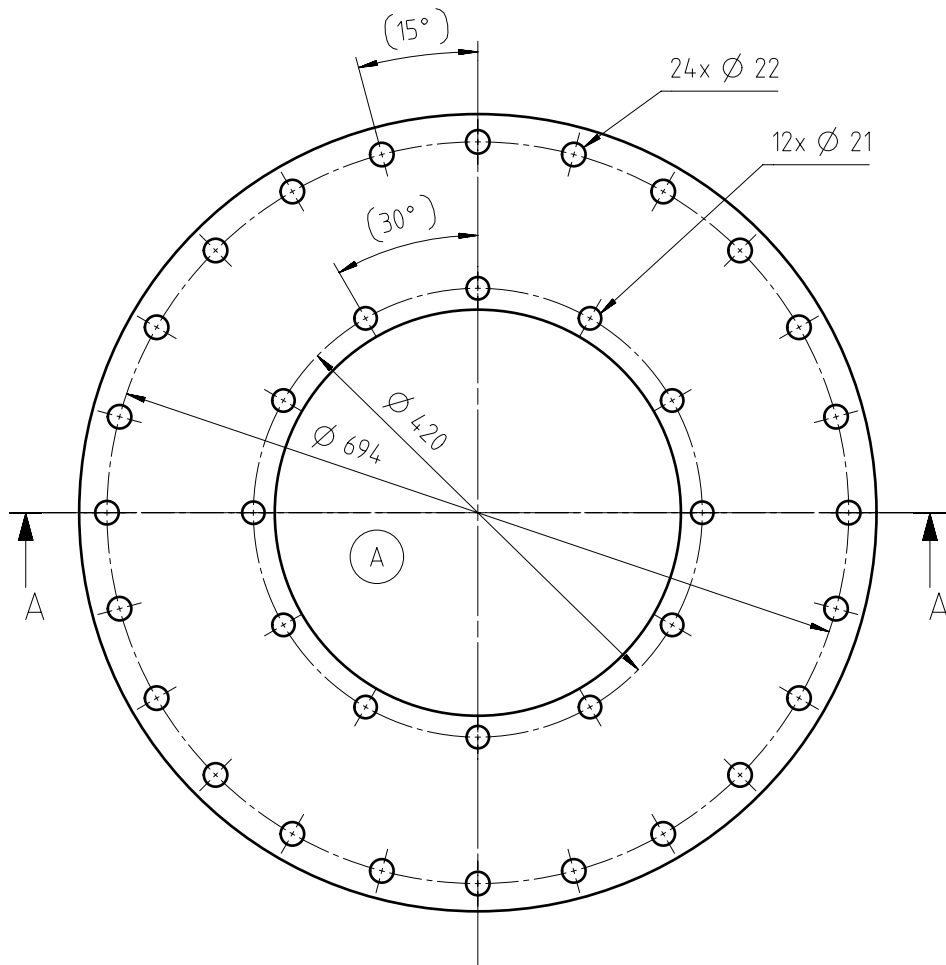
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Free space for lic.										XXXXXX		Draw.
										Standard ISO; JIS		
Modif.												
		Number	Drawn date		Number	Drawn date		Number	Drawn date		Number	Drawn date
			Product W-2S				HOLDER ON FRAME FOR OIL STRAINER Halter					
Units		mm kg	NX				Basic Material W-FU-235-JR				Net Weight 0,24	
Made	30.04.2021 dki021 DH.Kim				Scale 1:1		Size A4	Page 1/1	Material ID PAAD381276			
Chkd	30.04.2021 jpi101 Pickup				Design Group 9722		Drawing ID	DAAD143413				Rev. —
Appd	30.04.2021 mhu019 Hug											

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	1	2	3	4
A	SURFACE PROTECTION SEE GROUP 03/44			
B	TOLERANCING PRINCIPLE ISO8015			
	GENERAL TOLERANCES ACCORDING TO ISO2768-mK			
C	<div><div><div>40</div><div>84</div></div><div><div>6</div></div></div>			
D				
E	<div><div><div>Free space for lic.</div><div>Q-Code XXXXXX</div><div>Standard ISO; JIS</div><div>Main Drw.</div></div><div><div><div>Modif.</div><div><div><div></div><div>Number</div><div>Drawn date</div></div><div><div></div><div>Number</div><div>Drawn date</div></div><div><div></div><div>Number</div><div>Drawn date</div></div><div><div></div><div>Number</div><div>Drawn date</div></div></div></div></div></div>			
F	<div><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>FLAT BAR</div><div>Flachstahl</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 0,2</div></div></div><div><div><div>Made</div><div>30.04.2021 dki021 DH.Kim</div><div>Scale 1:1</div><div>Size A4</div><div>Page 1/1</div><div>Material ID PAAD381277</div></div><div><div><div>Chkd</div><div>30.04.2021 jpi101 Pickup</div><div>Design Group 9722</div><div>Drawing ID DAAD143414</div><div>Rev. —</div></div><div><div>Appd</div><div>30.04.2021 mhu019 Hug</div></div></div></div></div></div></div>			
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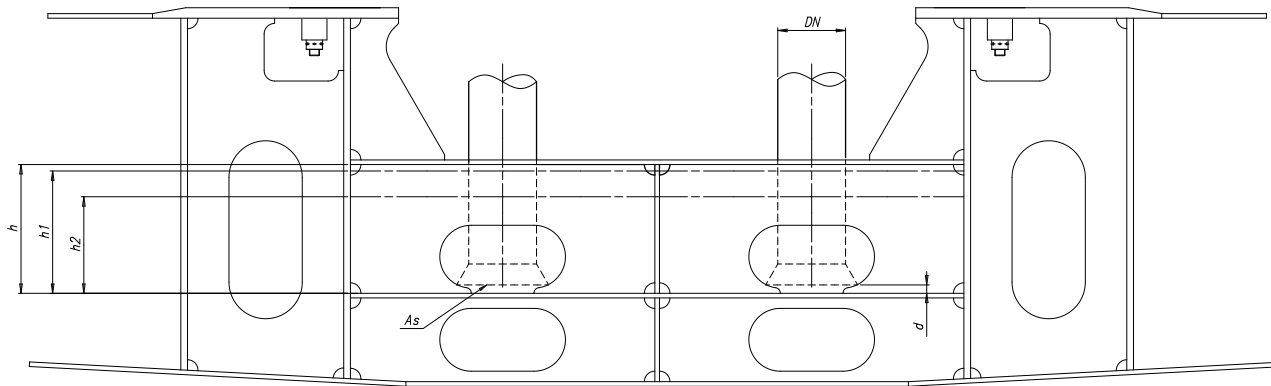


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Modif.	A	EAAD091530	30.01.2020								
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 <b>WIN GD</b> Winterthur Gas & Diesel				Product W-2S		RUBBER GASKET Gummidichtung					
Units	mm kg	NX				Basic Material			NBR Perbunan		
Made		31.10.2012		asex06 A.Sekulic		Scale		1:5		Size	A3
Chkd		03.12.2012		mhu019 Hug		Design Group		9722		Page	1/1
Appd		03.12.2012		wwr001 Wroblewski		Drawing ID		DAAD032827		Material ID	PAAD104199
										Rev.	A

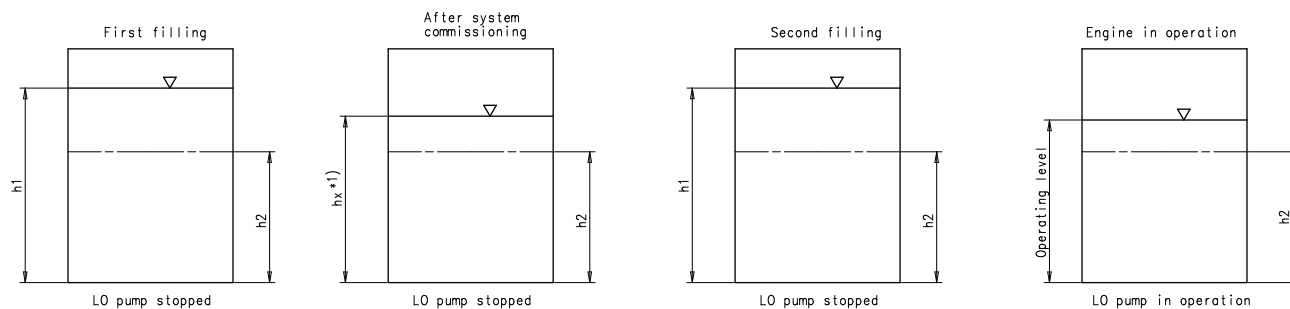
SURFACE PROTECTION SEE GROUP 0344  
 TOLERANCING PRINCIPLE ISO8015  
 GENERAL TOLERANCES ACCORDING TO ISO2768-mK

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② W-X52/W-X52DF



#### LO DRAIN TANK - FILLING PROCESS



Specifications that need to be met:

Dimensioning guidelines and capacities for tank design

No. of cylinders		4	5	6	7	8
h	Recommended total tank height (mm)	according to installation requirements				
	Recommended total tank volume: 105% ±4) (m³)	10	12	13	15	17
h1	Recommended filling level (mm)	according to installation requirements				
	Recommended volume: 100% ±4) (m³)	9	11	13	14	16
h2	Low-level alarm (mm)	*2)				
	Volume (m³)					
Vr	Min. retention volume ±5) (m³)	6	7	8	9	10
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.

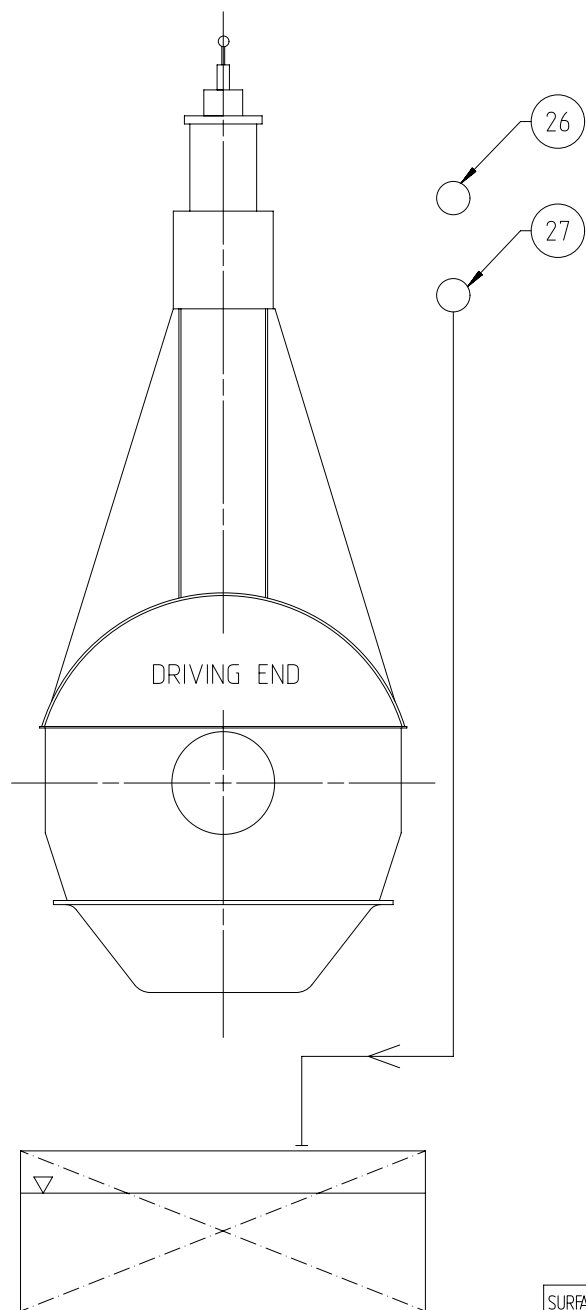
Minimum inclination angles comply with the rules of classification societies:

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).



Free space for I.C.		Q-Code XXXXX		Min. Drw.
Standard ISO JIS				
A) EAAD086282 16.11.2015		B) EAAD086531 31.03.2016		
Number	Draw date	Number	Draw date	Number
Product W-52		LUBRICATING OIL DRAIN TANK FILLING GUIDELINE		
WIN-GE				
Units mm kg IDE	Basic Material	Scale 1:25	Size A1	Page 1/1
Mode 10.12.2014	WANG	Design Group	Material ID	PAAD178480
Chkd 16.01.2015	mhu019 Hug	9722	DAAD061878	Rev. B
Appd 16.01.2015	bha009 Haag			
SURFACE PROTECTION SEE GROUP 0344				
TOLERANCING PRINCIPLE ISO8015				
GENERAL TOLERANCES ACCORDING TO ISO2768-mK				



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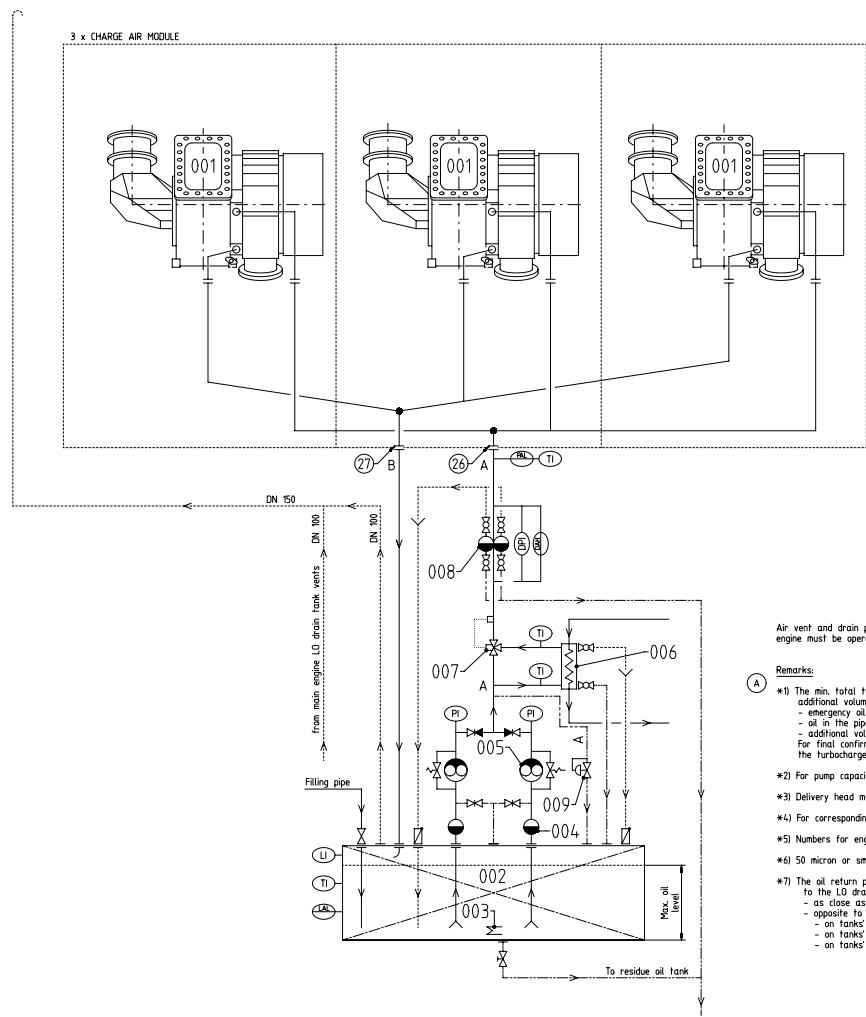
## SPECIFICATION which must be met

- 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
<div> Winterthur Gas &amp; Diesel</div>					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			

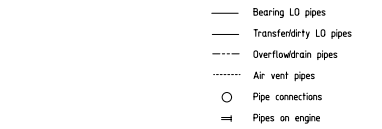
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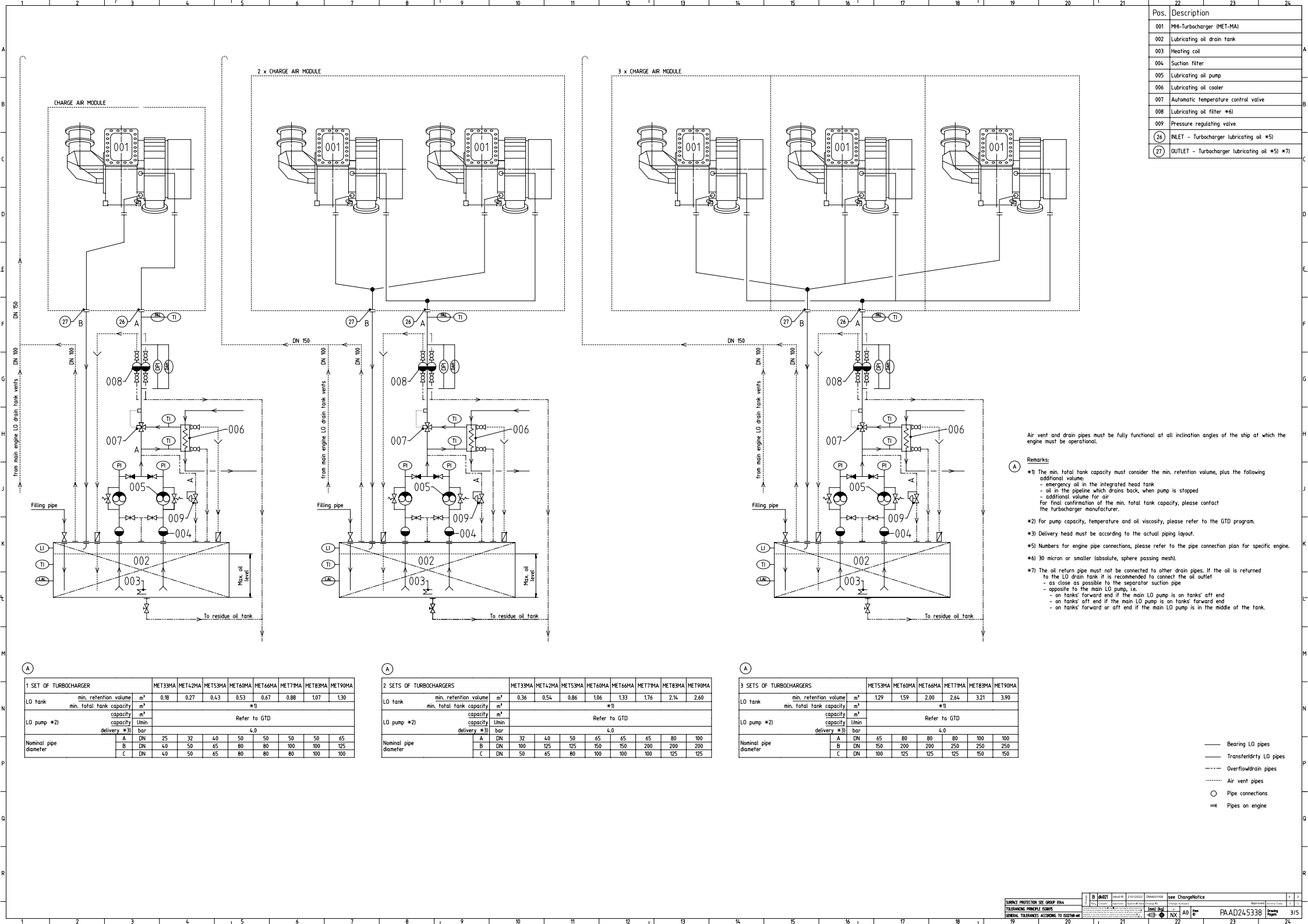
- #1) The min. total tank capacity must consider the min. retention volume, plus the following additional volume:
  - emergency oil in the integrated head tank
  - oil in the pipeline which drains back, when pump is stopped
  - additional volume for air
- For final confirmation of the min. total tank 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.
- #4) For corresponding data, please refer to manufacturer of turbocharger.
- #5) Numbers for engine pipe connections, please refer to the pipe connection plan for specific engine.
- #6) 50 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 LD drain tank it is recommended to connect the oil outlet:
  - as close as possible to the separator suction pipe
  - opposite to the main LD pump, i.e.
    - on tanks' forward end if the main LD pump is on tanks' aft end
    - on tanks' aft end if the main LD pump is on tanks' forward end
    - on tanks' forward end or aft end if the main LD pump is in the middle of the tank.



3 SETS OF TURBOCHARGERS		A175-L A275-L	A180-L A280-L	A185-L A285-L	A190-L
LO tank	min. retention volume min. total tank capacity	m <sup>3</sup> *4)		*1)	
LO pump *2)	capacity capacity delivery *3)	m <sup>3</sup> l/min bar		Refer to GTD 4.0	
Nominal pipe diameter	A	DN 65	65	65	80
	B	DN 125	125	150	150
	C	DN 125	125	150	150

- Air vent and drain pipes must be fully functional at all inclination angles of the ship at which the engine must be operational.
- 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 oilFor 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.
  - #4 For corresponding data, please refer to manufacturer of turbocharger.
  - #5 Numbers for engine pipe connections, please refer to the pipe connection plan for specific engine.
  - #6 50 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.





Pos.	Description
001	M4-Turbocharger (MET-MA)
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)

Air vent and drain pipes must be fully functional at all inclination angles of the ship at which the engine must be operational.

Remarks:

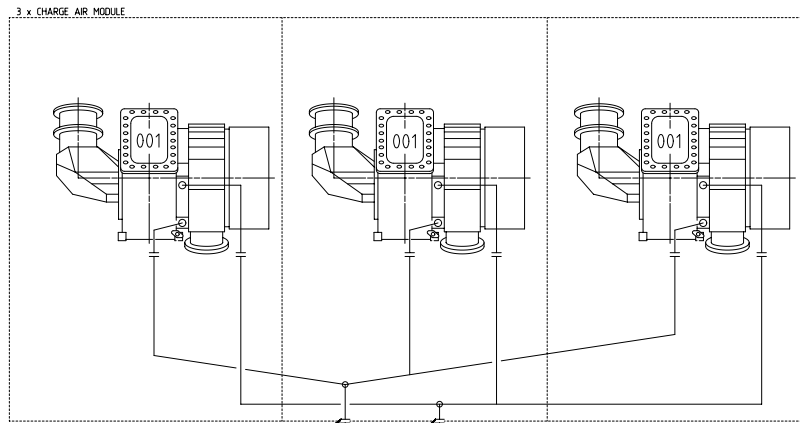
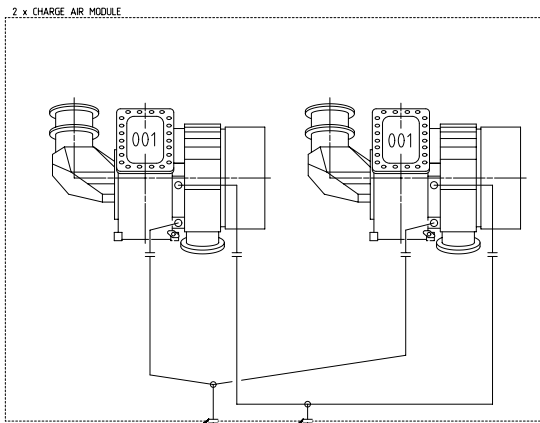
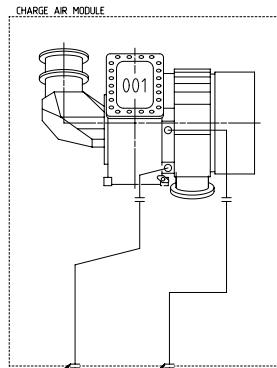
- \*1) The min. total tank capacity must consider the min. retention volume, plus the following additional volume:
- emergency oil in the integrated head tank
  - oil in the pipeline which drains back, when pump is stopped
  - additional volume for air
- For final confirmation of the min. total tank 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.

1 SET OF TURBOCHARGER		MET33MA	MET42MA	MET53MA	MET60MA	MET66MA	MET77MA	MET83MA	MET90MA
LO tank	min. retention volume	m³	0.18	0.27	0.43	0.53	0.67	0.88	1.07
	min. total tank capacity	m³	*)						
LO pump #2)	capacity	m³	Refer to GTD						
	delivery #3)	l/min	4.0						
Nominal pipe diameter	A	DN	25	32	40	50	50	50	65
	B	DN	40	50	65	80	80	100	125
	C	DN	40	50	65	80	80	80	100

2 SETS OF TURBOCHARGERS		MET33MA	MET42MA	MET53MA	MET60MA	MET66MA	MET77MA	MET83MA	MET90MA
LO tank	min. retention volume	m³	0.36	0.54	0.86	1.06	1.33	1.76	2.14
	min. total tank capacity	m³	*)						
LO pump #2)	capacity	m³	Refer to GTD						
	delivery #3)	l/min	4.0						
Nominal pipe diameter	A	DN	32	40	50	65	65	80	100
	B	DN	100	125	125	150	150	200	200
	C	DN	50	65	80	100	100	100	125

3 SETS OF TURBOCHARGERS		MET53MA	MET60MA	MET66MA	MET77MA	MET83MA	MET90MA
LO tank	min. retention volume	m³	1.29	1.59	2.00	2.64	3.21
	min. total tank capacity	m³	*)				
LO pump #2)	capacity	m³	Refer to GTD				
	delivery #3)	l/min	4.0				
Nominal pipe diameter	A	DN	65	80	80	80	100
	B	DN	150	200	200	250	250
	C	DN	100	125	125	125	150





Pos.	Description
001	M4-Turbocompressor (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 - Turbocompressor lubricating oil #5)
27	OUTLET - Turbocompressor lubricating oil #5) #7)

- Air vent and drain pipes must be fully functional at all inclination angles of the ship at which the engine must be operational.
- 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

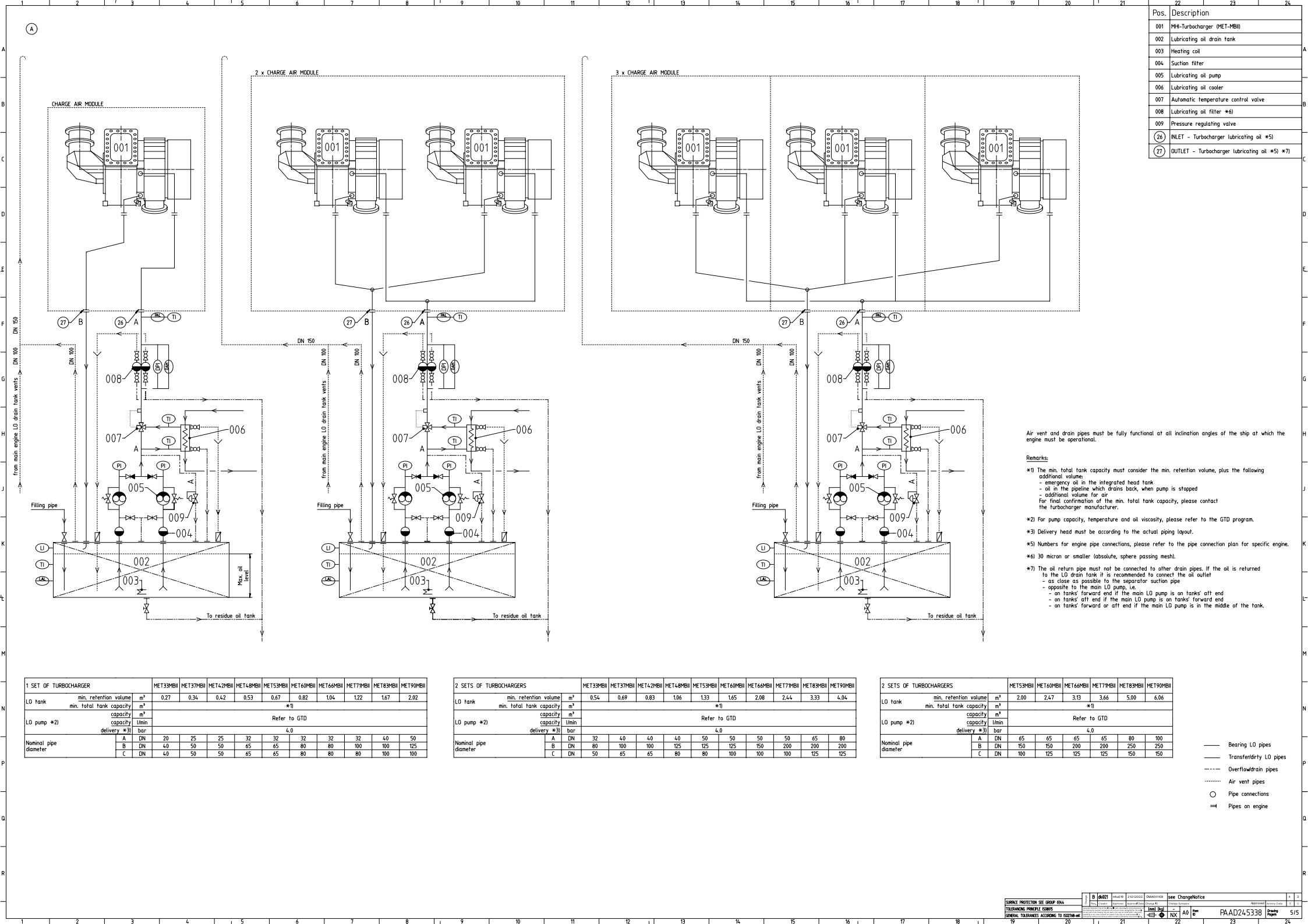
(A)																							
2 SETS OF TURBOCHARGERS			MET33MB		MET37MB		MET42MB		MET48MB		MET53MB		MET60MB		MET66MB		MET77MB		MET83MB		MET90MB		
LO tank	min. retention volume	m³	0.41		0.52		0.62		0.82		0.99		1.22		1.53		2.02		2.46		2.99		
	min. total tank capacity	m³	*1)																				
LO pump *2)	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									
	C	DN	50	65	65	65	80	80	80	100	100	100	100	125	125	125							

A

3 SETS OF TURBOCHARGERS

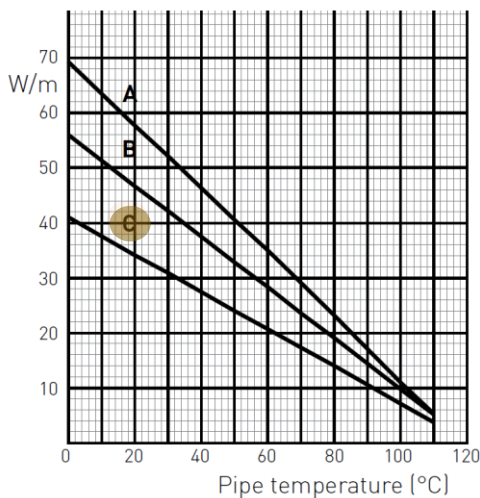
			MET33MB	MET60MB	MET66MB	MET77MB	MET83MB	MET90MB
LO tank	min. retention volume	m <sup>3</sup>	0.41	0.52	0.62	0.82	0.99	1.22
	min. total tank capacity	m <sup>3</sup>	*)1)					
LO pump #2)	capacity	m <sup>3</sup>	Refer to GTD					
	capacity	l/min						
	delivery #3)	bar	4.0					
Nominal pipe diameter	A	DN 65	45	45	45	45	80	100
	B	DN 150	150	200	200	250	250	250
	C	DN 100	125	125	125	125	150	150

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



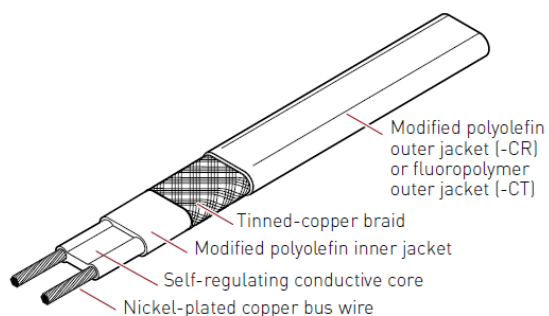
# Self-Regulating Heating Cable 10QTVR2-CT

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 X52-S2.0 – Lubricating Oil System (DG9722)

### TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2021-05-10	DRAWING SET	First web upload
2022-07-13	PAAD381280	System drg. – new revision
2023-04-06	PTAA058056 PTAA058059	New execution for 5cyl. added
2023-07-14	PAAD381280B	new execution
2023-11-15	PAAD381279B PTAA058055A	New execution

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