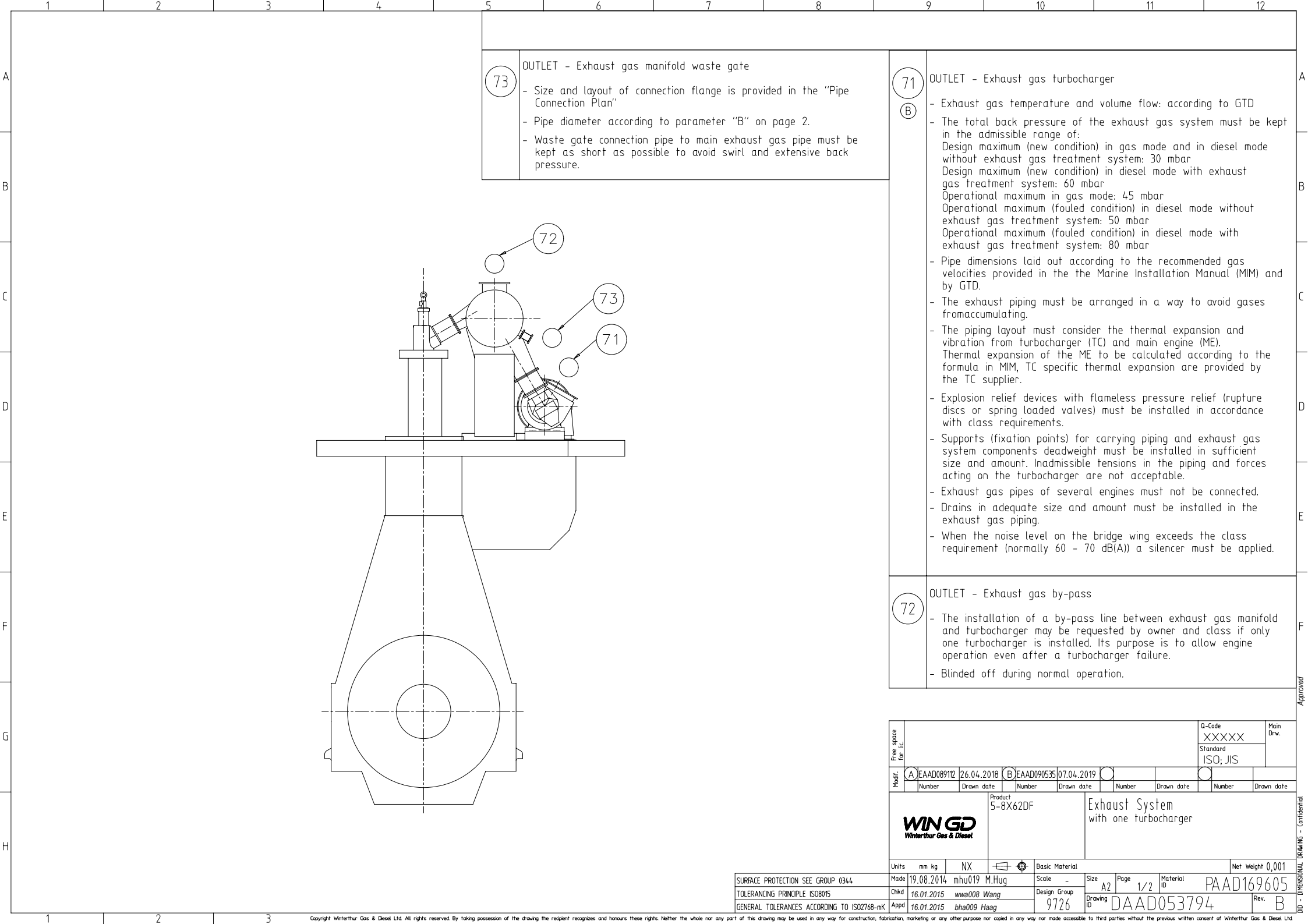


	1	2	3	4	5	6	7	8	
A									A
B									B
C									C
D									D
E									E
F									F


Net Weight											
0,001	0,001										
1	-	002	PAAD168257	Exhaust System with two turbochargers				DAAD053317		0,001	
-	1	001	PAAD169605	Exhaust System with one turbocharger				DAAD053794		0,001	
Quantity PER ENGINE		SEQ NO	Material ID	Material Name Dimension, Occ				Standard or Drawing		Basic Material Material Standard Weight GR./NET	
PAAD169029	PAAD169028	Free space for lic.							Q-Code XXXXXX		Main Drw. H
									Standard ISO; JIS		
Material ID	Modif.	<input checked="" type="radio"/>	EAAD090535	13.09.2019	<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		
		Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date		
		Product W5-8X62DF		Exhaust System Abgassystem							
Units mm kg NX				Basic Material				Net Weight			
Made 08.08.2014 mhu019 M.Hug		Scale -		Size A3		Page 1/1		Material ID			
Chkd 16.01.2015 wwa008 Wang		Design Group 9726		Drawing ID DAAD053617		Rev. A					
Appd 16.01.2015 bha009 Haag											
0 ISO2768-mK											



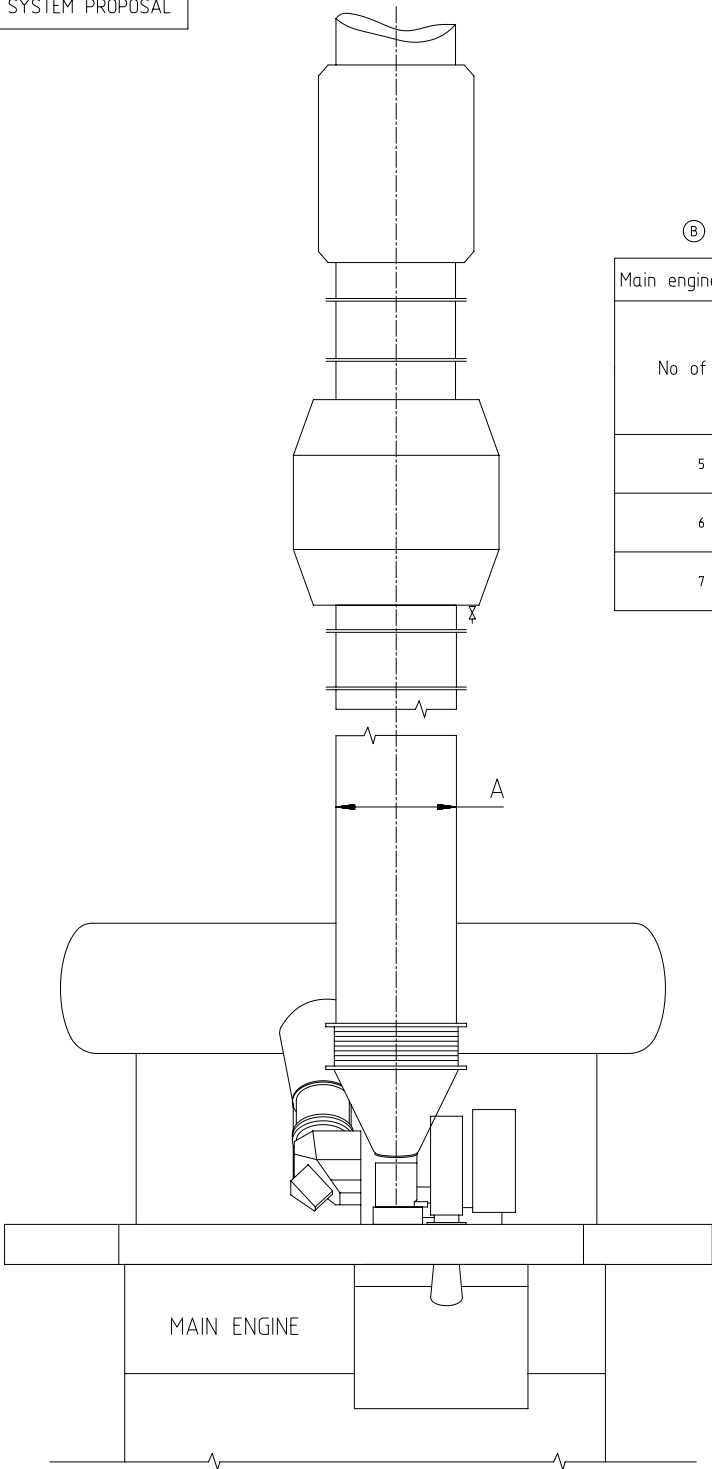
73	OUTLET - Exhaust gas manifold waste gate
	- Size and layout of connection flange is provided in the "Pipe Connection Plan"
	- Pipe diameter according to parameter "B" on page 2.
	- Waste gate connection pipe to main exhaust gas pipe must be kept as short as possible to avoid swirl and extensive back pressure.

71	OUTLET - Exhaust gas turbocharger
B	<ul style="list-style-type: none">- Exhaust gas temperature and volume flow: according to GTD- The total back pressure of the exhaust gas system must be kept in the admissible range of: Design maximum (new condition) in gas mode and in diesel mode without exhaust gas treatment system: 30 mbar Design maximum (new condition) in diesel mode with exhaust gas treatment system: 60 mbar Operational maximum in gas mode: 45 mbar Operational maximum (fouled condition) in diesel mode without exhaust gas treatment system: 50 mbar Operational maximum (fouled condition) in diesel mode with exhaust gas treatment system: 80 mbar- Pipe dimensions laid out according to the recommended gas velocities provided in the the Marine Installation Manual (MIM) and by GTD.- The exhaust piping must be arranged in a way to avoid gases from accumulating.- The piping layout must consider the thermal expansion and vibration from turbocharger (TC) and main engine (ME). Thermal expansion of the ME to be calculated according to the formula in MIM, TC specific thermal expansion are provided by the TC supplier.- Explosion relief devices with flameless pressure relief (rupture discs or spring loaded valves) must be installed in accordance with class requirements.- Supports (fixation points) for carrying piping and exhaust gas system components deadweight must be installed in sufficient size and amount. Inadmissible tensions in the piping and forces acting on the turbocharger are not acceptable.- Exhaust gas pipes of several engines must not be connected.- Drains in adequate size and amount must be installed in the exhaust gas piping.- When the noise level on the bridge wing exceeds the class requirement (normally 60 - 70 dB(A)) a silencer must be applied.

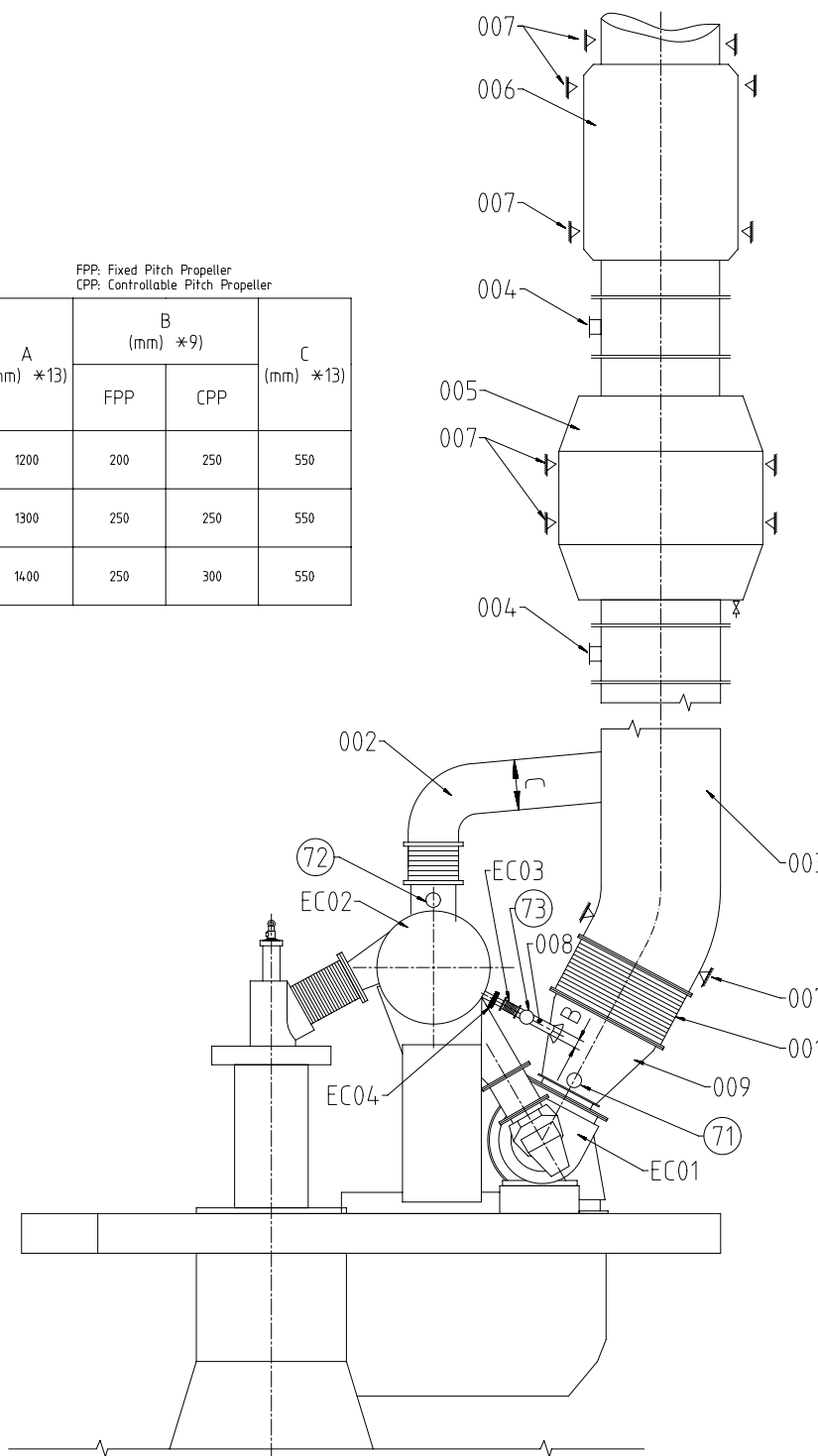
72	OUTLET - Exhaust gas by-pass
	<ul style="list-style-type: none">- The installation of a by-pass line between exhaust gas manifold and turbocharger may be requested by owner and class if only one turbocharger is installed. Its purpose is to allow engine operation even after a turbocharger failure.- Blinded off during normal operation.

Free space for file		Q-Code XXXXXX Standard ISO; JIS								Main Drw.	
Modif.	A	EAAD089112	26.04.2018	B	EAAD090535	07.04.2019					
	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date			
WIN GD Winterthur Gas & Diesel		Product 5-8X62DF		Exhaust System with one turbocharger							
Units	mm kg	NX				Basic Material					Net Weight 0,001
Made	19.08.2014	mhu019 M.Hug		Scale -		Size	Page	Material	PAAD169605		
Chkd	16.01.2015	wwa008 Wang		Design Group		Drawing ID	A2	1/2	DAAD053794	Rev.	B
Appd	16.01.2015	bha009 Haag		9726							

SYSTEM PROPOSAL



Main engine X62DF				
No of cyl.	A (mm) *13)	B (mm) *9)		C (mm) *13)
		FPP	CPP	
5	1200	200	250	550
6	1300	250	250	550
7	1400	250	300	550

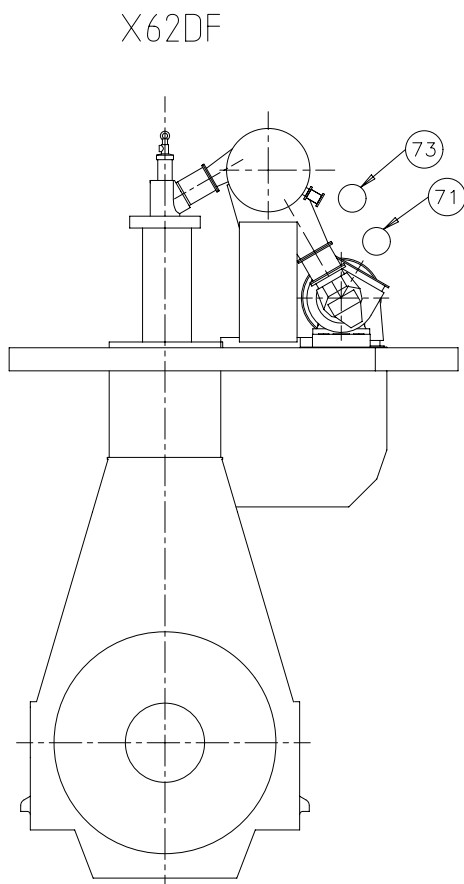


Pos.	SYSTEM COMPONENTS *1)
001	Compensator *4)
002	Exhaust gas by-pass line *8)
003	Exhaust gas pipe *12)
004	Explosion relief *5)
005	Boiler *11)
006	Silencer (with spark arrester) *10)
007	Support *6)
008	Waste gate pipe
009	Transition piece *7)
Pos.	ENGINE CONNECTIONS *2)
71	OUTLET - Exhaust gas turbocharger
72	OUTLET - Exhaust gas by-pass
73	OUTLET - Exhaust gas manifold waste gate
Pos.	ENGINE COMPONENTS *3)
EC01	Turbocharger
EC02	Exhaust gas manifold
EC03	Waste gate compensator *4) *9)
EC04	Waste gate valve
Remarks: B	
- Drain plugs and drain cocks to be installed where necessary.	
*1) Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connections.	
*2) To be delivered by external supplier and to be installed by the shipyard.	
*3) To be delivered by the engine builder, i.e. already equipped on engine side.	
*4) Dimension of expansion piece (compensator) must be defined by the shipyard taking into account the thermal growth of exhaust manifold and exhaust pipe. Vibrations of the pipe after the compensator must be lower than 45 mm/s RMS (root mean square).	
*5) Type of device (rupture discs or self-closing spring loaded valve) to be selected in accordance with class requirements and/or specification of the shipowner. Final amount and position must be defined by the system designer / shipyard under consideration of the system layout and requirements determined by calculation. For installation with rupture discs it is required to either send an opening control signal to the safety system, which trigger an engine shutdown to avoid a continuous exhaust gas flow into the engine room, or to apply a duct leading the exhaust to the outside.	
*6) Installed as fixed or sliding type in accordance with the requirements. Final amount and position have to be defined by the shipyard under consideration of system layout and requirements based on installation specific calculation.	
*7) Area ratio between outlet / inlet diameter = 1.1..1.6 Taper angle $\leq 40^\circ$	
*8) Optional, needs just to be installed if requested by owner and class to ensure engine operation even after a turbocharger failure.	
*9) Pipe dimension on engine side (before compensator) is one nominal pipe size smaller.	
*10) Optional, installed as required to meet noise requirements.	
*11) Optional.	
*12) The radius of pipe bends must not be smaller than 1.5 x DN.	
*13) The provided dimensions refer to an R1 rated engine and serve just as proposal. To make the project specific layout, data as provided by GTD and by the turbocharger supplier must be taken into account.	

Model	Free space for file	Q-Code	XXXXXX	Main Drw.			
Mod.	EAAD08912	26.04.2018	EAAD090535	07.04.2019			
Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
WINGD		Product		Exhaust System		with one turbocharger	
Units		mm	kg	NX	Basic Material		Net Weight
Made		19.08.2014	mhu019	M.Hug	Scale		-
Chd		16.01.2015	wna008	Wang	Design Group		2/2
Appd		16.01.2015	bha009	Haag	Drawing		9726
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		PAAD169605		Rev.		B	
SURFACE PROTECTION SEE GROUP 0344		DAAD053794		Material ID		PAAD169605	
TOLERANCING PRINCIPLE ISO8015		9726		Size		2/2	

Specifications which must be met:

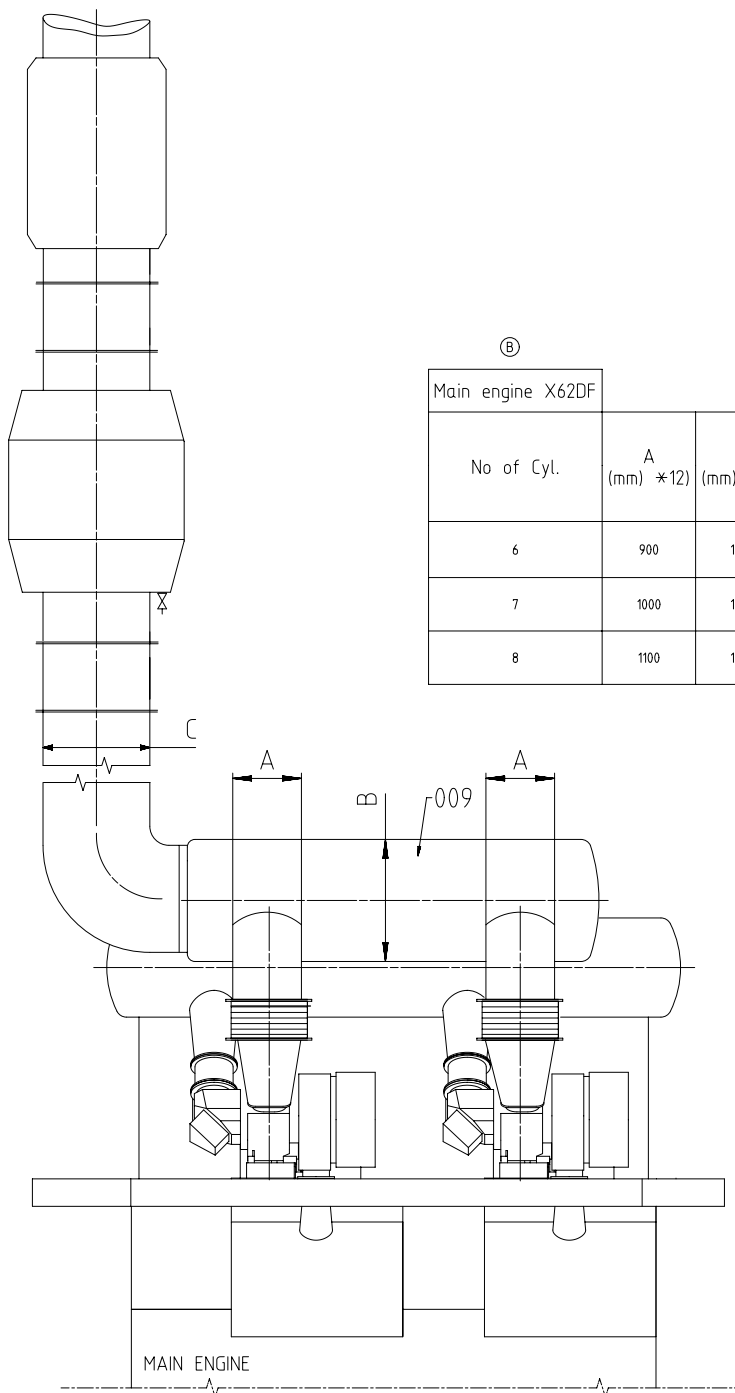
- 73) OUTLET - Exhaust gas manifold waste gate
- Size of connection flange described in the pipe connection plan.
 - Pipe diameter according to value B, defined on page 2.
 - Waste gate connection pipe to main exhaust gas pipe should be kept as short as possible to avoid swirl and extensive back pressure.



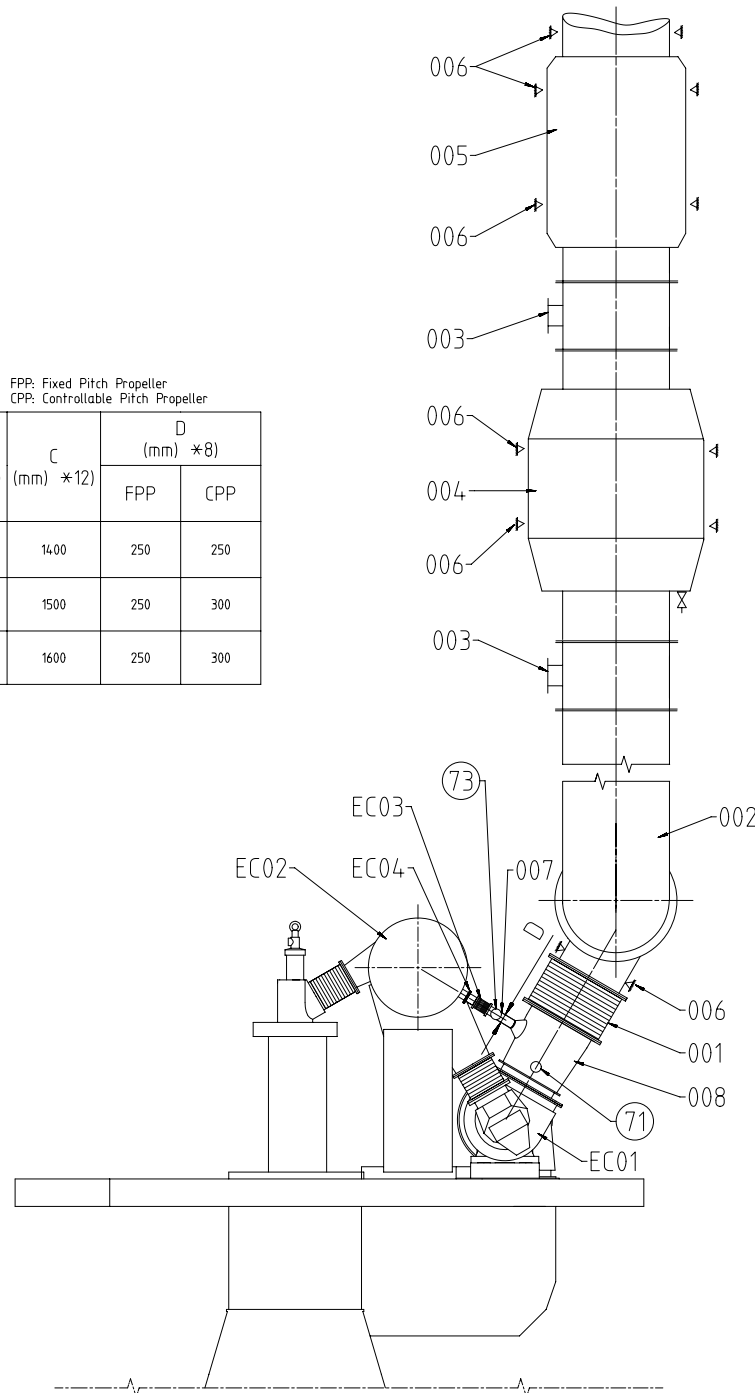
- 71) OUTLET - Exhaust gas turbocharger
- B)
- Exhaust gas temperature and volume flow: according to GTD
 - The total back pressure of the exhaust gas system must be kept in the admissible range of:
Design maximum (new condition) in gas mode and in diesel mode without exhaust gas treatment system: 30 mbar
Design maximum (new condition) in diesel mode with exhaust gas treatment system: 60 mbar
Operational maximum in gas mode: 45 mbar
Operational maximum (fouled condition) in diesel mode without exhaust gas treatment system: 50 mbar
Operational maximum (fouled condition) in diesel mode with exhaust gas treatment system: 80 mbar
 - Pipe dimensions laid out according to the recommended gas velocities provided in the Marine Installation Manual (MIM) and by GTD.
 - The exhaust piping must be arranged in a way to avoid gases from accumulating.
 - The piping layout must consider the thermal expansion and vibration from turbocharger (TC) and main engine (ME). Thermal expansion of the ME to be claculated according to the formula in MIM, TC specific thermal expansion are provided by the TC supplier.
 - Explosion relief devices with flameless pressure relief (rupture discs or spring loaded valves) must be installed in accordance with class requirements.
 - A continuous (extensive) exhaust gas flow into the engine room must be avoided.
 - Supports (fixation points) for carrying piping and exhaust gas system components deadweight must be installed in sufficient size and amount. In admissible tensions in the piping and forces acting on the turbocharger are not acceptable.
 - Exhaust gas pipes of several engines must not be connected.
 - Drains in adequate size and amount must be installed in the exhaust gas piping.
 - When the noise level on the bridge wing exceeds the class requirement (normally 60 - 70 dB(A)) a silencer must be applied.
 - An exhaust gas collector after the turbocharger must be installed.

Free space for lic.								Q-Code XXXXX	Main Drw.		
								Standard ISO; JIS			
Modif.	A	EAAD089112	26.04.2018	B	EAAD090535	07.04.2019					
		Number	Drawn date		Number	Drawn date		Number	Drawn date		
WIN GD Winterthur Gas & Diesel		Product 5-8X62DF		Exhaust System with two turbochargers							
Units	mm kg	NX				Basic Material			Net Weight 0,001		
SURFACE PROTECTION SEE GROUP 0344		Made	28.07.2014 mhu019 M.Hug		Scale	-		Size	A3	Page	1/2
TOLERANCING PRINCIPLE ISO8015		Chkd	16.01.2015 wwa008 Wang		Design Group	9726		Material ID	PAAD168257		
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	16.01.2015 bha009 Haag		Drawing ID	DAAD053317			Rev.	B	


SYSTEM PROPOSAL



Main engine X62DF					
FPP: Fixed Pitch Propeller CPP: Controllable Pitch Propeller					
No of Cyl.	A (mm) ×12)	B (mm) ×12)	C (mm) ×12)	D (mm) ×8)	
				FPP	CPP
6	900	1600	1400	250	250
7	1000	1800	1500	250	300
8	1100	1900	1600	250	300



Pos.	SYSTEM COMPONENTS *1)
001	Compensator *4)
002	Exhaust gas pipe *11)
003	Explosion relief *5)
004	Boiler *10)
005	Silencer (with spark arrester) *9)
006	Support *6)
007	Waste gate pipe
008	Transition piece *7)
(B) 009	Exhaust gas collector
Pos.	ENGINE CONNECTIONS *2)
(71)	OUTLET - Exhaust gas turbocharger
(73)	OUTLET - Exhaust gas manifold waste gate
Pos.	ENGINE COMPONENTS *3)
EC01	Turbocharger
EC02	Exhaust gas manifold
EC03	Waste gate compensator *4) *8)
EC04	Waste gate valve
Remarks: (B)	
- Drain plugs and drain cocks to be installed where necessary.	
*1)	Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connections.
*2)	To be delivered by external supplier and to be installed by the shipyard.
*3)	To be delivered by the engine builder, i.e. already equipped on engine side
*4)	Dimension of expansion piece (compensator) must be defined by the shipyard taking into account the thermal growth of exhaust manifold and exhaust pipe. Vibrations of the pipe after the compensator must be lower than 45 mm/s RMS (root mean square).
*5)	Type of device (rupture discs or self-closing spring loaded valve) to be selected in accordance with class requirements and/or specification of the shipowner. Final amount and position must be defined by the system designer / shipyard under consideration of the system layout and requirements determined by calculation. For installation with rupture discs it is required to either send an opening control signal to the safety system, which trigger an engine shutdown to avoid a continuous exhaust gas flow into the engine room, or to apply a duct leading the exhaust to the outside.
*6)	Installed as fixed or sliding type in accordance with the requirements. Final amount and position have to be defined by the shipyard under consideration of system layout and requirements based on installation specific calculation.
*7)	Area ratio between outlet / inlet diameter = 1.1..1.6 Taper angle $\leq 40^\circ$
*8)	Pipe dimension on engine side (before compensator) is one nominal pipe size smaller.
*9)	Optional, installed as required to meet noise requirements.
*10)	Optional.
*11)	To be laid out and installed according to the requirements. The radius of bends should be not smaller than 1.5 x DN.
*12)	The provided dimensions refer to an R1 rated engine and serve just as proposal. To make the project specific layout, data as provided by GTD and by the turbocharger supplier must be taken into account.

Free space for file											Q-Code XXXXXX		Main Drw.
											Standard ISO: JIS		
	Model	A EAAD09912		26.04.2018		B EAAD09953		07.04.2019					
	Number	Drawn date		Number	Drawn date		Number	Drawn date		Number	Drawn date		
<div><div><div>WIN</div><div>WindPower Gear & Gear</div></div><div>Product 5-8X6ZDF</div><div>Exhaust System with two turbochargers</div></div>													
Units		mm	kg	NX			Basic Material					Net Weight 0,001	
Made	28.07.2014		mhu019		M.Hug		Scale	-		Size	A1	Page 2/2	Material DAAD168257
Chkd	16.01.2015		waa008		Wang		Design Group			Drawing	DAAD053317		Rev. B
App'd	16.01.2015		bha009		Haag		9726						

MIDS - WinGD X62DF – Exhaust System (DG9726)

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2016-11-07	DRAWING SET	First web upload
2018-04-19	DAAD169605 DAAD053317	System drawing: new revision
2019-09-18	DAAD053617 DAAD169605 DAAD053317	Main and system drgs – new revision

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