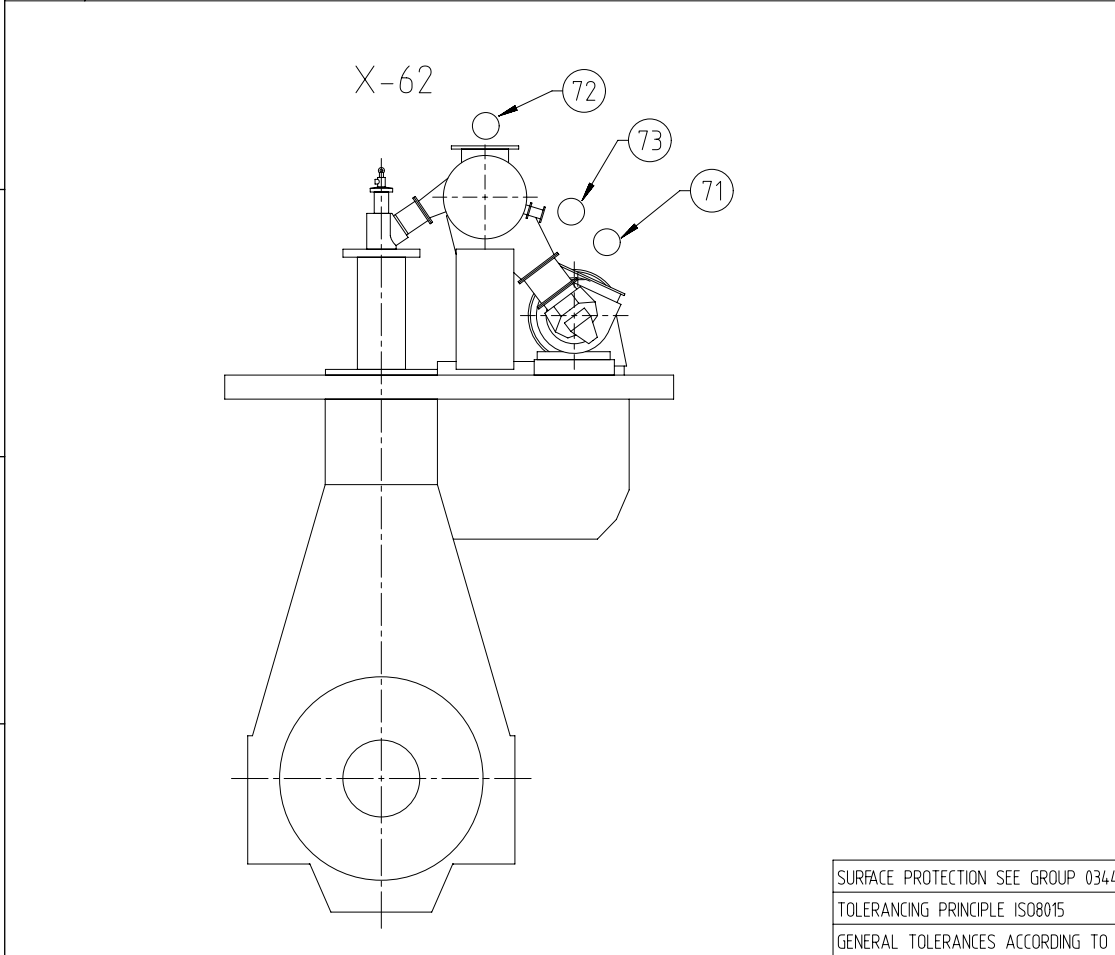


A	
B	
C	
D	
E	
F	



DEF

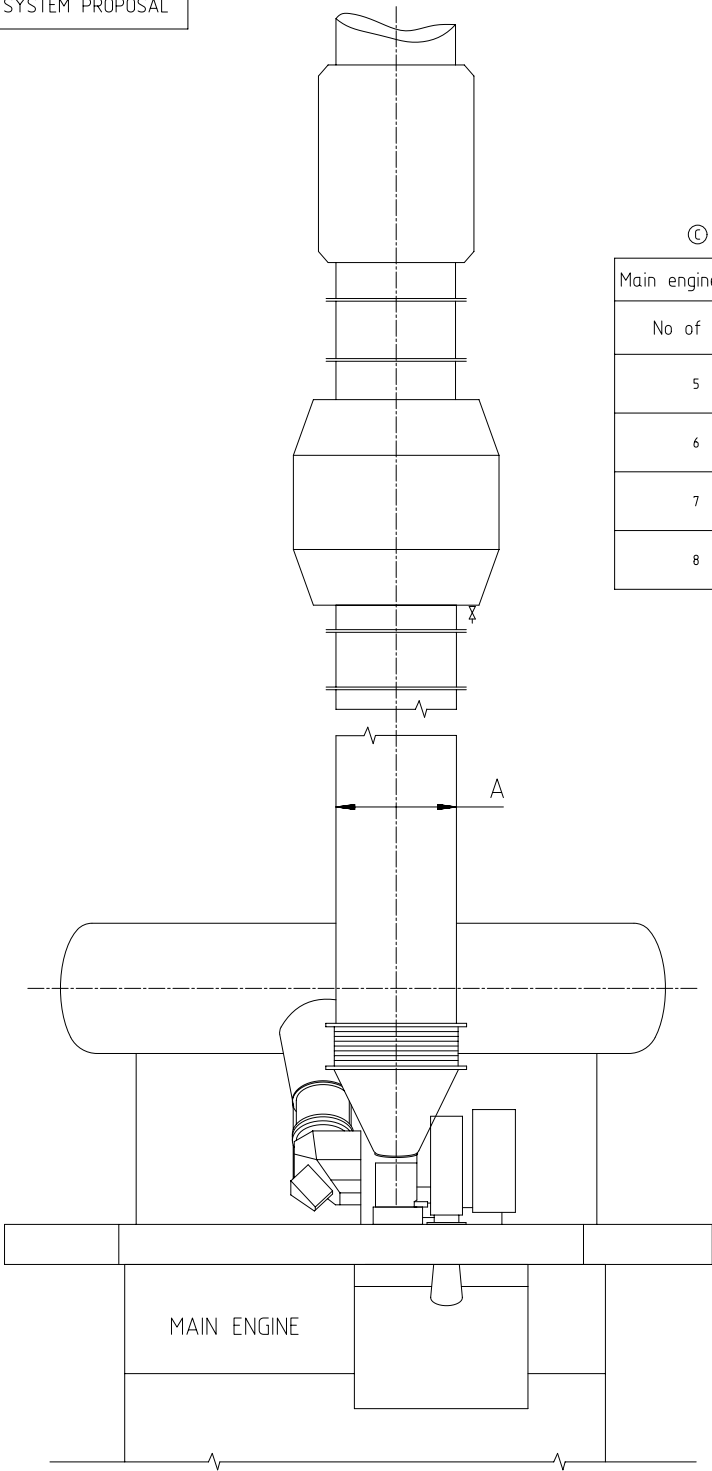
# Specifications which must be met:

A	<p>72 OUTLET - Exhaust gas by-pass</p> <ul style="list-style-type: none"> <li>- 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.</li> <li>- Blinded off during normal operation.</li> </ul>
B	<p>73 OUTLET - Exhaust gas manifold waste gate</p> <ul style="list-style-type: none"> <li>- Size and layout of connection flange is provided in the "Pipe Connection Plan"</li> <li>- Pipe diameter according to parameter "B" on page 2.</li> <li>- Waste gate connection pipe to main exhaust gas pipe must be kept as short as possible to avoid swirl and extensive back pressure.</li> </ul>



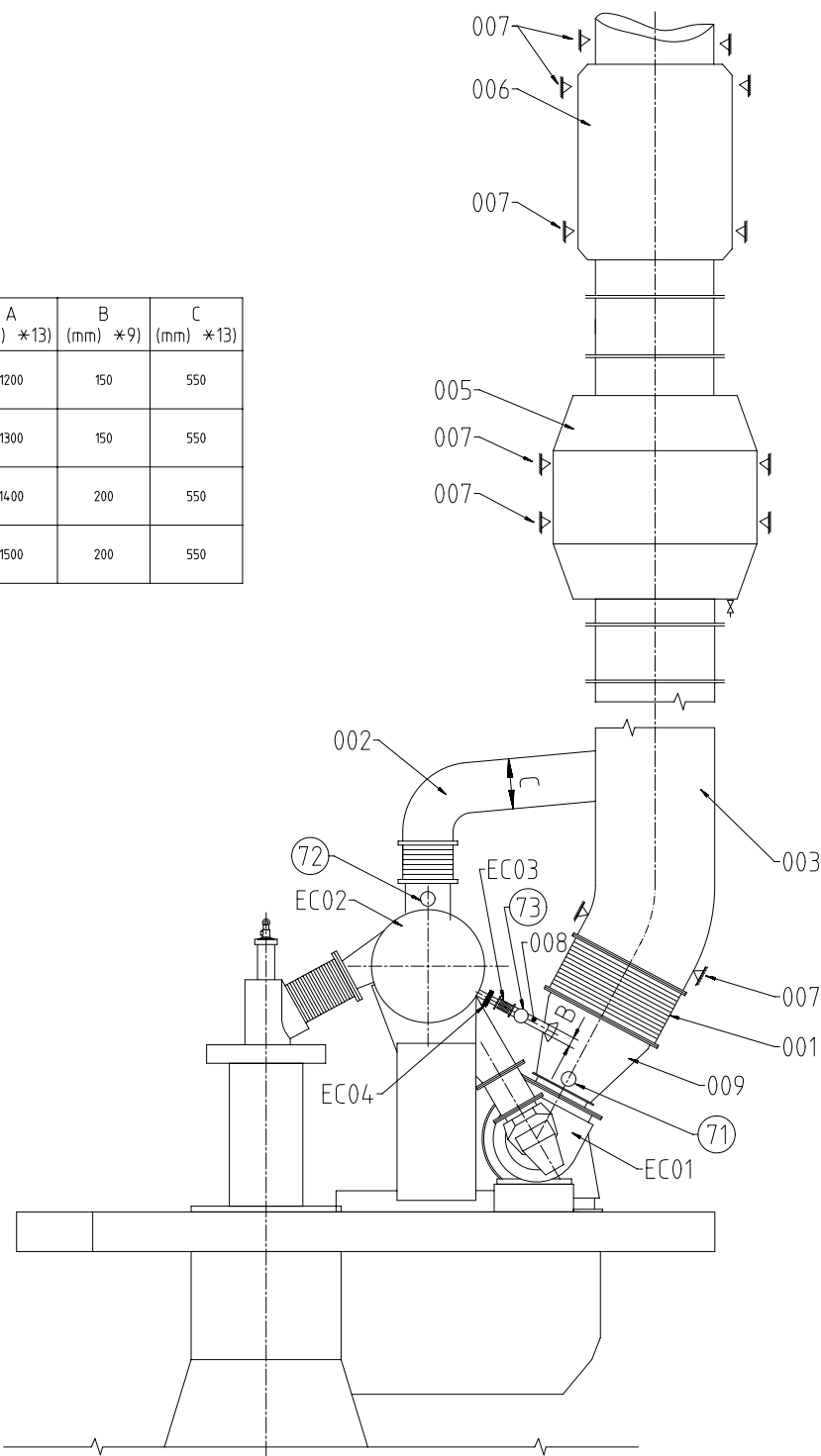
<p>71 OUTLET - Exhaust gas turbocharger</p> <ul style="list-style-type: none"> <li>- Exhaust gas temperature and volume flow: according to GTD</li> <li>- The total back pressure of the exhaust gas system must be kept in the admissible range of: Design maximum (new condition) without exhaust gas treatment system: 30 mbar Design maximum (new condition) with exhaust gas treatment system: 60 mbar</li> <li>Operational maximum (fouled condition) without exhaust gas treatment system: 50 mbar Operational maximum (fouled condition) with exhaust gas treatment system: 80 mbar</li> <li>- Pipe dimensions laid out according to the recommended gas velocities provided in the the Marine Installation Manual (MIM) and by GTD.</li> <li>- The exhaust piping must be arranged in a way to avoid gases from accumulating.</li> <li>- 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.</li> <li>- 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.</li> <li>- Exhaust gas pipes of several engines must not be connected.</li> <li>- Drains in adequate size and amount must be installed in the exhaust gas piping.</li> <li>- When the noise level on the bridge wing exceeds the class requirement (normally 60 - 70 dB(A)) a silencer must be applied.</li> </ul>	
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Free space for lic.							Q-Code XXXXX	Main Drw.			
							Standard ISO; JIS				
Modif.	A	EAAD089374	11.05.2018	B	EAAD090105	11.01.2019	C	EAAD090535	05.04.2019		
		Number	Drawn date		Number	Drawn date		Number	Drawn date		Drawn date
		Product 5-8X62		Exhaust System with one turbocharger							
Units	mm kg	NX				Basic Material			Net Weight 0,001		
SURFACE PROTECTION SEE GROUP 0344		Made	29.01.2018 dki021 DH.Kim		Scale	-		Size	A3	Page	1/2
TOLERANCING PRINCIPLE ISO8015		Chkd	14.02.2018 wwa008 Wang		Design Group	9726		Material ID	PAAD284496		
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	28.02.2018 mhu019 Hug		Drawing ID	DAAD096792		Rev.	C		



①

Main engine X-62			
No of cyl.	A (mm) *13)	B (mm) *9)	C (mm) *13)
5	1200	150	550
6	1300	150	550
7	1400	200	550
8	1500	200	550



Pos.	SYSTEM COMPONENTS *1)
001	Compensator *4)
002	Exhaust gas by-pass line *8)
003	Exhaust gas pipe *12)
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: ①

- 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).

\*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 should be not 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 ID	Q-Code	XXXXXX	Main Drw.				
Mod.	EAAD089374	11.05.2018	EAAD090905	11.01.2019	EAAD090535	05.04.2019	EAAD090535	05.04.2019
Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date	
Product		Exhaust System with one turbocharger		Net Weight 0,001				
5-BX62								
WINGO		Wärthner Gas & Diesel						
Units		mm kg		NX				
Scale		-		-				
Size		A1		2/2				
Material		ID		PAAD284496				
Design Group		9726		Rev.				
Drawing		DAAD096792		C				
Appd		28.02.2018		mhu019 Hug				
TOLERANCING PRINCIPLE		ISO8015						
GENERAL TOLERANCES		ACCORDING TO ISO2768-mK						
SURFACE PROTECTION		SEE GROUP 0344						
Made		29.01.2018		dk1021 DH.Kim				
Chd		14.02.2018		wms008 Wang				
Appd		28.02.2018		mhu019 Hug				

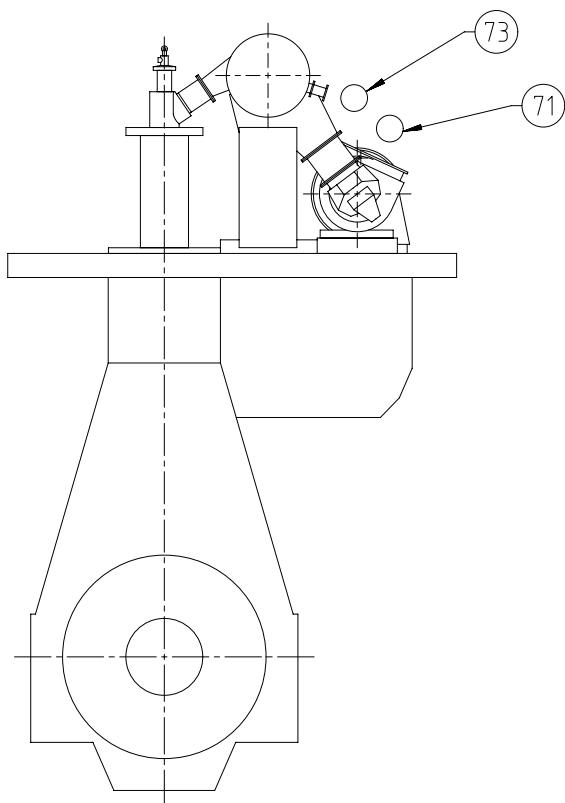
# Specifications which must be met:

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.

X-62



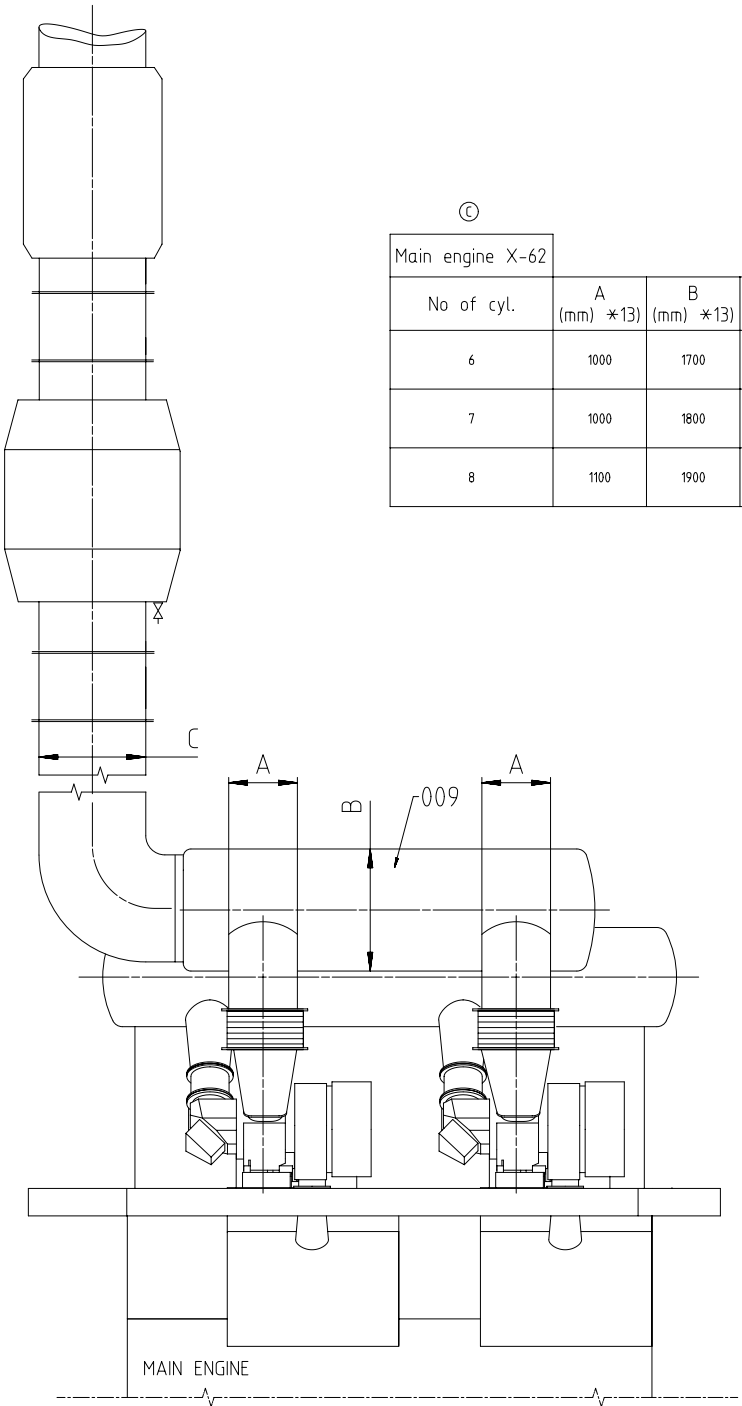
71

## OUTLET - Exhaust gas turbocharger

C

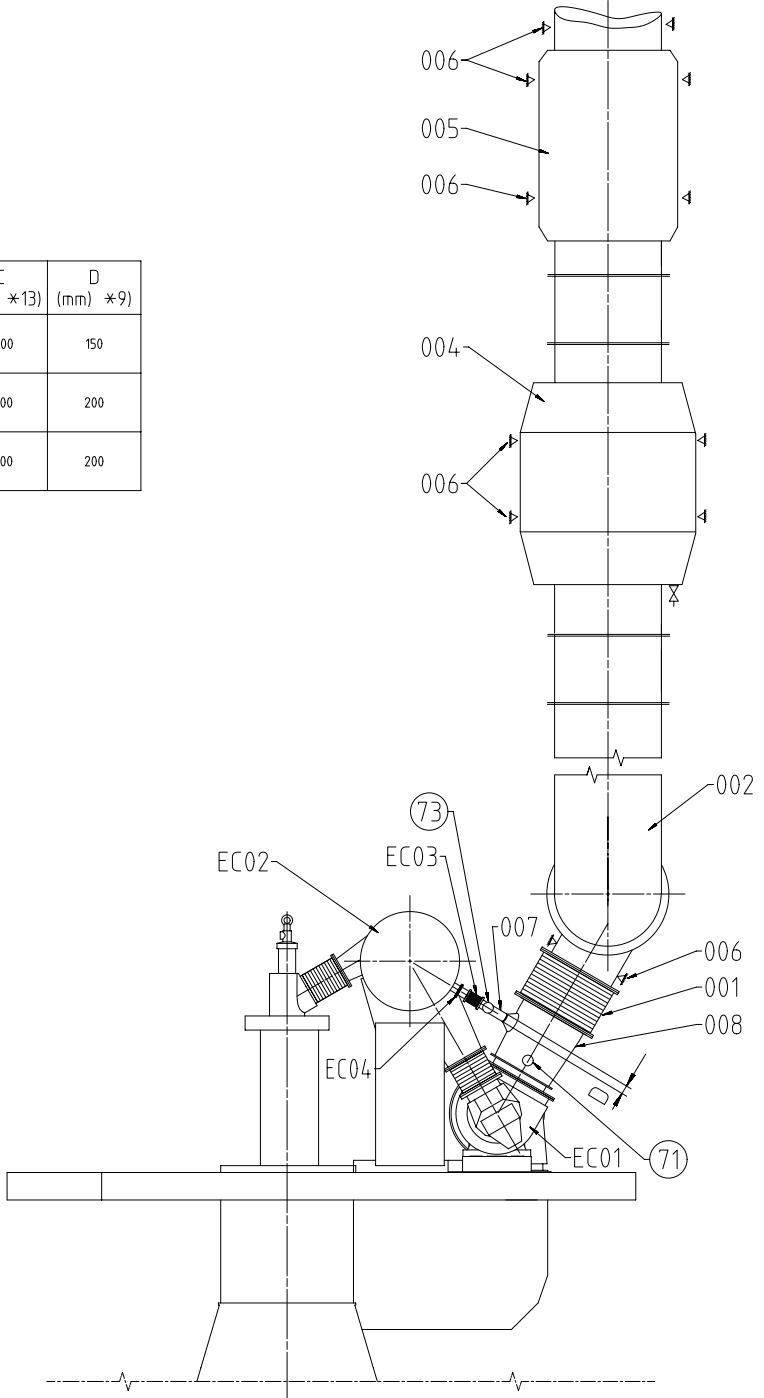
- Exhaust gas temperature and volume flow: according to GTD
- The total back pressure of the exhaust gas system must be kept in the admissible range of:  
Design maximum (new condition) without exhaust gas treatment system: 30 mbar  
Design maximum (new condition) with exhaust gas treatment system: 60 mbar  
Operational maximum (fouled condition) without exhaust gas treatment system: 50 mbar  
Operational maximum (fouled condition) 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.
- 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.
- An exhaust gas collector after the turbocharger must be installed.

Free space for lic.								Q-Code XXXXX	Main Drw.					
								Standard ISO; JIS						
Modif.	A	EAAD089374	11.05.2018	B	EAAD090105	11.01.2019	C	EAAD090535	05.04.2019					
		Number	Drawn date		Number	Drawn date		Number	Drawn date		Drawn date			
WIN GD Winterthur Gas & Diesel		Product 5-8X62		Exhaust System with two turbochargers										
Units	mm kg	NX		Basic Material		Net Weight 0,001								
SURFACE PROTECTION SEE GROUP 0344		Made	31.01.2018	dkio21	DH.Kim		Scale	-	Size	A3	Page	1/2	Material	PAAD284548
TOLERANCING PRINCIPLE ISO8015		Chkd	14.02.2018	wwa008 Wang			Design Group	9726		Drawing ID	DAAD096812		Rev.	C
GENERAL TOLERANCES ACCORDING TO ISO2768-mK		Appd	28.02.2018	mhu019 Hug										



Ⓒ

Main engine X-62				
No of cyl.	A (mm) *13)	B (mm) *13)	C (mm) *13)	D (mm) *9)
6	1000	1700	1400	150
7	1000	1800	1500	200
8	1100	1900	1600	200



Pos.	SYSTEM COMPONENTS *1)
001	Compensator *4)
002	Exhaust gas pipe *12)
004	Boiler *11)
005	Silencer (with spark arrester) *10)
006	Support *6)
007	Waste gate pipe
008	Transition piece *7)
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) *9)
EC04	Waste gate valve
Remarks: Ⓒ	
- 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).	
*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 ≤ 40°	
*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 should be not 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.	

Mod.	Free space for file	Q-Code	XXXXXX	Main Drw.												
EAAD089374	11.05.2018	EAAD090805	11.01.2019	EAAD090535	05.04.2019	ISO; JIS										
Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date									
Units		mm	kg	NX	Basic Material		Scale	-	Size	A1	Page	2/2	Material ID	PAAD284548	Net Weight	0,001
SURFACE PROTECTION SEE GROUP 0344																
TOLERANCING PRINCIPLE ISO8015																
GENERAL TOLERANCES ACCORDING TO ISO2768-mK																
Chd	14.02.2018	WWS008	Wang	Design Group	9726	Product	5-8X62	Exhaust System with two turbochargers								
Appd	28.02.2018	mtu019	Hug	Rev.	C	Drawing ID	DAAD096812									

## MIDS - WinGD X62 - EXHAUST SYSTEM (DG9726)

### TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2018-04-19	DRAWING SET	First web upload
2018-05-18	DAAD096792 DAAD096812	System drawings – new revision
2019-01-16	DAAD096792 DAAD096812	System drawings – new revision
2019-09-18	DAAD096815 DAAD096792 DAAD096812	Main and system drgs – new revision

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