TC Amount	1				X	X	X
	2	X	X	X			
SCR	Without			X			X
	LP SCR		X			X	
	HP SCR	X			X		

Net Weight											
0,001	0,001	0,001	0,001	0,001	0,001	SEQ NO	Material ID	Material Name Dimension, Occ	Standard or Drawing	Basic Material Material Standard	Weight GR./NET
1	-	-	1	-	-	004	PAAD219316	SCR TURBOCHARGER PROTECTION	DAAD075623		0,001
1	-	-	1	-	-	003	PAAD219883	SCR PIPING GUIDE	DAAD064155		0,001
1	1	1	-	-	-	002	PAAD294846	Exhaust System with two turbochargers	DAAD100472		0,001
-	-	-	1	1	1	001	PAAD294844	Exhaust System with one turbocharger	DAAD100470		0,001
Quantity PER ENGINE											
PAAD294856	PAAD294855	PAAD294854	PAAD294853	PAAD294852	PAAD294851						
Material ID											

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Free space for lic.

Q-Code XXXXX

Standard ISO; JIS

Main Drw. H

Modif.		Number	Drawn date		Number	Drawn date		Number	Drawn date		Number	Drawn date
	A	EAAD090535	10.04.2019									

WIN GD Winterthur Gas & Diesel

Product W5-8X72-B

Exhaust System
Abgassystem

Units	mm kg	NX	Basic Material	Net Weight
Made	10.05.2018 Arindam		Scale -	Size A3 / Page 1/1 / Material ID
Chkd	19.07.2018 wwa008 Wang		Design Group 9726	
Appd	27.07.2018 mhu019 Hug		Drawing ID DAAD100474	Rev. A

SURFACE PROTECTION SEE GROUP 0344

TOLERANCING PRINCIPLE ISO8015

GENERAL TOLERANCES ACCORDING TO ISO2768-mK

DID - DIMENSIONAL DRAWING - Confidential

Specifications which must be met:

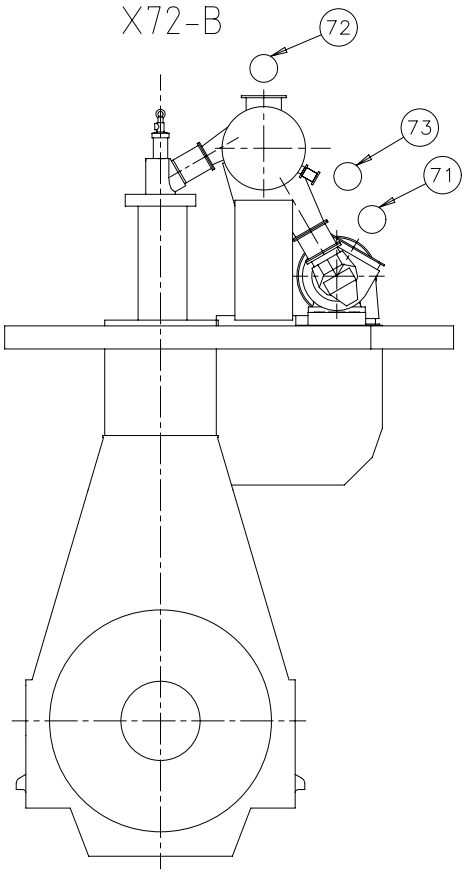
(72) OUTLET - Exhaust gas by-pass

- 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.

(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.

X72-B



(71) (A) OUTLET - Exhaust gas turbocharger

- 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.

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Free space for lic.		Q-Code XXXXX	Main Drw.
		Standard ISO; JIS	

Modif.		Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
	A	EAAD091567	14.11.2019						

WIN GD Winterthur Gas & Diesel

Product 5-8X72-B

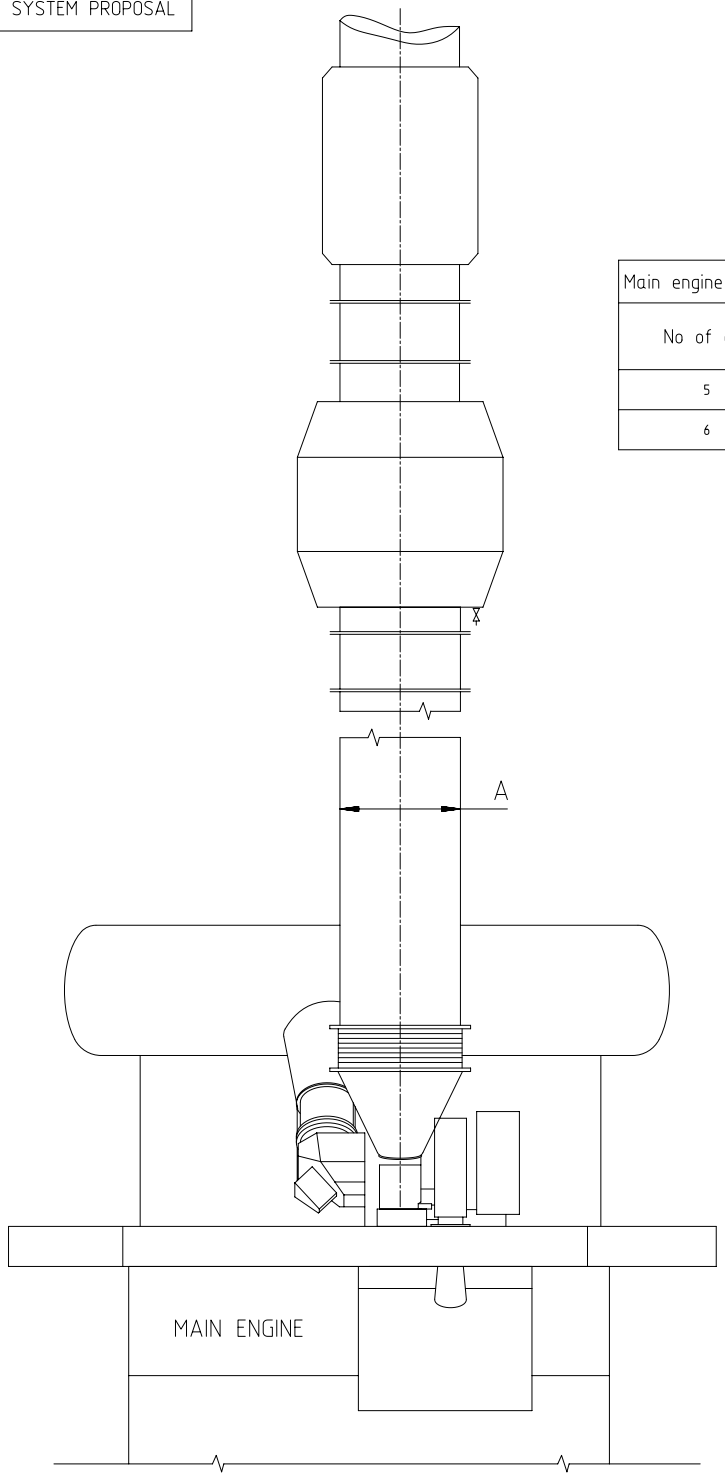
Exhaust System with one turbocharger

Units	mm kg	NX	Basic Material	Net Weight 0,001

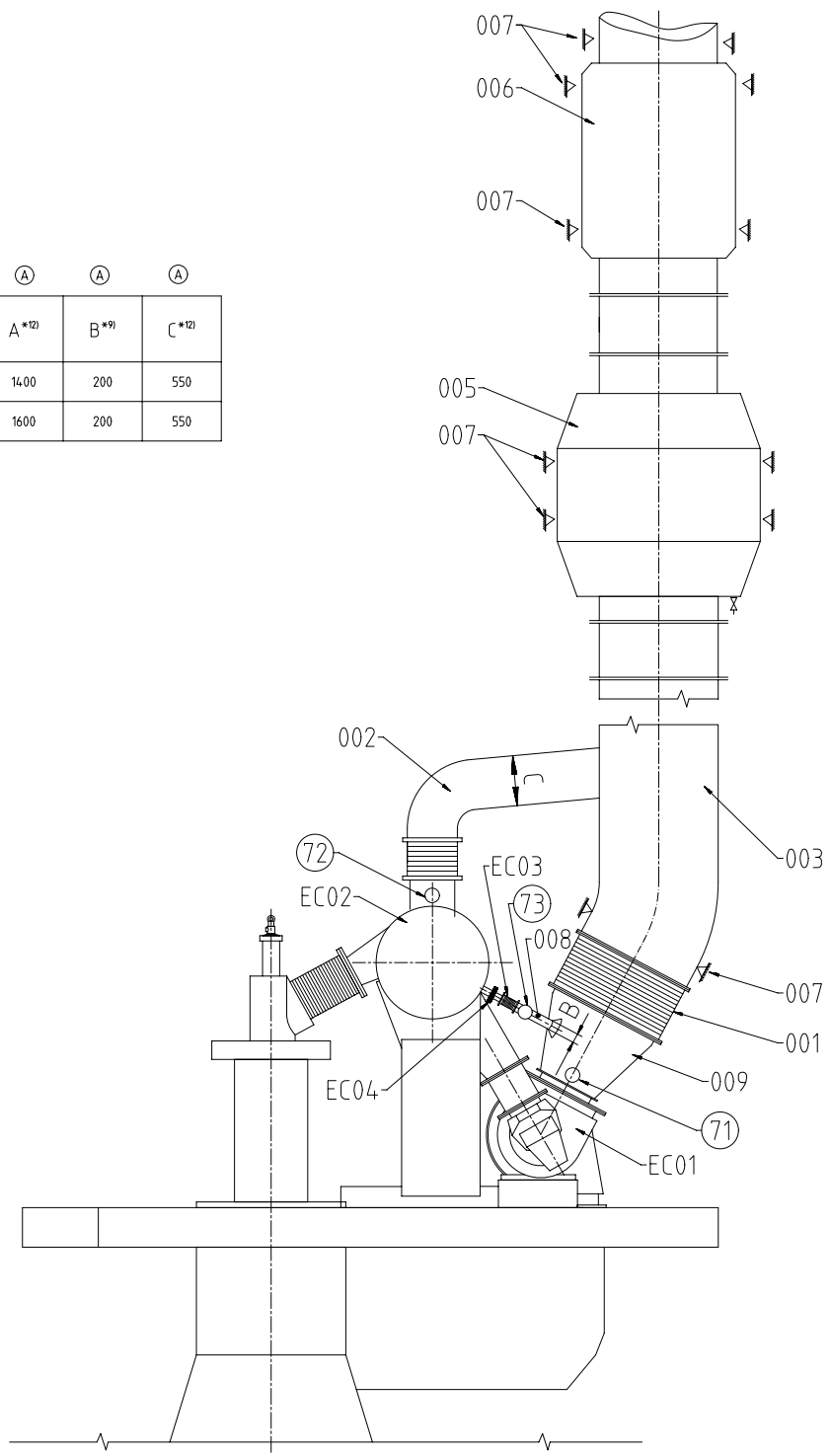
SURFACE PROTECTION SEE GROUP 0344	Made	10.05.2018 Arindam	Scale -	Size A3	Page 1/2	Material ID PAAD294844
TOLERANCING PRINCIPLE ISO8015	Chkd	19.07.2018 wwa008 Wang	Design Group 9726	Drawing ID DAAD100470		Rev. A
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	27.07.2018 mhu019 Hug				

DID - DIMENSIONAL DRAWING - Confidential

SYSTEM PROPOSAL



Main engine X72-B	Ⓐ	Ⓐ	Ⓐ
No of cyl.	A *12)	B *9)	C *12)
5	1400	200	550
6	1600	200	550



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

- 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°

*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 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 lic.
Q-Code XXXXX
Standard ISO; JIS
Main Drw.

Modif.	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
A	EAAD091567	14.11.2019						

WIN GD Winterthur Gas & Diesel

Product 5-8X72-B

Exhaust System with one turbocharger

Units mm kg | NX | Basic Material | Net Weight 0,001

SURFACE PROTECTION SEE GROUP 0344	Made	10.05.2018	Arindam	Scale -	Size A1	Page 2/2	Material ID PAAD294844
TOLERANCING PRINCIPLE ISO8015	Chkd	19.07.2018	wwa008 Wang	Design Group 9726	Drawing ID DAAD100470		Rev. A
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	27.07.2018	mhu019 Hug				

Approved

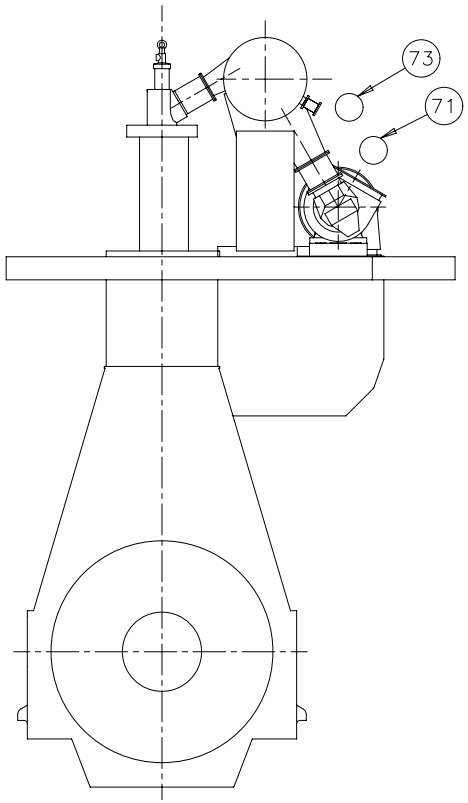
3D - DIMENSIONAL DRAWING - confidential

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.

X72-B



(71) OUTLET - Exhaust gas turbocharger

(A)

- 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 claculated 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.

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Free space for lic.									Q-Code XXXXX		Main Drw.
									Standard ISO; JIS		
Modif.	A	EAAD090535	05.04.2019								
		Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date		

WIN GD Winterthur Gas & Diesel

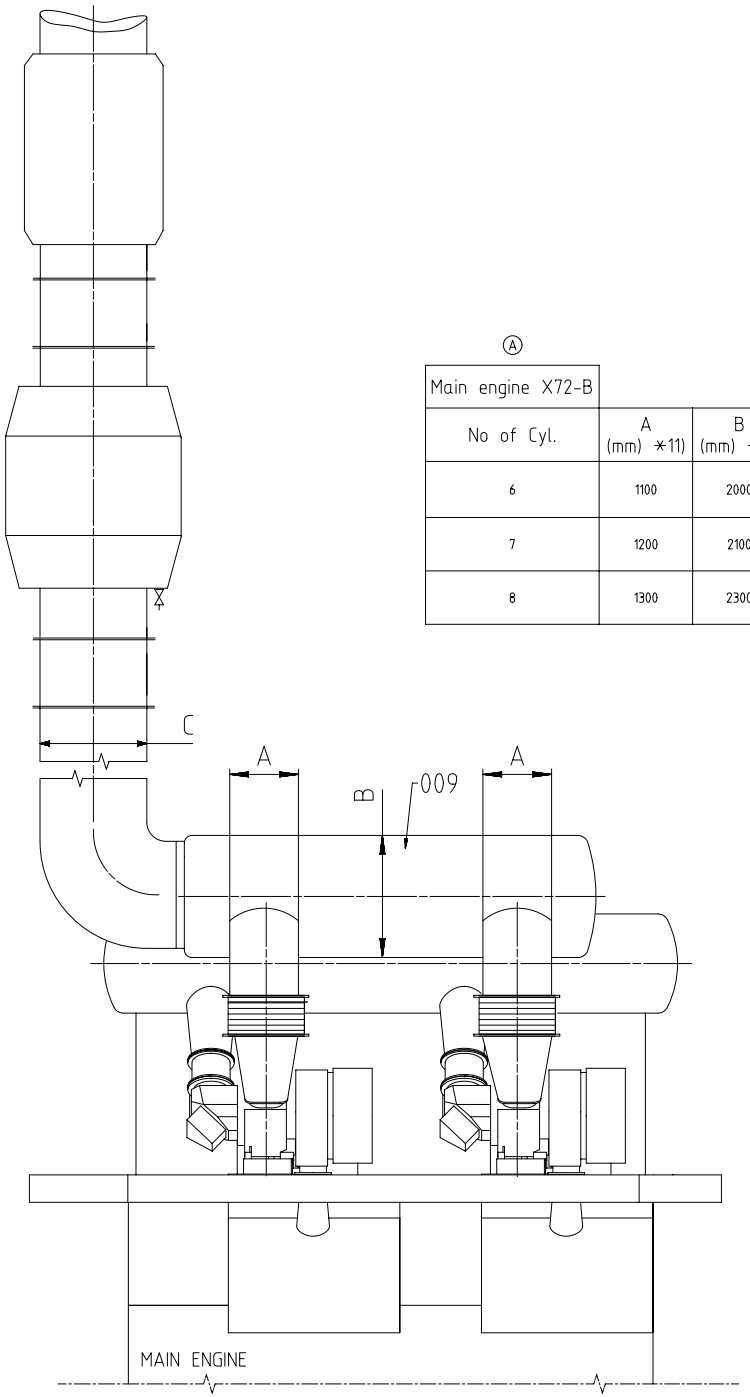
Product 5-8X72-B

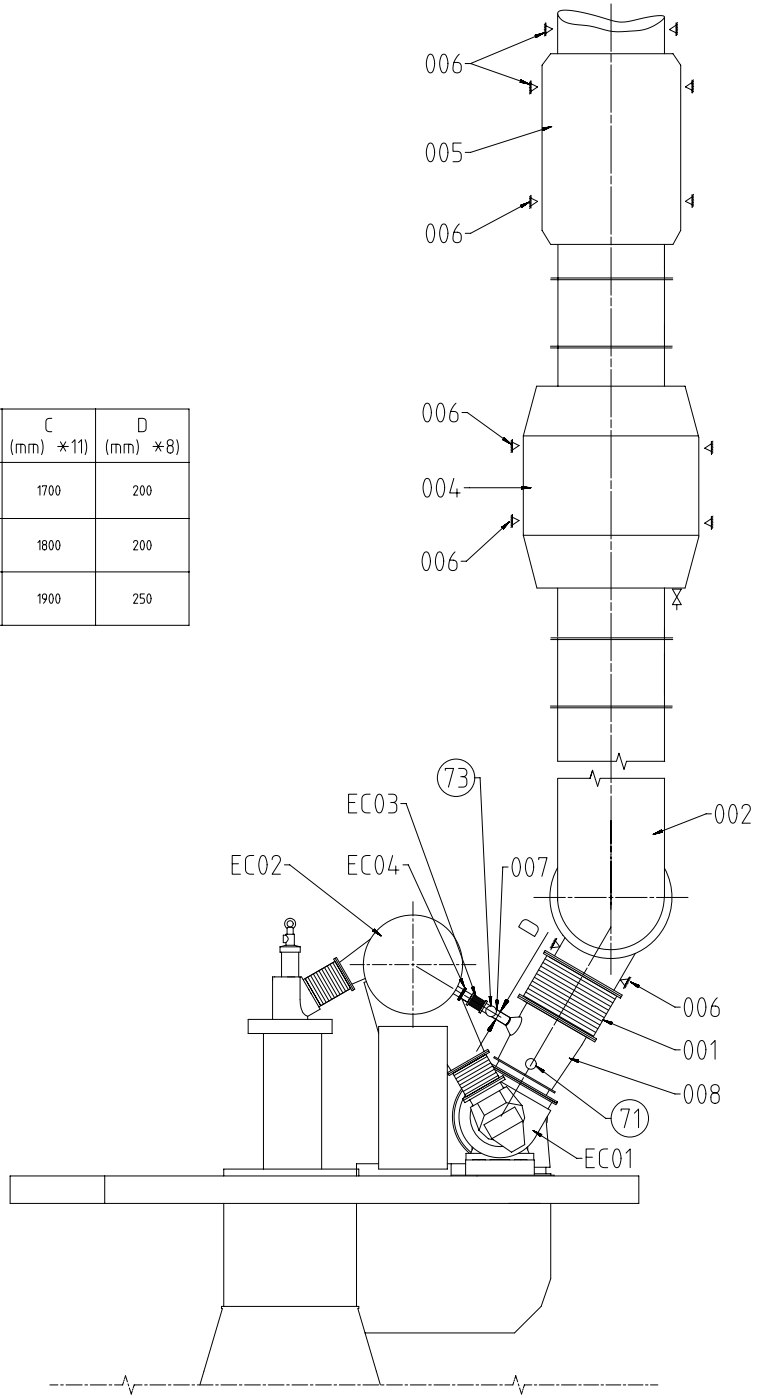
Exhaust System with two turbochargers

Units mm kg	NX		Basic Material			Net Weight 0,001
SURFACE PROTECTION SEE GROUP 0344	Made	10.05.2018 Arindam	Scale -	Size A3	Page 1/2	Material ID PAAD294846
TOLERANCING PRINCIPLE ISO8015	Chkd	19.07.2018 wwa008 Wang	Design Group 9726	Drawing ID DAAD100472		Rev. A
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	27.07.2018 mhu019 Hug				

DID - DIMENSIONAL DRAWING - Confidential

SYSTEM PROPOSAL





Ⓐ

Main engine X72-B				
No of Cyl.	A (mm) *11)	B (mm) *11)	C (mm) *11)	D (mm) *8)
6	1100	2000	1700	200
7	1200	2100	1800	200
8	1300	2300	1900	250

Pos.	SYSTEM COMPONENTS *1)
001	Compensator *4)
002	Exhaust gas pipe *12)
004	Boiler *10)
005	Silencer (with spark arrester) *9)
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) *8)
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°

*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) 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.

*12) The radius of pipe bends should be not smaller than 1.5 x DN

Free space for lic. | Q-Code XXXXX | Standard ISO; JIS | Main Drw.

Modif.	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
Ⓐ	EAAD090535	05.04.2019						

WINGD Winterthur Gas & Diesel

Product 5-8X72-B

Exhaust System
with two turbochargers

Units mm kg | NX | Basic Material | Net Weight 0,001

SURFACE PROTECTION SEE GROUP 0344	Made	10.05.2018	Arindam	Scale -	Size A1	Page 2/2
TOLERANCING PRINCIPLE ISO8015	Chkd	19.07.2018	wwa008 Wang	Design Group 9726	Material ID	PAAD294846
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	27.07.2018	mhu019 Hug	Drawing ID	DAAD100472	Rev. A

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DD - DIMENSIONAL DRAWING - Confidential

MIDS - WinGD-X72-B - EXHAUST SYSTEM (DG9726)

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2018-09-12	DRAWING SET	First web upload
2019-09-18	DAAD100474 DAAD100472	Main and system drg – new revision
2020-09-01	DAAD100470	System drg – new revision

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