Available executions

Execution No.	Material ID	Attribute 1: Emission class (Tier)			
		Tier II without SCR	Tier III HP-SCR on-engine	Tier III HP-SCR off-engine	Tier III LP-SCR off-engine
001	PAAD379487	X			
002	PAAD379488		X		
003	PTAA066955			X	
004	PTAA066969				X

NOTE
The above executions can be configured using the Engine Configurator.
Detailed guidance for the executions is provided within the Marine Installation Manual (MIM). If a specific execution of interest is not shown in the above table, then it may still be under development or not available. For further information or in case of a project-specific request, WinGD must be contacted directly.

Prod.	X52-S2.0							

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
–	sna102	mhu019	24.05.2023	CNAA003753	new Design	Approved	-	-

WIN GD
Winterthur Gas & Diesel

EXHAUST SYSTEM
MIDS master drawing

separate BOM available

Dimension

Scale	–	NX	Units [mm] [kg]	Basic Material	Net Weight	0.001
Main Design			Design Group	9726	Q-Code XXXXX	Standard WDS
Qty per			A4	Item ID	PTAA025645	Drawing Page/s 1/1

SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
1	1	PAAD379401	Exhaust System with one turbocharger			0.001
3	1	PAAD327310	SPECIFICATION			0.001

Prod.	5,6,7,8 X52-S2.0			

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
-	dki021	mhu019	23.04.2021	EAAD787399	-		-	-

WIN GD
Winterthur Gas & Diesel

Exhaust System

Bill Of Material

Dimension							
Units	[m] [kg]	Basic Material				Net Weight	0.001
Main Design	Yes	Design Group	9726	Q-Code	XXXXX	Standard	WDS
Qty per	Engine	A4	Item ID	PAAD379487		BOM Page/s	01/01

SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
001	1	PAAD379408	Exhaust System with one turbocharger			0.001

Prod.	5,6,7,8 X52-S2.0			

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
A	sna102	mhu019	21.07.2023	CNAA004127	Main Design updated		4	3
-	dki021	mhu019	23.04.2021	EAAD787399	-		-	-

WIN GD
Winterthur Gas & Diesel

Exhaust System

Bill Of Material

Dimension

Units	[m] [kg]	Basic Material				Net Weight	0.001
Main Design	Yes	Design Group	9726	Q-Code	X X M	Standard	WDS
Qty per	Engine	A4	Item ID	PAAD379488		BOM Page/s	01/01

SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
1	1	PAAD379401	Exhaust System with one turbocharger			0.001
2	1	PAAD327310	SPECIFICATION			0.001
3	1	DAAD064155	SCR PIPING GUIDE			
4	1	DAAD075623	SCR TURBOCHARGER PROTECTION			

Prod.	5,6,7,8 X52			

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis		Activity Code	E	C
-	npa101	nhu019	23052023	CNAA003752	New MainDesign			-	-

WIN GD
Winterthur Gas & Diesel

Exhaust System

Bill Of Material

Dimension						
Units	[m] [kg]	Basic Material			Net Weight	0.001
Main Design	Yes	Design Group	9726	Q-Code XXXXX	Standard	WDS
Qty per	Engine	A4	Item ID	PTAA066955	BOM Page/s	01/01

SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
1	1	PAAD379401	Exhaust System with one turbocharger			0.001
3	1	PAAD327310	SPECIFICATION			0.001

Prod.	5,6,7,8 X52-S2.0			

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
-	npa101	nhu019	23052023	CNAA003752	New MainDesign	Approved	-	-

WIN GD
Winterthur Gas & Diesel

Exhaust System

Bill Of Material

Dimension							
Units	[m] [kg]	Basic Material				Net Weight	0.001
Main Design	Yes	Design Group	9726	Q-Code	XXXXX	Standard	WDS
Qty per	Engine	A4	Item ID	PTAA066969		BOM Page/s	01/01

Specifications which must be met:

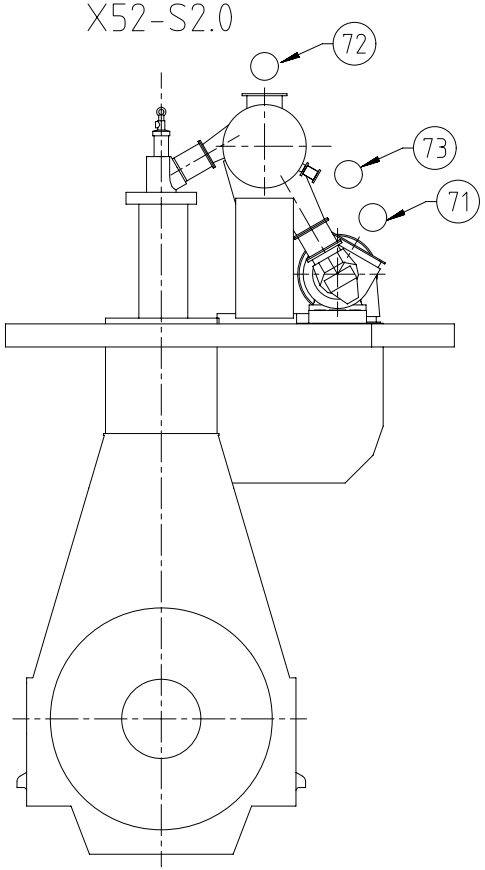
(72) OUTLET - Exhaust gas by-pass

- 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.

X52-S2.0



(71) 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 low pressure exhaust gas treatment system: 60 mbar

  Operational maximum (fouled condition) without exhaust gas treatment system: 50 mbar
  Operational maximum (fouled condition) with low pressure 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 with cones, bends and pipe connections must be flow optimised and 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 is to be calculated according to the formula in MIM, TC specific thermal expansion are provided by the TC supplier.
- A continuous (extensive) exhaust gas leakage must be avoided.
- 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.

Approved

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	

WIN GD Winterthur Gas & Diesel

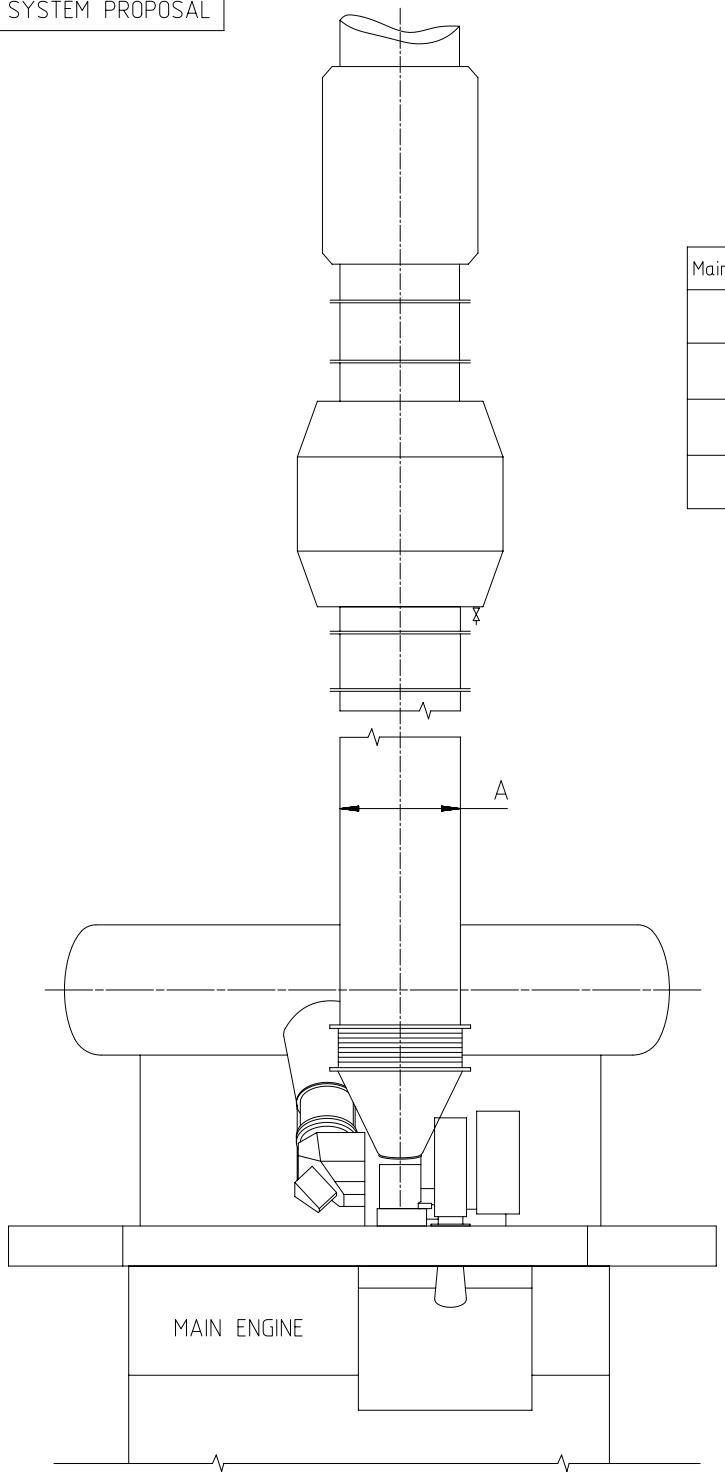
Product 5-7X52-S2.0

Exhaust System with one turbocharger

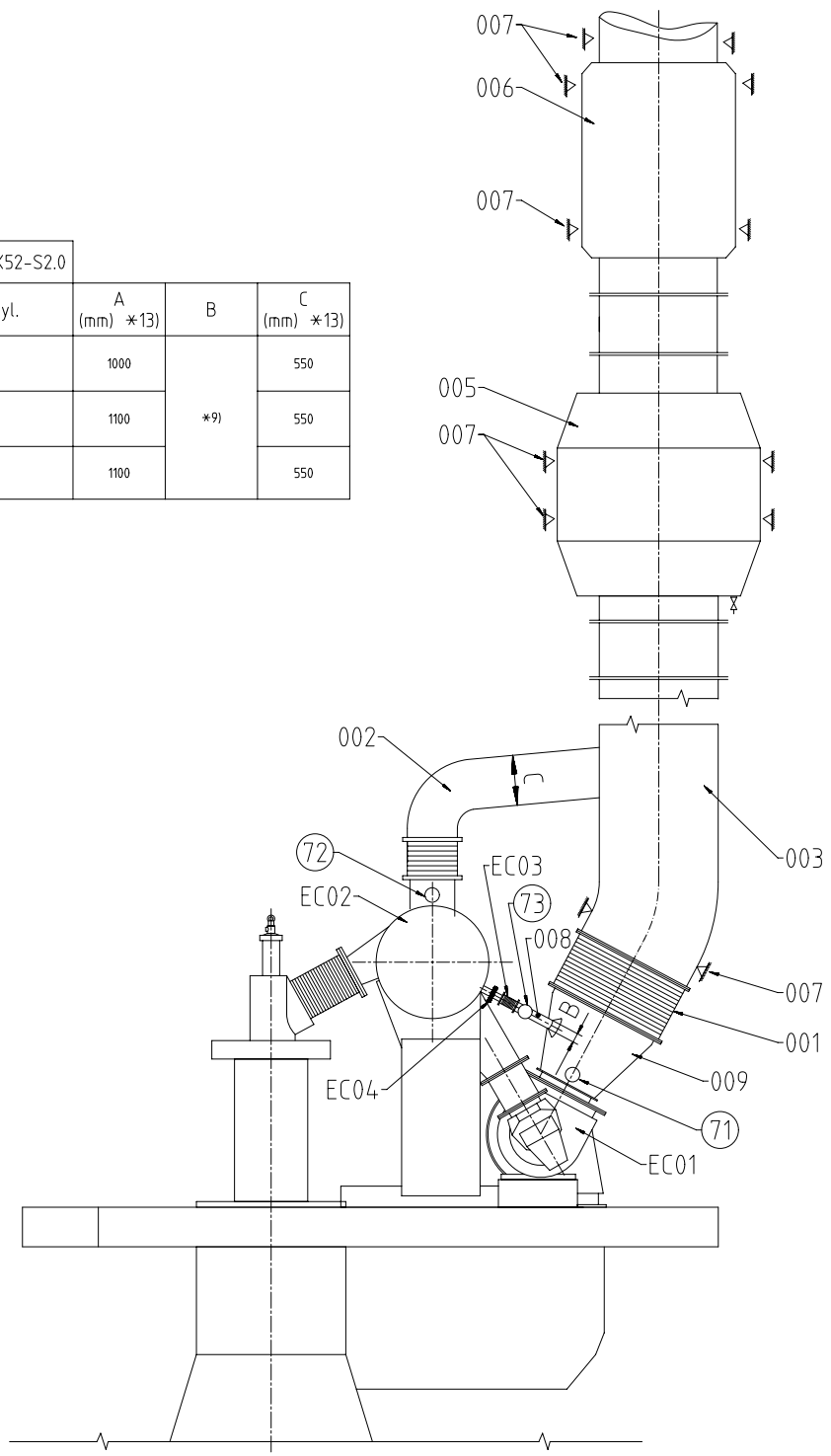
Units mm kg	NX		Basic Material		Net Weight 0,001
SURFACE PROTECTION SEE GROUP 0344	Made	08.04.2021 dki021 DH.Kim	Scale –	Size A3	Page 1/2	Material ID PAAD379401
TOLERANCING PRINCIPLE ISO8015	Chkd	23.04.2021 jpi101 Pickup	Design Group 9726	Drawing ID DAAD142440		Rev. –
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	23.04.2021 mhu019 Hug				

DID - DIMENSIONAL DRAWING - Confidential

SYSTEM PROPOSAL



Main engine X52-S2.0			
No of Cyl.	A (mm) *13)	B	C (mm) *13)
5	1000	*9)	550
6	1100		550
7	1100		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:

- 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 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) The piping of the exhaust gas system must be structurally supported to withstand the mass and to minimise vibrations across the system.
It is suggested that this is achieved by supports which are connected to the ship hull or otherwise. The type of these supports (fixed or sliding type), their final amount, and position must 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°

*8) Optional, needs just to be installed if requested by owner and class to ensure engine operation even after a turbocharger failure.

*9) Guidance regarding the selection of the waste gate pipe size is provided by the drawing "DAAD116127" as linked on the main drawing of this design group. The waste gate pipe on the shipside is one nominal pipe size larger than the waste gate pipe on the engine side (before the compensator).

*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.

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

WINGD Winterthur Gas & Diesel

Product 5-7X52-S2.0

Exhaust System with one turbocharger

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

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

Made 08.04.2021 dki021 DH.Kim
Chkd 23.04.2021 jpi101 Pickup
Appd 23.04.2021 mhu019 Hug

Scale - | Design Group 9726 | Size A1 | Page 2/2 | Material ID PAAD379401 | Drawing ID DAAD142440 | Rev. -

ISO - DIMENSIONAL DRAWING - Confidential - Approved

Specifications which must be met:

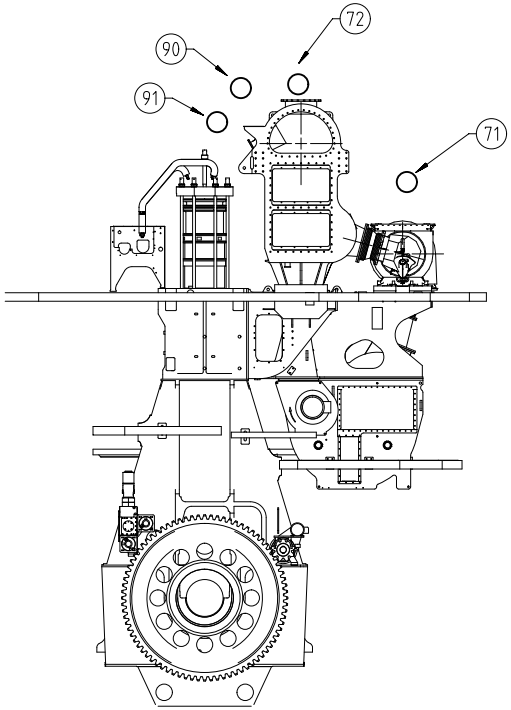
(72) OUTLET - Exhaust gas by-pass

- 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.

(90) INLET - Urea for SCR injection system
Urea quality: According to ISO 18611-1:2014
Urea consumption: According to GTD
Urea pressure: 0.3 - 2.0 bar
Urea Temperature: 5 - 40 °C

(91) OUTLET - Urea backflow from SCR injection system
Return to urea service tank

X52-S2.0



(71) 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 in relation to permissible design velocities are provided 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.

Approved

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

WIN GD Winterthur Gas & Diesel

Product 5-8X52-S2.0

Exhaust System with iSCR

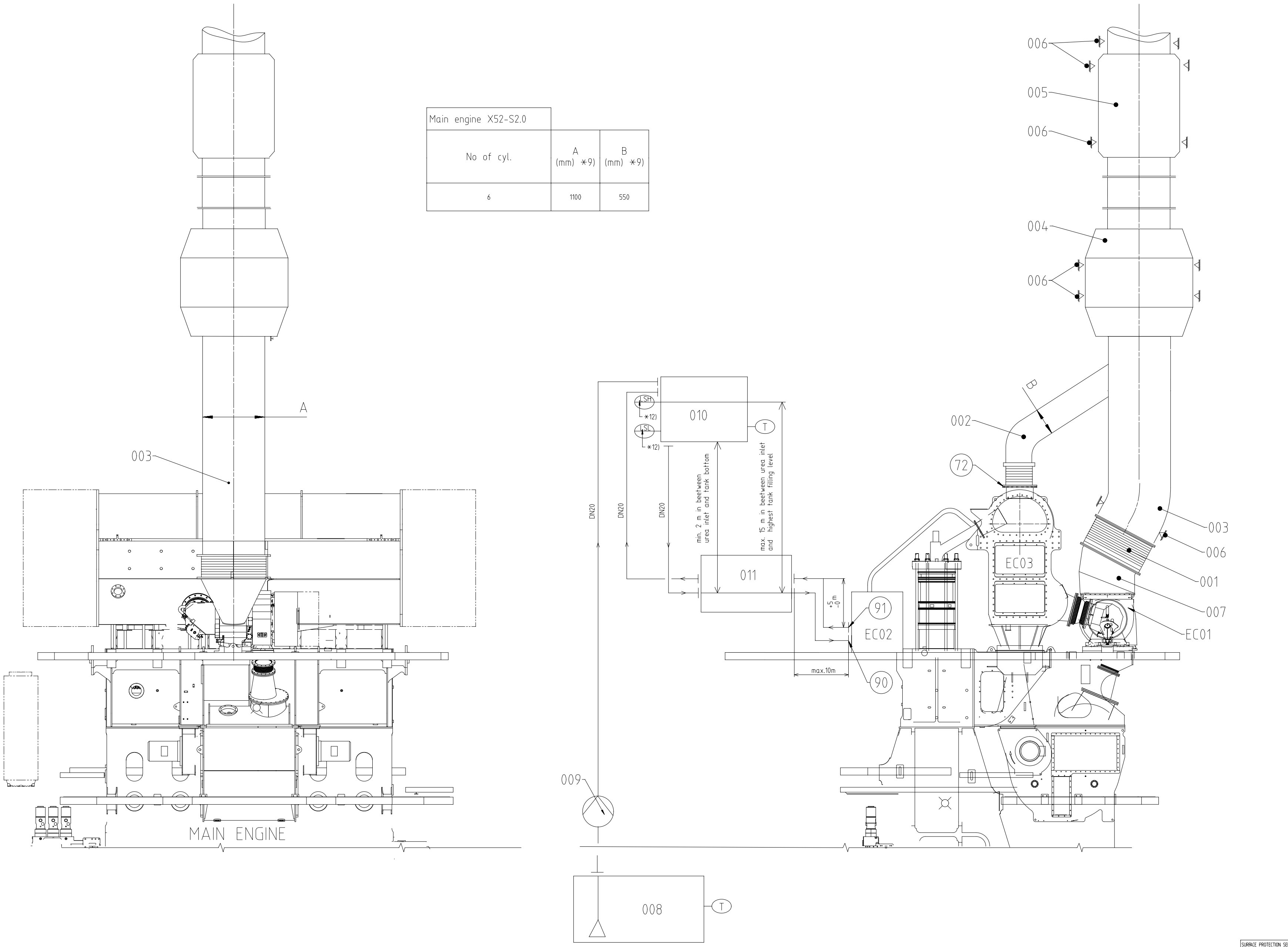
Units mm kg | NX | Basic Material | Net Weight 0,001

SURFACE PROTECTION SEE GROUP 0344	Made	09.04.2021 dki021 DH.Kim	Scale –	Size A2	Page 1/2
TOLERANCING PRINCIPLE ISO8015	Chkd	23.04.2021 jpi101 Pickup	Design Group 9726	Material ID	PAAD379408
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	23.04.2021 mhu019 Hug	Drawing ID	DAAD142442	Rev. –

DID - DIMENSIONAL DRAWING - Confidential

SYSTEM PROPOSAL

Main engine X52-S2.0		
No of cyl.	A (mm) *9)	B (mm) *9)
6	1100	550



Pos.	SYSTEM COMPONENTS *2)
001	Compensator *7)
002	Exhaust gas by-pass line *6)
003	Exhaust gas pipe
004	Boiler
005	Silencer (with spark arrester) *8)
006	Support *4)
007	Transition piece *5)
008	Urea storage tank *11)
009	Urea feed pump *10) *12)
010	Urea Service tank
011	SCR Pump Unit *13)

Pos.	ENGINE CONNECTIONS *1)
71	OUTLET - Exhaust gas turbocharger
72	OUTLET - Exhaust gas by-pass
90	INLET - Urea for SCR
91	OUTLET - Urea backflow

Pos.	ENGINE COMPONENTS *3)
EC01	Turbocharger
EC02	SCR Dosing Unit
EC03	SCR Reactor

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 installed by the shipyard.

*3) To be delivered by the engine builder, i.e. already equipped on engine side

*4) The piping of the exhaust gas system must be structurally supported to withstand the mass and to minimise vibrations across the system. It is suggested that this is achieved by supports which are connected to the ship hull or otherwise. The type of supports (fixed or sliding type), their final amount, and position must be defined by the shipyard under consideration of system layout and requirements based on installation specific calculation.

*5) Area ratio between outlet/inlet = 1.1...1.6, taper angle ≦ 40°

*6) Optional, needs just to be installed if requested by owner and class to ensure engine operation even after a turbocharger failure.

*7) 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).

*8) Optional, installed as required to meet noise requirements.

*9) 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 turbocharger supplier must be taken into account.

*10) Pump capacity to be laid out under consideration of the actual urea consumption and relative height of the urea service tank.

*11) Tank volume to be laid out under consideration of the actual urea consumption.

*12) Pump start is triggred by LSL (low level switch), pump stopp is triggered by LSH (high level switch).

*13) To be ordered via Licensee and to be installed by the shipyard.

Q-Code	XXXXX	Standard	ISO; JIS
Product	5-8X52-S2.0	Title	Exhaust System with iSCR
Units	mm kg	NX	
Basic Material		Net Weight	0,001
SURFACE PROTECTION SEE GROUP 0344	Made	09.04.2021	dki021 DH.Kim
TOLERANCING PRINCIPLE ISO8015	Chkd	23.04.2021	jpi101 Pickup
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	23.04.2021	mhu019 Hug
Scale	-	Design Group	9726
Size	A0	Page	2/2
Material ID	PAAD379408	Drawing ID	DAAD142442
Rev.	-		

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MIDS - Exhaust System (DG9726)

WinGD X52-S2.0

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2021-05-10	DRAWING SET	First web upload
2023-05-25	PTAA066955- PTAA066969-	new revision
2023-07-27	PAAD379488-A	new revison

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