SURFACE PROTECTION SEE GROUP 0344

TOLERANCING PRINCIPLE ISO8015

Available executions

Execution No.	Material ID	Attribute 1: HT_static-pressure	
		Buffer unit	Exp. tank
001	PTAA036934		X
002	PTAA036935	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. X52DF-2.1

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
–	sna102				new Design			

WIN GD
Winterthur Gas & Diesel

CENTRAL COOLING WATER SYSTEM

MIDS master drawing

separate BOM available

Dimension

Scale –	NX	Units [mm] [kg]	Basic Material	Net Weight	0.001
Main Design		Design Group 9721	Q-Code XXXXX	Standard	WDS
Qty per		A4	Item ID PTAA025615	Drawing Page/s	1/1

SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
1	1	PTAA036523	COOLING WATER SYSTEMS iCER off-engine + HT CW EXP tank			0
2	1	107.429.532.500	CONCEPT GUIDANCE			0.001

Prod.	5,6,7,8 X52DF-2.1			

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
A	mhu019	mhu019	04.07.2022	CNAA002127	Drawing Updated		4	3
-	sde101	mhu019	29.06.2022	CNAA002055	Main Design/Drawing Introduced		-	-

WIN GD
Winterthur Gas & Diesel

COOLING WATER SYSTEMS

iCER off-engine +HT CW exp. tank

Bill **O**f **M**aterial

Dimension	iCER off-engine +HT CW exp. tank						
Units	[m] [kg]	Basic Material				Net Weight	0
Main Design	Yes	Design Group	9721	Q-Code	XXXXX	Standard	WDS
Qty per	Engine	A4	Item ID	PTAA036934		BOM Page/s	01/01

SEQ NO	QTY	Item ID	Item Name / Dimension	Standard-ID	Basic Material	Net Weight
015	1	PAAD166922	EXPANSION TANK			0.001
016	1	107.245.419.500	EXPANSION TANK			0.001

Prod.	X52DF-2.1							

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
E	dpa103	mhu019	11.01.2024	CNAA005099	Drawing updated		4	3
D	npa101	mhu019	31.03.2023	CNAA003486	Drawing updated		4	3
C	npa101	mhu019	24.03.2023	CNAA003461	Drawing Updated		4	3
-	sde101	mhu019	29.06.2022	CNAA002055	new Design		-	-
					Approved			

WIN GD
Winterthur Gas & Diesel

COOLING WATER SYSTEMS

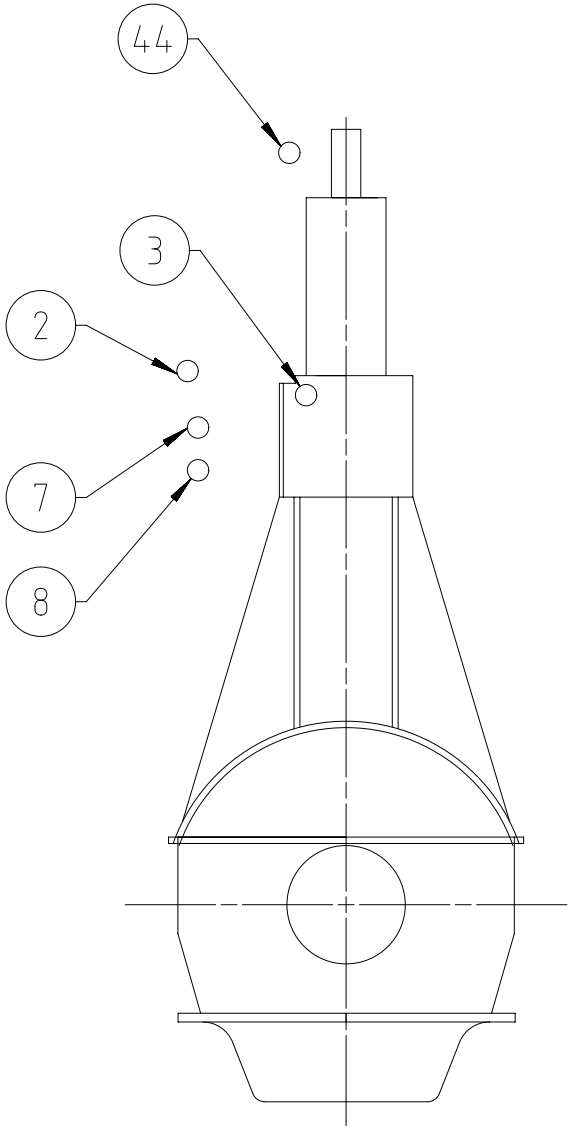
iCER off-engine +HT CW exp. tank

Bill Of Material

Dimension	iCER off-engine +HT CW exp. tank				
Units	[m] [kg]	Basic Material			Net Weight 0
Main Design		Design Group	9721	Q-Code X X M	Standard WDS
Qty per	A4	Item ID	PTAA036523		BOM Page/s 01/01

SPECIFICATIONS which must be met:

44	OUTLET - Cylinder cooling water air venting - To be vented to a safe area outside of the engine room



2	INLET - Cylinder cooling water (HT water) - Cooling water pressure: 3.0 - 5.0 bar - Cooling water volume flow: according to GTD specification - Cooling water (freshwater) must be treated according to WinGD's specification - Pre-heating: The engine must be warmed-up by means of heated HT water to min. 60°C before engine start - HT cooling water amount on engine side: Given in table 1 on page 2
3	OUTLET - Cylinder cooling water (HT water) - Cooling water temperature - Controller set-point: 90 °C (controller type: PI) - Steady state condition: 90 ± 2 °C - Transient condition: 90 ± 4 °C - A venting devise (air separator) must be installed as close as possible after the outlet connection. Venting air must be released to a safe area outside of the engine room
7	INLET - Scavenge air cooler (SAC) cooling water (LT water) - Cooling water pressure: 2.0 - 4.0 bar - Cooling water temperature set point: 25 °C, max. 36 °C when seawater temperature at 32 °C - Cooling water volume flow: according to GTD specification - Cooling water (freshwater) must be treated according to WinGD's specification - LT cooling water amount on engine side: Given in table 1 on page 2
8	OUTLET - Scavenge air cooler (SAC) cooling water (LT water) - Cooling water volume flow: according to GTD specification, adjusted by an orifice in the outlet pipe on shipside

Prod. X52DF-2.1

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Approved	Activity Code	E	C
E	dpa103	mhu019	11.01.2024	CNAA005099	Drawing updated			4	3
D	npa101	mhu019	31.03.2023	CNAA003486	Drawing updated			4	3
C	npa101	mhu019	24.03.2023	CNAA003461	Drawing Updated			4	3
-	sde101	mhu019	29.06.2022	CNAA002055	new Design			-	-

WIN GD Winterthur Gas & Diesel

COOLING WATER SYSTEMS

iCER off-engine +HT CW exp. tank

separate BOM available

Dimension: iCER off-engine +HT CW exp. tank

Scale - NX

Units [mm] [kg]

Basic Material

Net Weight 0.000

SURFACE PROTECTION SEE GROUP 0344

TOLERANCING PRINCIPLE ISO8015

GENERAL TOLERANCES ACCORDING TO ISO2768-mK

Main Design		Design Group	9721	Q-Code	X X M	Standard	WDS
Qty per		A3	Item ID	PTAA036523		Drawing Page/s	1/3

SYSTEM PROPOSAL FOR SINGLE ENGINE

NOTE
Further installation details and variants can be found listed in the Marine Installation Manual (MIM), which provides also the acronyms used in this drawing set. The piping symbols are explained by the piping symbol key as included in the drawing set "Various Installation Items".

Table 1: Water volume on engine side

Cylinder	HT circuit Cyl. C.W. Volume (l)	LT circuit SAC Volume (l)
5	450 l	370 l
6	540 l	400 l
7	620 l	480 l a) / 510 l b)
8	710 l	550 l

a) Values for executions with 1 scavenge air cooler.
b) Values for executions with 2 scavenge air cooler.

Pos.	ENGINE CONNECTIONS *2)
(2)	INLET - Cylinder cooling water (HT water)
(3)	OUTLET - Cylinder cooling water (HT water)
(7)	INLET - Scavenge air cooler (SAC) cooling water (LT water) *7)
(8)	OUTLET - Scavenge air cooler (SAC) cooling water (LT water) *7)
(44)	OUTLET - Cylinder cooling water air venting *10)

Number of cylinders			5	6	7	8
Main engine X52DF-2.1 R1 rated	power	(kW)	7450	8940	10430	11920
	speed	(rpm)	105			
Pressure drop across the engine	(bar)		1.3			
Cooling water expansion tank (HT)	Cap.	(m³)	Depending on ancillary plants, min. 10% of HT cooling water			
Cooling water expansion tank (LT)	Cap.	(m³)	Depending on ancillary plants min. 10% of LT cooling water			
PROPOSAL for pipe dimensioning *11)						
Nominal pipe diameter	A	DN	Yard determination, suitable for main engine and ancillary plants			
	B	DN				
	C	DN				
	D	DN	200	200	250	250
	E	DN	100	125	125	125
	G	DN	100	125	125	125
	H	DN	65	65	65	80
	J	DN	80	80	100	100
	K	DN	The pipe size must be selected depending on the project specific requirement and EGC supplier's recommendation.			
	L	DN				

Remarks:

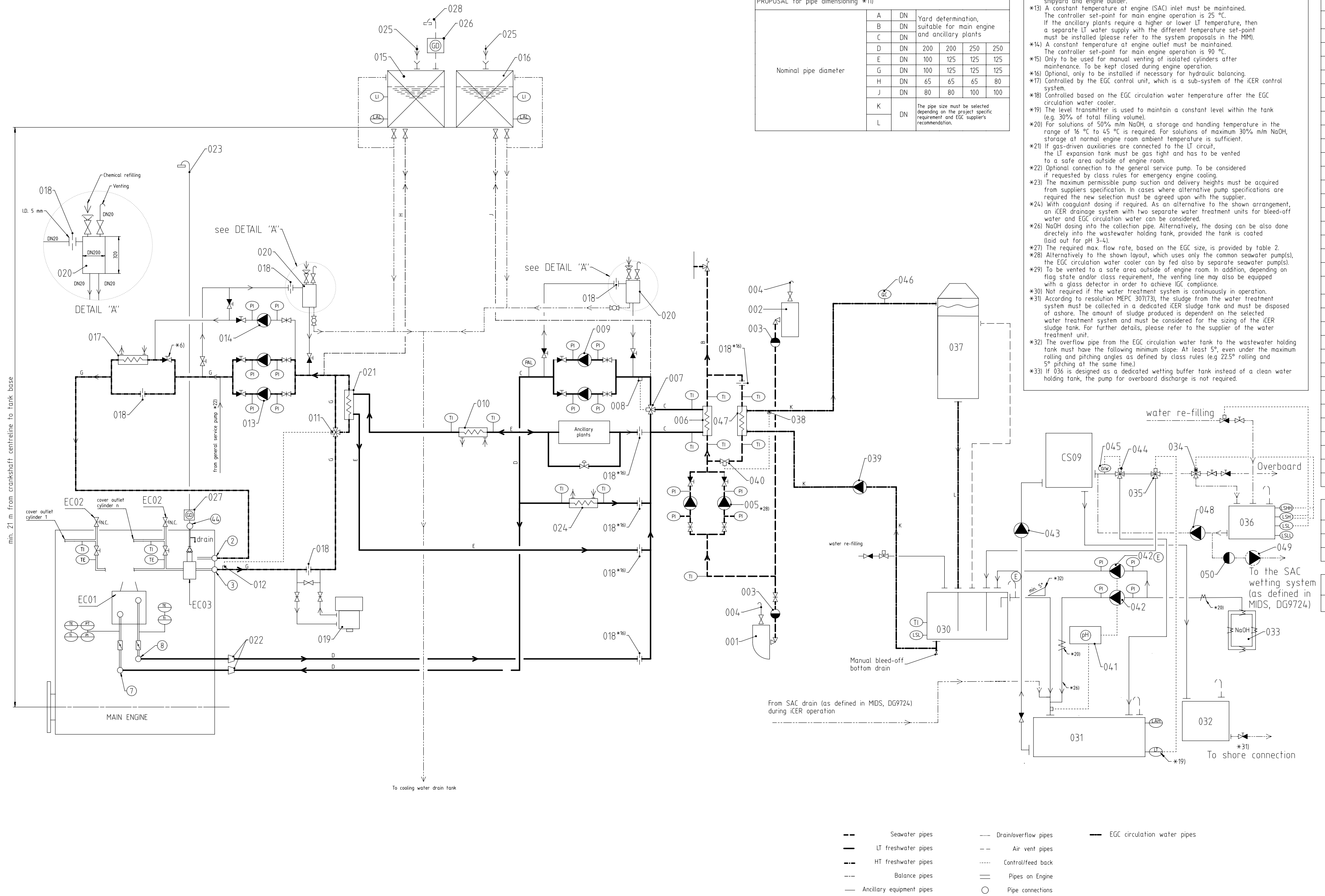
- Air vent and drain pipes are not shown on this drawing. They must be installed where required.
- Air vent and drain pipes must be fully functional at all inclination angles of the ship at which the engine must be operational.

*1) To be installed by the shipyard.
*2) Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connection.
*3) To be delivered by the engine manufacturer, i.e. already equipped on engine side.
*4) To be installed for cooling water aftertreatment during regular engine operation. Convenient dimensions are provided in view "A". Other designs are possible.
*5) When using a valve, lock it in proper position to prevent incorrect use.
*6) Only when pos. 014 is installed.
*7) The inlet and outlet pipes to SAC must be designed to allow engine thermal expansion, or be fitted with expansion pieces.
*8) For guidance only, final layout according to actual engine pre-heating requirements.
*9) Installed as required (check with "Pipe Connection Plan")
*10) To be vented to a safe area outside of engine room. In addition, depending on flag state and/or class requirement, the venting line must also be equipped with a gas detector.
*11) All given diameters are valid for the mentioned rating and serve just as an example. To make the layout for the project-specific rating please refer to DG9730 "Fluid velocities and flow rates, recommended values for pipework of diesel plants" for selecting the appropriate pipe diameter. Rating specific flow rates are provided by the GTD.
*12) To be supplied by a certified supplier. Ordering to be coordinated between shipyard and engine builder.
*13) A constant temperature at engine (SAC) inlet must be maintained. The controller set-point for main engine operation is 25 °C. If the ancillary plants require a higher or lower LT temperature, then a separate LT water supply with the different temperature set-point must be installed (please refer to the system proposals in the MIM).
*14) A constant temperature at engine outlet must be maintained. The controller set-point for main engine operation is 90 °C.
*15) Only to be used for manual venting of isolated cylinders after maintenance. To be kept closed during engine operation.
*16) Optional, only to be installed if necessary for hydraulic balancing.
*17) Controlled by the EGC control unit, which is a sub-system of the iCER control system.
*18) Controlled based on the EGC circulation water temperature after the EGC circulation water cooler.
*19) The level transmitter is used to maintain a constant level within the tank (e.g. 30% of total filling volume).
*20) For solutions of 50% m/m NaOH, a storage and handling temperature in the range of 16 °C to 45 °C is required. For solutions of maximum 30% m/m NaOH, storage at normal engine room ambient temperature is sufficient.
*21) If gas-driven auxiliaries are connected to the LT circuit, the LT expansion tank must be gas tight and has to be vented to a safe area outside of engine room.
*22) Optional connection to the general service pump. To be considered if requested by class rules for emergency engine cooling.
*23) The maximum permissible pump suction and delivery heights must be acquired from suppliers specification. In cases where alternative pump specifications are required the new selection must be agreed upon with the supplier.
*24) With coagulant dosing if required. As an alternative to the shown arrangement, an iCER drainage system with two separate water treatment units for bleed-off water and EGC circulation water can be considered.
*26) NaOH dosing into the collection pipe. Alternatively, the dosing can be also done directely into the wastewater holding tank, provided the tank is coated (laid out for pH 3-4).
*27) The required max. flow rate, based on the EGC size, is provided by table 2.
*28) Alternatively to the shown layout, which uses only the common seawater pump(s), the EGC circulation water cooler can by fed also by separate seawater pump(s).
*29) To be vented to a safe area outside of engine room. In addition, depending on flag state and/or class requirement, the venting line may also be equipped with a glass detector in order to achieve IGC compliance.
*30) Not required if the water treatment system is continuously in operation.
*31) According to resolution MEPC 307(73), the sludge from the water treatment system must be collected in a dedicated iCER sludge tank and must be disposed of ashore. The amount of sludge produced is dependent on the selected water treatment system and must be considered for the sizing of the iCER sludge tank. For further details, please refer to the supplier of the water treatment unit.
*32) The overflow pipe from the EGC circulation water tank to the wastewater holding tank must have the following minimum slope: At least 5°, even under the maximum rolling and pitching angles as defined by class rules (e.g 22.5° rolling and 5° pitching at the same time.)
*33) If 036 is designed as a dedicated wetting buffer tank instead of a clean water holding tank, the pump for overboard discharge is not required.

Pos.	SYSTEM COMPONENTS *1)
001	Low sea chest
002	High sea chest
003	Seawater strainer
004	Air vent (air vent pipe or equal venting system acc. to shipyard's design)
005	Seawater circulating pump
006	Central seawater cooler
007	Automatic temperature control valve for LT circuit *13)
008	LT water temperature sensor *13)
009	Cooling water pump for LT circuit
010	Lubricating oil cooler
011	Automatic temperature control valve for HT circuit *14)
012	HT water temperature sensor *14)
013	Cylinder cooling water (CCW) pump for HT circuit
014	Pre-heating circulating pump (optional), cap. 10% from cylinder cooling pump *8)
015	HT water expansion tank (link to detail drawing on the partlist of this drawing)
016	LT water expansion tank *21) (link to detail drawing on the partlist of this drawing)
017	Pre-heater for main engine (HT circuit)
018	Throttling disc *5) *16)
019	Freshwater generator
020	Chemical treatment refill unit *4)
021	HT cooling water cooler
022	Transition piece (adapter) *9)
023	Cylinder cooling water air venting line *10)
024	MDO/MGO cooler
025	Filling pipe / inlet chemical treatment
026	Gas detector *29)
027	Gas detector *10)
028	Cylinder cooling water air venting line *29)
030	EGC circulation water tank
031	Wastewater holding tank
032	iCER sludge tank
033	NaOH storage tank *20)
034	Automatic 3/2 valve
035	Flow regulating valve
036	Combined clean water holding tank (for zero discharge area) and SAC wetting buffer tank
037	Exhaust Gas Cooler (EGC)
038	EGC circulation water temperature control sensor *17) *18)
039	EGC circulation water pump (frequency controlled) *17) *23) *27)
040	Seawater flow control valve *17) *18)
041	Water Analyser (pH check)
042	NaOH dosing pump unit
043	Water treatment unit water transfer pump
044	Switching valve
045	Oil-in-water monitoring sensor (standard type)
046	Water analyser (quality check) *30)
047	EGC circulation water cooler
048	Overboard water discharge pump *33)
049	SAC wetting water supply pump
050	Strainer (max. size 250 micron, absolute)

Pos.	ENGINE COMPONENTS *3)
EC01	Scavenge air cooler (SAC)
EC02	Manual vent valve, each cylinder *15)
EC03	Air separator

Pos.	COMPONENTS from certified suppliers *12)
CS09	Water treatment unit *24)



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

Change	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code		
	E	dpa103	mhu019	11.01.2024	CNAA005099	Drawing updated		4	3
						Approved		E	C

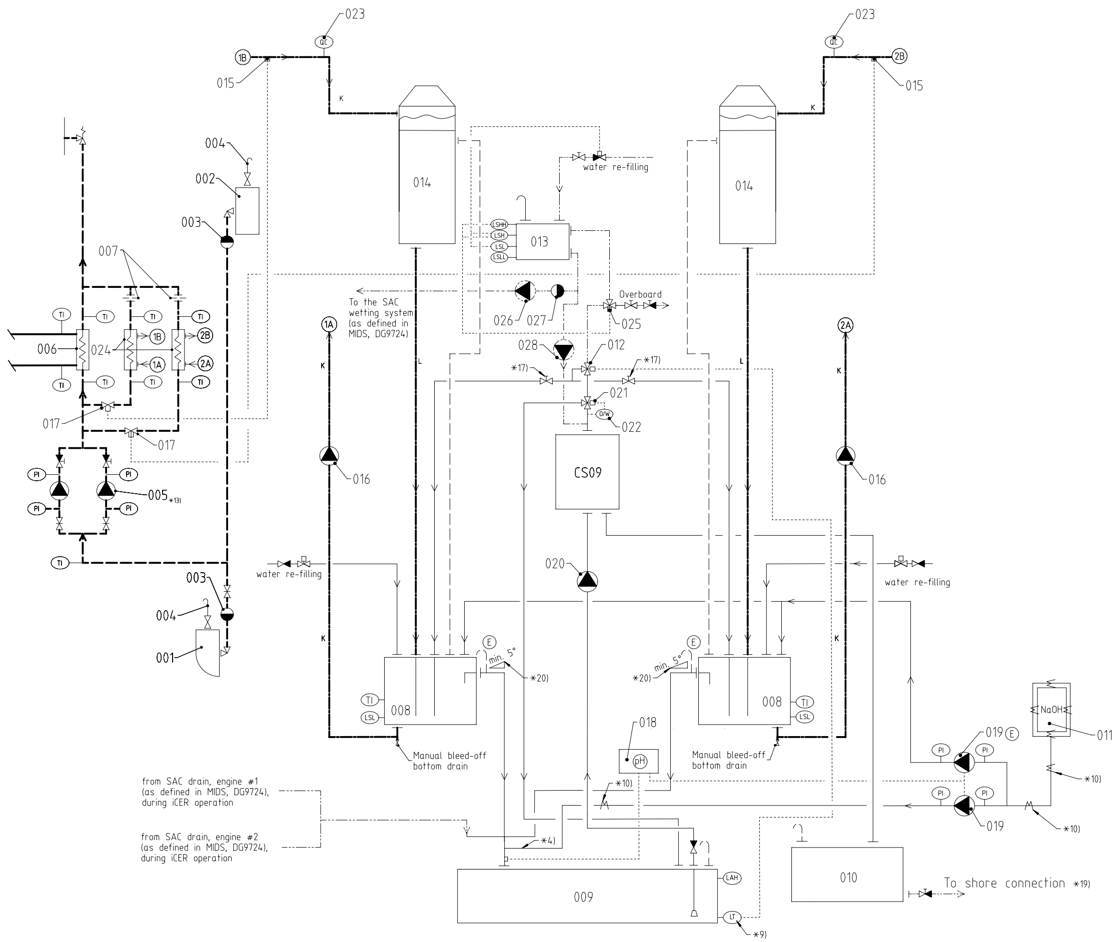
[mm] [kg] - NX A0 Item ID PTAA036523 Drawing Page/s 2/3

SYSTEM PROPOSAL FOR TWIN ENGINES iCER

NOTE
Further installation details and variants can be found listed in the Marine Installation Manual (MIM), which provides also the acronyms used in this drawing set. The piping symbols are explained by the piping symbol key as included in the drawing set "Various Installation Items".

Pos.	COMPONENTS from certified suppliers *6)
CS09	Water treatment unit *12)

Pos.	SYSTEM COMPONENTS *1)
001	Low sea chest
002	High sea chest
003	Seawater strainer
004	Air vent (air vent pipe or equal venting system acc. to shipyard's design)
005	Seawater circulating pump
006	Central seawater cooler
007	Throttling disc *5) *7)
008	EGC circulation water tank
009	Wastewater holding tank
010	iCER sludge tank
011	NaOH storage tank *4) *10)
012	3/2-way valve
013	Combined clean water holding tank (for zero discharge area) and SAC wetting buffer tank
014	Exhaust Gas Cooler (EGC)
015	EGC circulation water temperature control sensor *15) *16)
016	EGC circulation water pump (frequency controlled) *8) *11) *15)
017	Seawater flow control valve *15) *16)
018	Water Analyser (pH check)
019	NaOH dosing pump unit
020	Water treatment unit water transfer pump
021	Switching valve
022	Oil-in-water monitoring sensor (standard type)
023	Water analyser (quality check) *18)
024	EGC circulation water cooler
025	Automatic 3/2 valve
026	SAC wetting water supply pump
027	Strainer (max. size 250 micron, absolute)
028	Overboard water discharge pump *21)



Line type		Line type		Line type
Seawater pipes		Drain/overflow pipes		EGC circulation water pipes
LT freshwater pipes		Air vent pipes		
HT freshwater pipes		Control/feed back		
Balance pipes		Pipes on Engine		
Ancillary equipment pipes		Pipe connections		

Remarks:

- Air vent and drain pipes are not shown on this drawing. They must be installed where required.
- 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 installed by the shipyard.
*2) Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connection.
*3) To be delivered by the engine manufacturer, i.e. already equipped on engine side.
*4) NaOH dosing into the collection pipe. Alternatively, the dosing can be also done directely into the wastewater holding tank, provided the tank is coated (laid out for pH 3-4).
*5) When using a valve, lock it in proper position to prevent incorrect use.
*6) To be supplied by a certified supplier. Ordering to be coordinated between shipyard and engine builder.
*7) Optional, only to be installed if needed for hydraulic balancing.
*8) The required max. flow rate, based on EGC size, is provided by table 2.
*9) The level transmitter is used to maintain a constant level within the tank (e.g. 30% of total filling volume).
*10) For solutions of 50% m/m NaOH, a storage and handling temperature in the range of 16 °C to 45 °C is required. For solutions of maximum 30% m/m NaOH, storage at normal engine room ambient temperature is sufficient.
*11) The maximum permissible pump suction and delivery heights must be acquired from suppliers specification. In cases where alternative pump specifications are required the new selection must be agreed upon with the supplier.
*12) With coagulant dosing if required. As an alternative to the shown arrangement, an iCER drainage system with two separate water treatment units for bleed-off water and EGC circulation water can be considered.
*13) Alternatively to the shown layout, which uses only the common seawater pump(s), the EGC circulation water cooler can by fed also by separate seawater pump(s).
*15) Controlled by the EGC control unit, which is a sub-system of the iCER control system.
*16) Controlled based on the EGC circulation water temperature after the EGC circulation water cooler.
*17) Used for hydraulic balancing. The valve must be locked in proper position to prevent incorrect use. As an alternative to the valve a throttling disc can be installed.
*18) Not required if the water treatment system is continuously in operation.
*19) According to resolution MEPC 307(73), the sludge from the water treatment system must be collected in a dedicated iCER sludge tank and must be disposed of ashore. The amount of sludge produced is dependent on the selected water treatment system and must be considered for the sizing of the iCER sludge tank. For further details, please refer to the supplier of the water treatment unit.
*20) The overflow pipe from the EGC circulation water tank to the wastewater holding tank must have the following minimum slope: At least 5°, even under the maximum rolling and pitching angles as defined by class rules (e.g 22.5° rolling and 5° pitching at the same time.)
*21) If 013 is designed as a dedicated wetting buffer tank instead of a clean water holding tank, the pump for overboard discharge is not required.

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

Change	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis		
	E	dpa103	mhu019	11012024	CNAA005099	Drawing updated	4	3

Approved | Activity Code | E | C
[mm] [kg] | - | NX | A0 | Item ID PTAA036523 | Drawing Page/s 3/3

SEQ NO	QTY	Item ID	Item Name / Dimension	Standard-ID	Basic Material	Net Weight
1	1	PTAA036713	COOLING WATER SYSTEMS iCER off-engine + HT CW buffer unit			0
2	1	107.429.532.500	CONCEPT GUIDANCE			0.001

Prod.				
	5,6,7,8 X52DF-2.1			

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
A	iav101	mhu019	04.07.2022	CNAA002127	Drawing Updated		4	3
-	sde101	mhu019	29.06.2022	CNAA002055	Main Design/Drawing Introduced		-	-

WIN GD
Winterthur Gas & Diesel

COOLING WATER SYSTEMS

iCER off-engine + HT CW buffer unit

Bill **O**f **M**aterial

Dimension	iCER off-engine +HT CW exp. tank						
Units	[m] [kg]	Basic Material				Net Weight	0
Main Design	Yes	Design Group	9721	Q-Code	XXXXX	Standard	WDS
Qty per	Engine	A4	Item ID	PTAA036935		BOM Page/s	01/01

SEQ NO	QTY	Item ID	Item Name / Dimension	Standard-ID	Basic Material	Net Weight
015	1	107.245.626.500	BUFFER			0.001
016	1	107.245.419.500	EXPANSION TANK			0.001

Prod.	X52DF-2.1							

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
E	npa101	mhu019	11.01.2024	CNAA005099	Drawing updated	4	4	3
D	npa101	mhu019	31.03.2023	CNAA003486	Drawing updated	4	4	3
C	npa101	mhu019	24.03.2023	CNAA003461	Drawing Updated	4	4	3
-	sde101	mhu019	29.06.2022	CNAA002055	new Design	-	-	-

Approved

WIN GD
Winterthur Gas & Diesel

COOLING WATER SYSTEMS

iCER off-engine + HT CW buffer unit

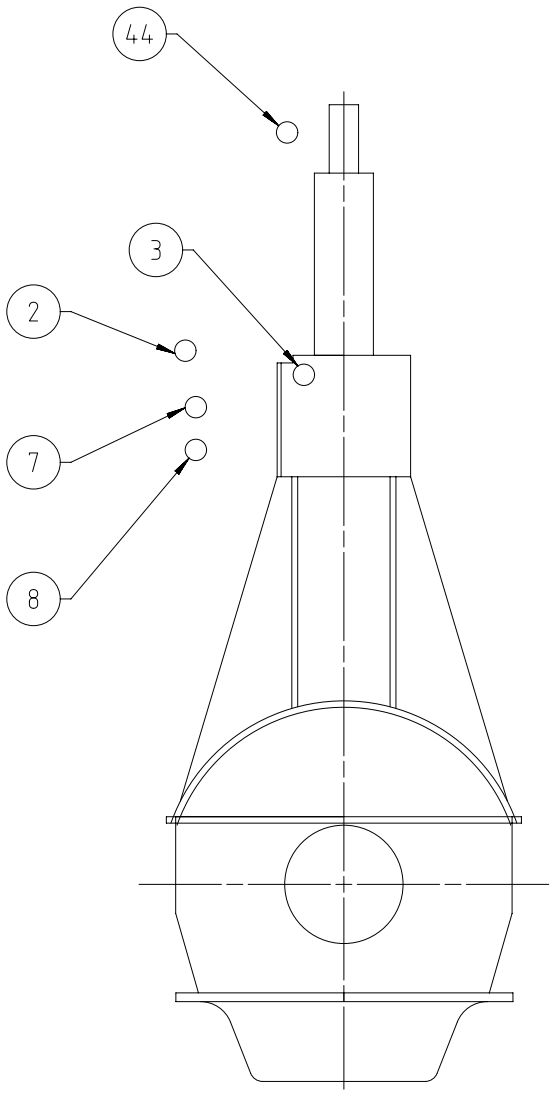
Bill Of Material

Dimension	iCER off-engine + HT CW buffer unit				
Units [m] [kg]	Basic Material			Net Weight	0
Main Design	Design Group	9721	Q-Code X X M	Standard	WDS
Qty per	A4	Item ID	PTAA036713	BOM Page/s	01/01

SPECIFICATIONS which must be met:

(44) OUTLET - Cylinder cooling water air venting

- To be vented to a safe area outside of the engine room



(2) INLET - Cylinder cooling water (HT water)

- Cooling water pressure: 3.0 - 5.0 bar
- Cooling water volume flow: As specified in the GTD
- Cooling water (freshwater) must be treated according to WinGD specification
- A buffer unit must be installed
- The static pressure at the engine inlet must be adjusted by buffer unit pressure setting
- Before starting the engine, the engine must be heated-up to 60 °C via heated HT water
- HT cooling water volume on engine side: Provided in table 1 on page 2

(3) OUTLET - Cylinder cooling water (HT water)

Cooling water temperature
- Controller set-point: 90 °C
- Steady state condition: 90 ± 2 °C
- Transient condition: 90 ± 4 °C

(7) INLET - Scavenge air cooler (SAC) cooling water (LT water)

- Cooling water pressure: 2.0 - 4.0 bar
- Cooling water temperature: maximum 36 °C when the seawater temperature is at 32 °C. Controller set-point: 25 °C
- Cooling water volume flow: As specified in the GTD
- Cooling water (freshwater) must be treated according to WinGD specification
- LT cooling water volume on engine side: Provided in table 1 on page 2

(8) OUTLET - Scavenge air cooler (SAC) cooling water (LT water)

- Cooling water volume flow: As specified in the GTD, adjusted by an orifice in the outlet pipe on shipside

Prod. X52DF-2.1

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Approved	Activity Code	E	C
E	npa101	mhu019	11.01.2024	CNAA005099	Drawing updated			4	3
D	npa101	mhu019	31.03.2023	CNAA003486	Drawing updated			4	3
C	npa101	mhu019	24.03.2023	CNAA003461	Drawing Updated			4	3
-	sde101	mhu019	29.06.2022	CNAA002055	new Design			-	-

WIN GD Winterthur Gas & Diesel

COOLING WATER SYSTEMS

iCER off-engine + HT CW buffer unit

separate BOM available

Dimension	iCER off-engine + HT CW buffer unit				
Scale - NX	Units [mm] [kg]	Basic Material		Net Weight	0.000
Main Design	Design Group 9721	Q-Code X X M		Standard	WDS
Qty per	A3	Item ID PTAA036713		Drawing Page/s	1/3

SURFACE PROTECTION SEE GROUP 0344

TOLERANCING PRINCIPLE ISO8015

GENERAL TOLERANCES ACCORDING TO ISO2768-mK

SYSTEM PROPOSAL FOR SINGLE ENGINE

NOTE
Further installation details and variants can be found listed in the Marine Installation Manual (MIM), which provides also the acronyms used in this drawing set. The piping symbols are explained by the piping symbol key as included in the drawing set "Various Installation Items".

Table 1: Water volume on engine side

Cylinder	HT circuit Cyl. C.W. Volume (l)	LT circuit SAC Volume (l)
5	450 l	370 l
6	540 l	400 l
7	620 l	480 l a) / 510 l b)
8	710 l	550 l

a) Values for executions with 1 scavenge air cooler.
b) Values for executions with 2 scavenge air cooler.

Pos.	ENGINE CONNECTIONS *2)
(2)	INLET - Cylinder cooling water (HT water)
(3)	OUTLET - Cylinder cooling water (HT water)
(7)	INLET - Scavenge air cooler (SAC) cooling water (LT water) *7)
(8)	OUTLET - Scavenge air cooler (SAC) cooling water (LT water) *7)
(44)	OUTLET - Cylinder cooling water air venting *10)

Number of cylinders			5	6	7	8
Main engine X52DF-2.1 R1 rated	power	(kW)	7450	8940	10430	11920
	speed	(rpm)	105			
Pressure drop across the engine	(bar)		1.3			
Cooling water expansion tank (HT)	Cap.	(m^3)	Depending on ancillary plants, min. 10% of HT cooling water			
Cooling water expansion tank (LT)	Cap.	(m^3)	Depending on ancillary plants min. 10% of LT cooling water			
PROPOSAL for pipe dimensioning *11)						
Nominal pipe diameter	A	DN	Yard determination, suitable for main engine and ancillary plants			
	B	DN				
	C	DN				
	D	DN	200	200	250	250
	E	DN	100	125	125	125
	G	DN	100	125	125	125
	H	DN	80	80	100	100
	I	DN	65	65	65	80
	J	DN	80	80	100	100
	K	DN	The pipe size must be selected depending on the project specific requirement and EGC supplier's recommendation.			
	L					

Remarks:

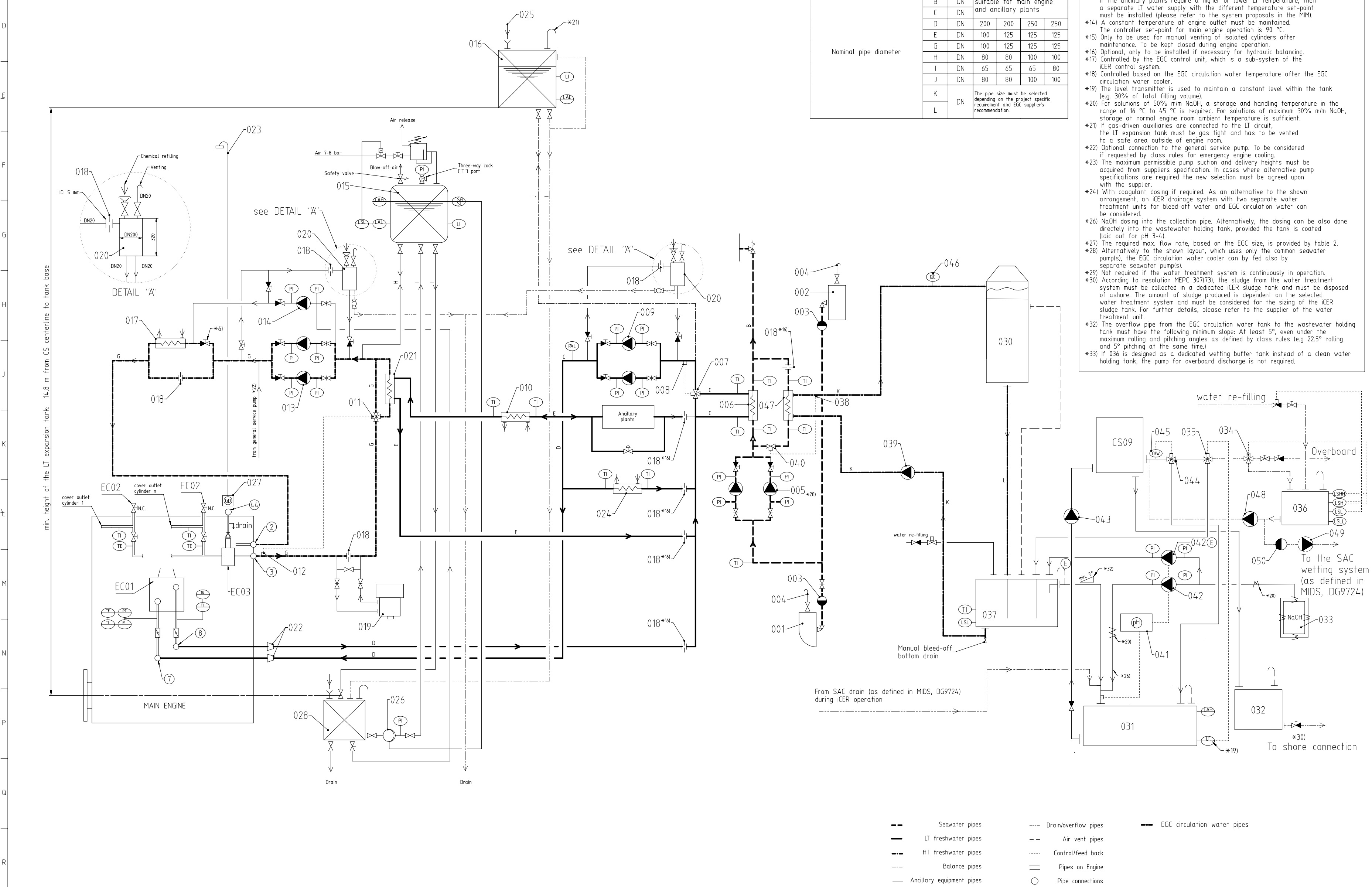
- Air vent and drain pipes are not shown on this drawing. They must be installed where required.
- Air vent and drain pipes must be fully functional at all inclination angles of the ship at which the engine must be operational.

*1) To be installed by the shipyard.
*2) Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connection.
*3) To be delivered by the engine manufacturer, i.e. already equipped on engine side.
*4) To be installed for cooling water aftertreatment during regular engine operation. Convenient dimensions are provided in view "A". Other designs are possible.
*5) When using a valve, lock it in proper position to prevent incorrect use.
*6) Only when pos. 014 is installed.
*7) The inlet and outlet pipes to SAC must be designed to allow engine thermal expansion, or be fitted with expansion pieces.
*8) For guidance only, final layout according to actual engine pre-heating requirements.
*9) Installed as required (check with "Pipe Connection Plan")
*10) To be vented to a safe area outside of engine room. In addition, depending on flag state and/or class requirement, the venting line must also be equipped with a gas detector.
*11) All given diameters are valid for the mentioned rating and serve just as an example. To make the layout for the project-specific rating please refer to DG9730 "Fluid velocities and flow rates, recommended values for pipework of diesel plants" for selecting the appropriate pipe diameter. Rating specific flow rates are provided by the GTD.
*12) To be supplied by a certified supplier. Ordering to be coordinated between shipyard and engine builder.
*13) A constant temperature at engine (SAC) inlet must be maintained. The controller set-point for main engine operation is 25 °C. If the ancillary plants require a higher or lower LT temperature, then a separate LT water supply with the different temperature set-point must be installed (please refer to the system proposals in the MIM).
*14) A constant temperature at engine outlet must be maintained. The controller set-point for main engine operation is 90 °C.
*15) Only to be used for manual venting of isolated cylinders after maintenance. To be kept closed during engine operation.
*16) Optional, only to be installed if necessary for hydraulic balancing.
*17) Controlled by the EGC control unit, which is a sub-system of the iCER control system.
*18) Controlled based on the EGC circulation water temperature after the EGC circulation water cooler.
*19) The level transmitter is used to maintain a constant level within the tank (e.g. 30% of total filling volume).
*20) For solutions of 50% m/m NaOH, a storage and handling temperature in the range of 16 °C to 45 °C is required. For solutions of maximum 30% m/m NaOH, storage at normal engine room ambient temperature is sufficient.
*21) If gas-driven auxiliaries are connected to the LT circuit, the LT expansion tank must be gas tight and has to be vented to a safe area outside of engine room.
*22) Optional connection to the general service pump. To be considered if requested by class rules for emergency engine cooling.
*23) The maximum permissible pump suction and delivery heights must be acquired from suppliers specification. In cases where alternative pump specifications are required the new selection must be agreed upon with the supplier.
*24) With coagulant dosing if required. As an alternative to the shown arrangement, an iCER drainage system with two separate water treatment units for bleed-off water and EGC circulation water can be considered.
*26) NaOH dosing into the collection pipe. Alternatively, the dosing can be also done directely into the wastewater holding tank, provided the tank is coated (laid out for pH 3-4).
*27) The required max. flow rate, based on the EGC size, is provided by table 2.
*28) Alternatively to the shown layout, which uses only the common seawater pump(s), the EGC circulation water cooler can by fed also by separate seawater pump(s).
*29) Not required if the water treatment system is continuously in operation.
*30) According to resolution MEPC 307(73), the sludge from the water treatment system must be collected in a dedicated iCER sludge tank and must be disposed of ashore. The amount of sludge produced is dependent on the selected water treatment system and must be considered for the sizing of the iCER sludge tank. For further details, please refer to the supplier of the water treatment unit.
*32) The overflow pipe from the EGC circulation water tank to the wastewater holding tank must have the following minimum slope: At least 5°, even under the maximum rolling and pitching angles as defined by class rules (e.g 22.5° rolling and 5° pitching at the same time.)
*33) If 036 is designed as a dedicated wetting buffer tank instead of a clean water holding tank, the pump for overboard discharge is not required.

Pos.	SYSTEM COMPONENTS *1)
001	Low sea chest
002	High sea chest
003	Seawater strainer
004	Air vent (air vent pipe or equal venting system acc. to shipyard's design)
005	Seawater circulating pump
006	Central seawater cooler
007	Automatic temperature control valve for LT circuit *13)
008	LT water temperature sensor *13)
009	Cooling water pump for LT circuit
010	Lubricating oil cooler
011	Automatic temperature control valve for HT circuit *14)
012	HT water temperature sensor *14)
013	Cylinder cooling water (CCW) pump for HT circuit
014	Pre-heating circulating pump (optional), cap. 10% from cylinder cooling pump *8)
015	Buffer unit for HT circuit (link to detail drawing on the partlist of this drawing)
016	LT water expansion tank (link to detail drawing on the partlist of this drawing)
017	Pre-heater for main engine (HT circuit)
018	Throttling disc *5) *16)
019	Freshwater generator
020	Chemical treatment refill unit *4)
021	HT cooling water cooler
022	Transition piece (adapter) *9)
023	Cylinder cooling water air venting line *10)
024	MDO/MGO cooler
025	Filling pipe / inlet chemical treatment
026	Supply pump, automatic level control (0.5 m^3/h at 4 bar)
027	Gas detector *10)
028	Cylinder cooling water (CCW) feed and drain tank
030	Exhaust Gas Cooler (EGC)
031	Wastewater holding tank
032	iCER sludge tank
033	NaOH storage tank *20)
034	Automatic 3/2 valve
035	Flow regulating valve
036	Combined clean water holding tank (for zero discharge area) and SAC wetting buffer tank
037	EGC circulation water tank
038	EGC circulation water temperature control sensor *17) *18)
039	EGC circulation water pump (frequency controlled) *17) *23) *27)
040	Seawater flow control valve *17) *18)
041	Water Analyser (pH check)
042	NaOH dosing pump unit
043	Water treatment unit water transfer pump
044	Switching valve
045	Oil-in-water monitoring sensor (standard type)
046	Water analyser (quality check) *29)
047	EGC circulation water cooler
048	Overboard water discharge pump *33)
049	SAC wetting water supply pump
050	Strainer (max. size 250 micron, absolute)

Pos.	ENGINE COMPONENTS *3)
EC01	Scavenge air cooler (SAC)
EC02	Manual vent valve, each cylinder *15)
EC03	Air separator

Pos.	COMPONENTS from certified suppliers *12)
CS03	EGC circulation water cooler
CS09	Water treatment unit *24)



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

Change	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis		
	E	npa101	mhu019	11.01.2024	CNAA005099	Drawing updated	4	3

Approved — Activity Code: E C

[mm] [kg] – NX A0 Item ID PTAA036713 Drawing Page/s 2/3

SYSTEM PROPOSAL FOR TWIN ENGINES iCER

NOTE
Further installation details and variants can be found listed in the Marine Installation Manual (MIM), which provides also the acronyms used in this drawing set. The piping symbols are explained by the piping symbol key as included in the drawing set "Various Installation Items".

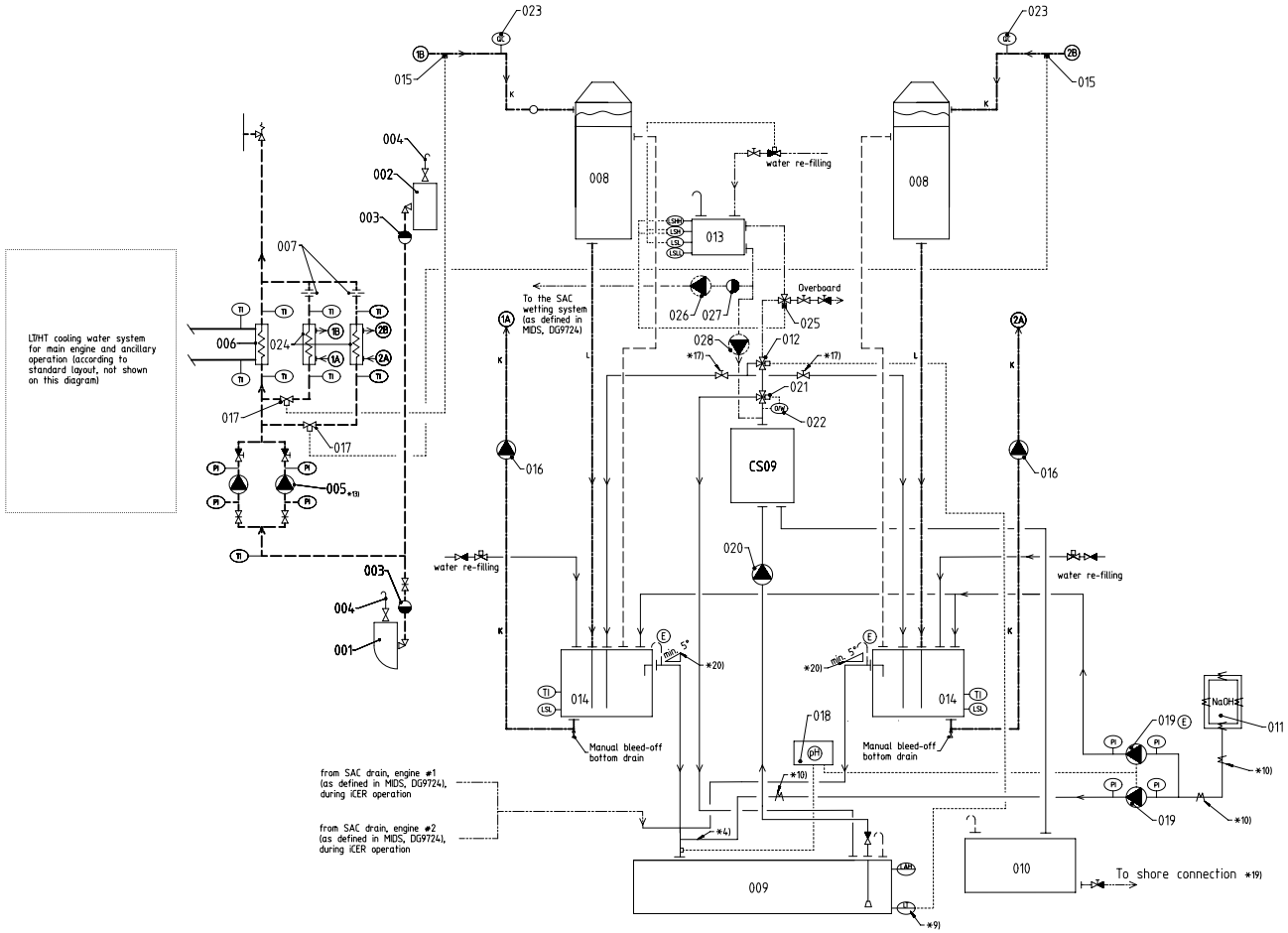
Pos.	COMPONENTS from certified suppliers *6)
CS09	Water treatment unit *12)

Pos.	SYSTEM COMPONENTS *1)
001	Low sea chest
002	High sea chest
003	Seawater strainer
004	Air vent (air vent pipe or equal venting system acc. to shipyard's design)
005	Seawater circulating pump
006	Central seawater cooler
007	Throttling disc *5) *7)
008	Exhaust Gas Cooler (EGC)
009	Wastewater holding tank
010	iCER sludge tank
011	NaOH storage tank *4) *10)
012	3/2-way valve
013	Combined clean water holding tank (for zero discharge area) and SAC wetting buffer tank
014	EGC circulation water tank
015	EGC circulation water temperature control sensor *15) *16)
016	EGC circulation water pump (frequency controlled) *8) *11) *15)
017	Seawater flow control valve *15) *16)
018	Water Analyser (pH check)
019	NaOH dosing pump unit
020	Water treatment unit water transfer pump
021	Switching valve
022	Oil-in-water monitoring sensor (standard type)
023	Water analyser (quality check) *18)
024	EGC circulation water cooler
025	Automatic 3/2 valve
026	SAC wetting water supply pump
027	Strainer (max. size 250 micron, absolute)
028	Overboard water discharge pump *21)

Remarks:

- Air vent and drain pipes are not shown on this drawing. They must be installed where required.
- 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 installed by the shipyard.
*2) Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connection.
*3) To be delivered by the engine manufacturer, i.e. already equipped on engine side.
*4) NaOH dosing into the collection pipe. Alternatively, the dosing can be also done directely into the wastewater holding tank, provided the tank is coated (laid out for pH 3–6).
*5) When using a valve, lock it in proper position to prevent incorrect use.
*6) To be supplied by a certified supplier. Ordering to be coordinated between shipyard and engine builder.
*7) Optional, only to be installed if needed for hydraulic balancing.
*8) The required max. flow rate, based on EGC size, is provided by table 2.
*9) The level transmitter is used to maintain a constant level within the tank (e.g. 30% of total filling volume).
*10) For solutions of 50% m/m NaOH, a storage and handling temperature in the range of 16 °C to 45 °C is required. For solutions of maximum 30% m/m NaOH, storage at normal engine room ambient temperature is sufficient.
*11) The maximum permissible pump suction and delivery heights must be acquired from suppliers specification. In cases where alternative pump specifications are required the new selection must be agreed upon with the supplier.
*12) With coagulant dosing if required. As an alternative to the shown arrangement, an iCER drainage system with two separate water treatment units for bleed-off water and EGC circulation water can be considered.
*13) Alternatively to the shown layout, which uses only the common seawater pump(s), the EGC circulation water cooler can by fed also by separate seawater pump(s).
*15) Controlled by the EGC control unit, which is a sub-system of the iCER control system.
*16) Controlled based on the EGC circulation water temperature after the EGC circulation water cooler.
*17) Used for hydraulic balancing. The valve must be locked in proper position to prevent incorrect use. As an alternative to the valve a throttling disc can be installed.
*18) Not required if the water treatment system is continuously in operation.
*19) According to resolution MEPC 307(73), the sludge from the water treatment system must be collected in a dedicated iCER sludge tank and must be disposed of ashore. The amount of sludge produced is dependent on the selected water treatment system and must be considered for the sizing of the iCER sludge tank. For further details, please refer to the supplier of the water treatment unit.
*20) The overflow pipe from the EGC circulation water tank to the wastewater holding tank must have the following minimum slope: At least 5°, even under the maximum rolling and pitching angles as defined by class rules (e.g. 22.5° rolling and 5° pitching at the same time.)
*21) If 013 is designed as a dedicated wetting buffer tank instead of a clean water holding tank, the pump for overboard discharge is not required.

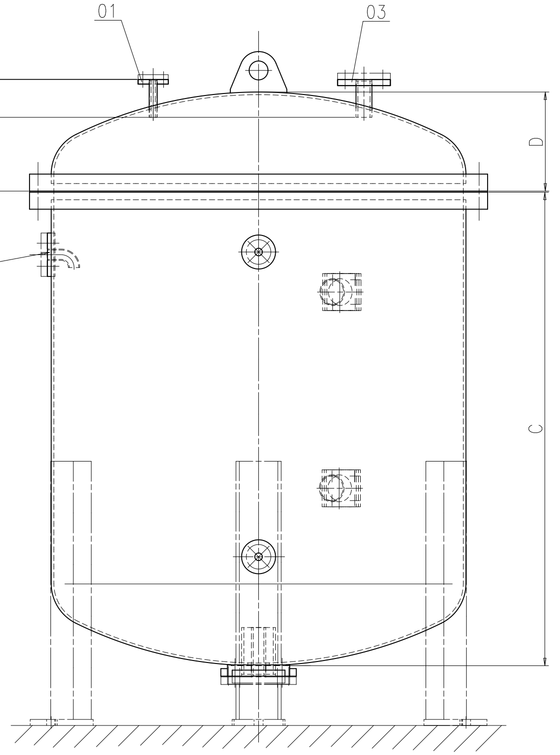


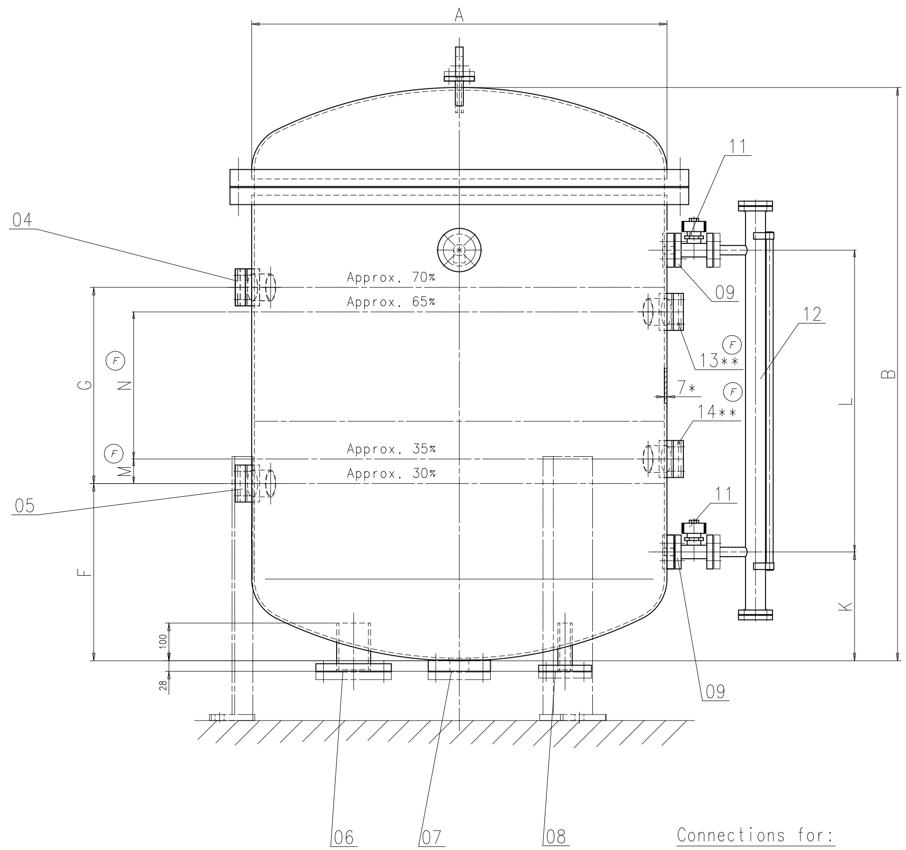
SURFACE PROTECTION SEE GROUP 0344
TOLERANCING PRINCIPLE ISO8015
GENERAL TOLERANCES ACCORDING TO ISO2768-mK

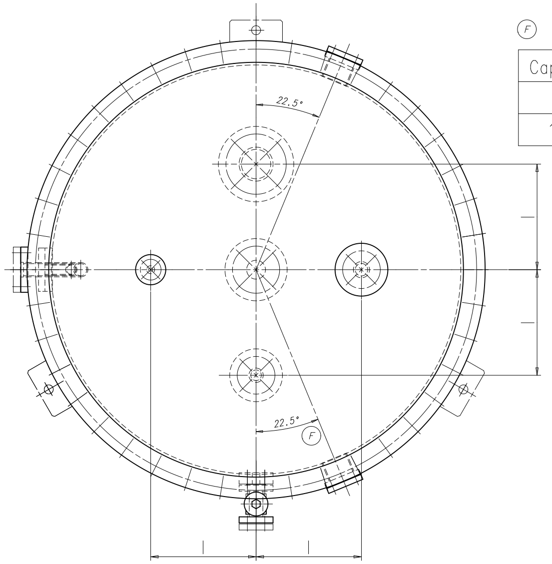
Drawing updated

[mm] [kg] NX A0 Item ID PTAA036713 Drawing Pages 3/3

Tank Proposal (F)







(F)

Capacity	A	B	C	D	E	F	G	H	I	K	L	M	N
800l	ø900	1430	1205	222	250	455	520	600	250	250	800	65	390
1200l	ø1100	1520	1255	262	300	470	520	650	280	290	800	65	390

Connections for:

01 Compressed air supply from control air valve, DN15 with blank flange
02 Pressure indicator, DN25 with blank flange
03 Safety and relief valve adjustment 5,5 bar DN32 with blank flange
04 Level alarm high, with blank flange
05 Level alarm low, with blank flange
06 Compensation, DN80 with blank flange
07 Drain, DN32 with blank flange
08 Feed, DN32 with blank flange
09 Flanges for level indicator
(F) 11 Valve for level indicator, self-closing type
12 Level indicator
13 Level switch high, with blank flange **
14 Level switch low, with blank flange **

Drawn for 1200l capacity

Working pressure : 5 bar
* Wall thickness and test pressure : according to relevant classification society/rules
Service temperature : max. 95°C
(F) ** Tank volume between LSH and LSL shall be no less than 150 litres.

Modif.	C	7-61.644	05.03.2008	D	EAAD084051	14.08.2012	E	EAAD085172	22.04.2014	F	EAAD087035	12.10.2016

Q-Code XXXXX — Standard ISO — Main Drw.

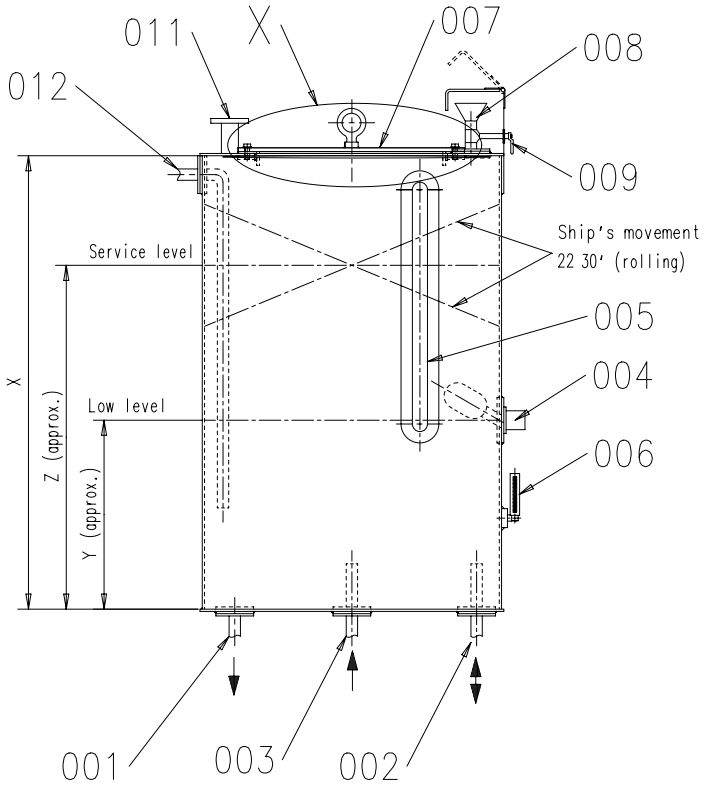
WIN GD Winterthur Gas & Diesel — Product W-2S — BUFFER TO CYL.COOLING WATER SYS Puffer

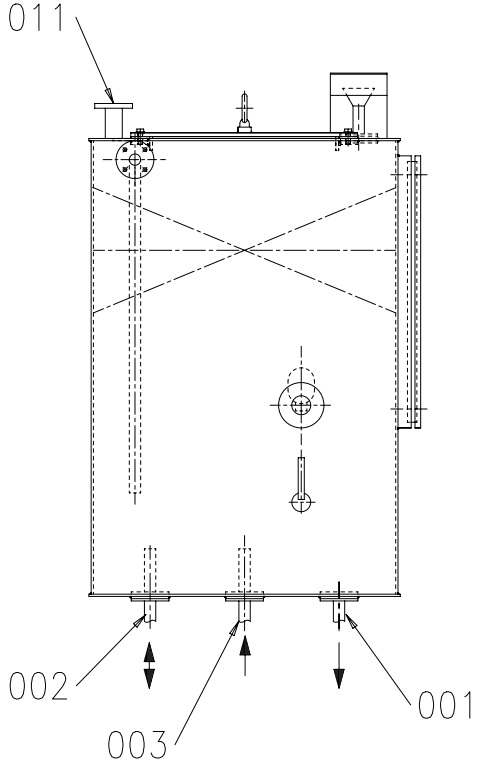
Units mm kg — IDE — Basic Material — Net Weight 0.001

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

Made 22.09.00 S.STYLIANOU — Chkd — Appd — Scale 1:5 — Design Group 9721 — Size A0 — Page 1/1 — Material ID 107.245.626.500 — Drawing ID 107.245.626 — Rev. F

DID - DIMENSIONAL DRAWING - Confidential — Approved





Pos.	Description
001	Drain from HT circuit
002	Balance pipe from HT circuit
Ⓐ 003	Air vent from HT circuit *5)
004	Low level alarm *4)
005	Level indicator *1) *4)
006	Thermometer *4)
007	Inspection cover (manhole) *2)
008	Filling pipe/inlet chemical treatment *2)
009	Cock *3)
010	Sealing
011	Venting *6)
012	Overflow/air vent

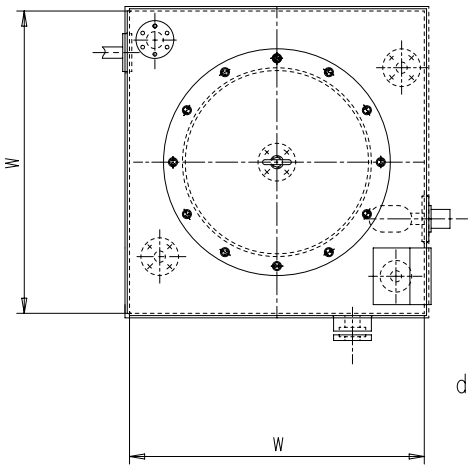
Remarks: Ⓐ

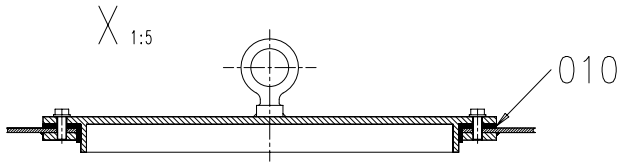
*1) Level indicator can be omitted if an alternative is fitted.
*2) Other gas tight solutions are also possible.
*3) Has to be closed always after treatment.
*4) Any instrumentation installed in the system has to be certified explosion proof apparatus.
*5) This connection is only needed if the HT cooling water system venting is done via the expansion tank.
*6) To be vented outside of engine room

- Tank dimensions are defined by the Tank capacity, as seen in Table 1. For capacity and pipe diameter, refer to drawing 'Central cooling water system'.

Table 1: Tank dimensions

HT Tank capacity	W	X	Y	Z
(m^3)	(mm)	(mm)	(mm)	(mm)
0.5	800	800	330	640
0.75	800	1200	500	960
1.0	800	1600	670	1280
1.25	1000	1250	530	1000
1.5	1000	1500	630	1200
1.75	1000	1750	730	1400
2.0	1000	2000	830	1600





Ⓐ drawing view shows dimensioning scale for 0.75 m³ capacity

Free space for llc.

Q-Code XXXXX | Main Drw.

Standard ISO; JIS

Approved

Modif.	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
Ⓐ	EAAD091567	15.11.2019						

WIN GD Winterthur Gas & Diesel

Product W-2S

EXPANSION TANK
CENTRAL COOLING WATER HT CIRCUIT
Ausgleichstank
Zentralkuehlwassersystem HT circuit

Units	mm kg	NX	Basic Material	Net Weight 0,001

SURFACE PROTECTION SEE GROUP 0344	Made	07.07.2014 mhu019 M.Hug	Scale 1:10	Size A2	Page 1/1	Material ID PAAD166922
TOLERANCING PRINCIPLE ISO8015	Chkd	08.08.2014 bha009 Haag	Design Group 9721	Drawing ID DAAD052664		Rev. A
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd	08.08.2014 bha009 Haag				

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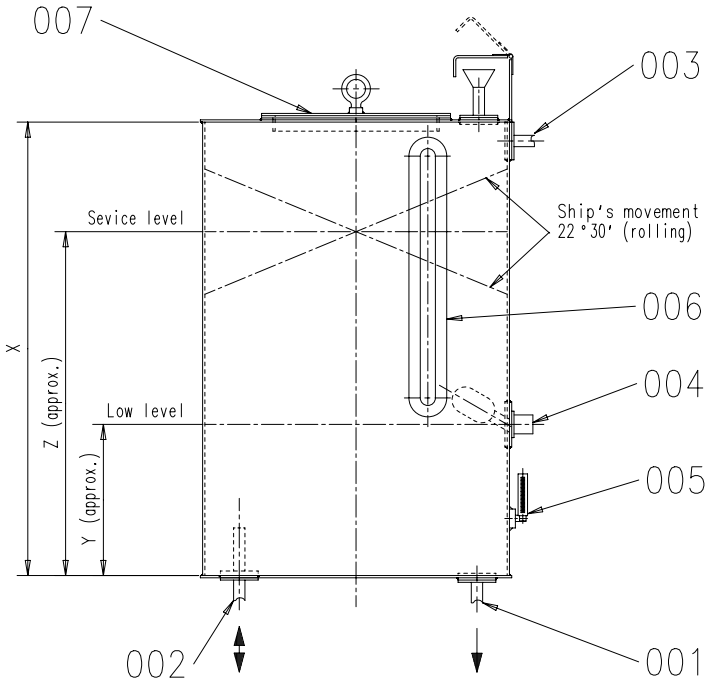
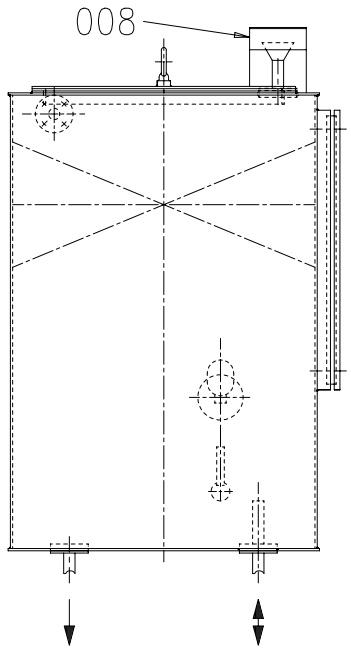
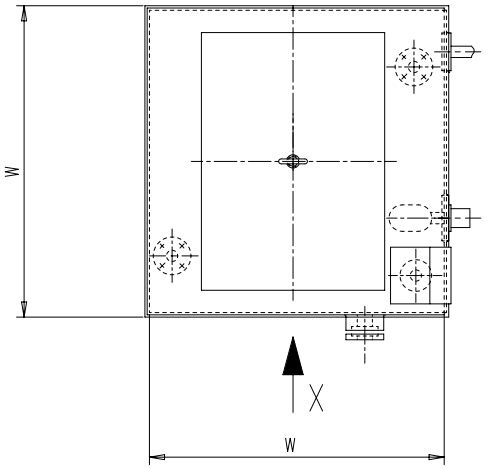
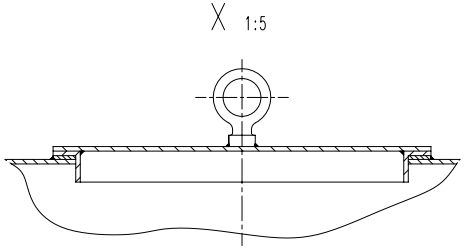








Drawn for 0.75 m^3 capacity

Pos.	Description Ⓓ
001	Drain
002	Balance pipe from LT circuit
003	Overflow/air vent
004	Low level alarm
005	Thermometer
006	Level indicator *1)
007	Inspection cover *2)
008	Filling pipe/inlet chemical treatment *2)

Remarks:

*1) Level indicator can be omitted if an alternative is fitted.
*2) Other designs like hinged covers, etc. are also possible

- For required tank capacity and pipe diameters refer to drawing 'Central cooling water system'

Table 1: Tank dimensions

LT tank capacity	W	X	Y	Z
(m^3)	(mm)	(mm)	(mm)	(mm)
0.5	800	800	330	640
0.75	800	1200	500	960
1.0	800	1600	670	1280
1.25	1000	1250	530	1000
1.5	1000	1500	630	1200
1.75	1000	1750	730	1400
2.0	1000	2000	830	1600

Free space for lic.

Q-Code XXXXX

Standard ISO; JIS

Main Drw.

Approved

Modif.	Number	Drawn date	Number	Drawn date	Number	Drawn date	Number	Drawn date
A	EAAD014356	16.06.1997	B 7-37.090	16.08.2007	C EAAD083145	25.01.2012	D EAAD091029	12.09.2019

WIN GD Winterthur Gas & Diesel

Product W-2S

EXPANSION TANK
CENTRAL COOLING WATER LT CIRCUIT
Ausgleichstank
Zentralkuehlwassersystem LT

Units mm kg	NX	Basic Material			Net Weight 0,001
SURFACE PROTECTION SEE GROUP 0344	Made 11.06.1997 T.LANDERT	Scale 1:10	Size A2	Page 1/1	Material ID 107.245.419.500
TOLERANCING PRINCIPLE ISO8015	Chkd	Design Group 9721	Drawing ID 107.245.419		Rev. D
GENERAL TOLERANCES ACCORDING TO ISO2768-mK	Appd 11.06.1997 WCH001 Service User				

DID - DIMENSIONAL DRAWING - Confidential

NOT VALID for new projects

The following pages are provided only as reference
for projects which had been contracted before April 2022

NOT VALID for new projects

SURFACE PROTECTION SEE GROUP 0344

TOLERANCING PRINCIPLE ISO8015

GENERAL TOLERANCES ACCORDING TO ISO2768-mK

Available executions

Execution No.	Material ID	Cylinder No.	Attribute 1: HT_static-pressure	
			Buffer unit	Exp. tank
001	PAAD359251	5-8		X
002	PAAD368973	5-8	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. X52DF-2.1

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
–	sna102				new Design			

WIN GD
Winterthur Gas & Diesel

CENTRAL COOLING WATER SYSTEM

MIDS master drawing

separate BOM available

Dimension

Scale	–	NX	Units [mm] [kg]	Basic Material	Net Weight	0.001
Main Design			Design Group	9721	Q-Code XXXXX	Standard WDS
Qty per			A4	Item ID PTAA025615		Drawing Page/s 1/1

SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
1	1	PAAD359155	CENTRAL COOLING WATER SYSTEM			0.001
3	1	107.429.532.500	CONCEPT GUIDANCE			0.001

Prod.			
	5,6,7 X52DF-2.1		

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
-	dki021	dst009	14.07.2021	CNAA000233	main drawing introduced		-	-

WIN GD
Winterthur Gas & Diesel

CENTRAL COOLING WATER SYSTEM

HT_static-pressure: EXP tank, X-DF2.0: iCER Gas

Bill Of Material

Dimension							
Units	[m] [kg]	Basic Material				Net Weight	0.001
Main Design	Yes	Design Group	9721	Q-Code	XXXXX	Standard	WDS
Qty per	Engine	A4	Item ID	PAAD359251		BOM Page/s	01/01

SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
015	1	PAAD166922	EXPANSION TANK			0.001
016	1	107.245.419.500	EXPANSION TANK			0.001

Prod.								
	X52DF-2.1							

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Approved	Activity Code	E	C
D	sde101	dst009	02.03.2022	CNAA001508	Drawing Updated		4	4	3
C	mhu019	dst009	20.12.2021	CNAA001054	Drawing Updated		4	4	3
B	mhu019	dst009	14.07.2021	CNAA000233	drawing updated		-	-	-
-	dki021	mhu019	04.12.2020		-		-	-	-

WIN GD
Winterthur Gas & Diesel

CENTRAL COOLING WATER SYSTEM

HT_static-pressure: EXP tank, X-DF2.0: iCER Gas

Bill Of Material

Dimension

Units [m] [kg]	Basic Material			Net Weight	0.001
Main Design	Design Group	9721	Q-Code XXXXX	Standard	WDS
Qty per	A4	Item ID	PAAD359155	BOM Page/s	01/01

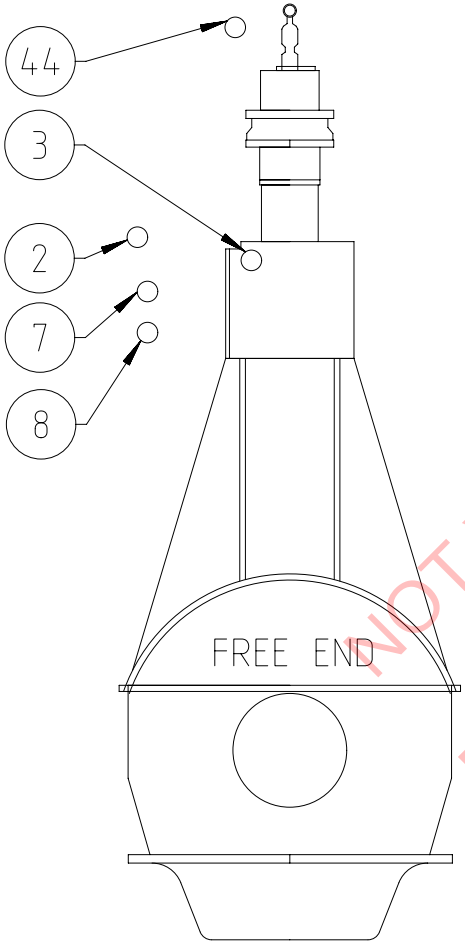
SPECIFICATION which must be met:

8 OUTLET - Scavenge air cooler (SAC) cooling water (LT water)

- Cooling water volume flow: As specified in the GTD, adjusted by an orifice in the outlet pipe on shipside.

44 OUTLET - Cylinder cooling water air venting

- To be vented to a safe area outside of the engine room.



2 INLET - Cylinder cooling water (HT water)

- Cooling water pressure: 3.0 - 5.0 bar
- Cooling water volume flow: As specified in the GTD
- Cooling water (freshwater) must be treated according to WinGD specification.
- An expansion tank must be installed.
- The static pressure at the engine inlet must be adjusted by the installation height of the expansion tank.
- Before starting the engine, the engine must be heated-up to 60 °C via heated HT water.
- HT cooling water amount on engine side: Given in table 1 on page 2

3 OUTLET - Cylinder cooling water (HT water)

Cooling water temperature
- Controller set-point: 90 °C
- Steady state condition: 90 ± 2 °C
- Transient condition: 90 ± 4 °C

7 INLET - Scavenge air cooler (SAC) cooling water (LT water)

- Cooling water pressure: 2.0 - 4.0 bar
- Cooling water temperature: maximum 36 °C when the seawater temperature is at 32 °C. Controller set-point: 25 °C.
- Cooling water volume flow: As specified in the GTD
- Cooling water (freshwater) must be treated according to WinGD specification.
- LT cooling water amount on engine side: Given in table 1 on page 2.

Prod. X52DF-2.1

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Approved	Activity Code	E	C
D	sde101	mhu019	02.03.2022	CNAA001508	Drawing Updated			4	3
C	mhu019	dst009	20.12.2021	CNAA001054	Drawing Updated			4	3
B	mhu019	dst009	14.07.2021	CNAA000233	drawing updated			-	-
-	dki021	mhu019	04.12.2020		-			-	-

WIN GD Winterthur Gas & Diesel

CENTRAL COOLING WATER SYSTEM

HT_static-pressure: EXP tank, X-DF2.0: iCER Gas

separate BOM available

Dimension

Scale - | dst009 02.03.2022 | NX CNAA001508 | Units [mm] [kg] | Basic Material | Net Weight 4.001

SURFACE PROTECTION SEE GROUP 0344

TOLERANCING PRINCIPLE ISO8015

GENERAL TOLERANCES ACCORDING TO ISO2768-mK

Main Design	Design Group	9721	Q-Code XXXXX	Approved	Standard WDS
Qty per	A3	Item ID PAAD359155			Drawing Page/s 1/2

SYSTEM PROPOSAL

NOTE
Further installation details and variants can be found listed in the Marine Installation Manual (MIM), which provides also the acronyms used in this drawing set. The piping symbols are explained by the piping symbol key as included in the drawing set "Various Installation Items".

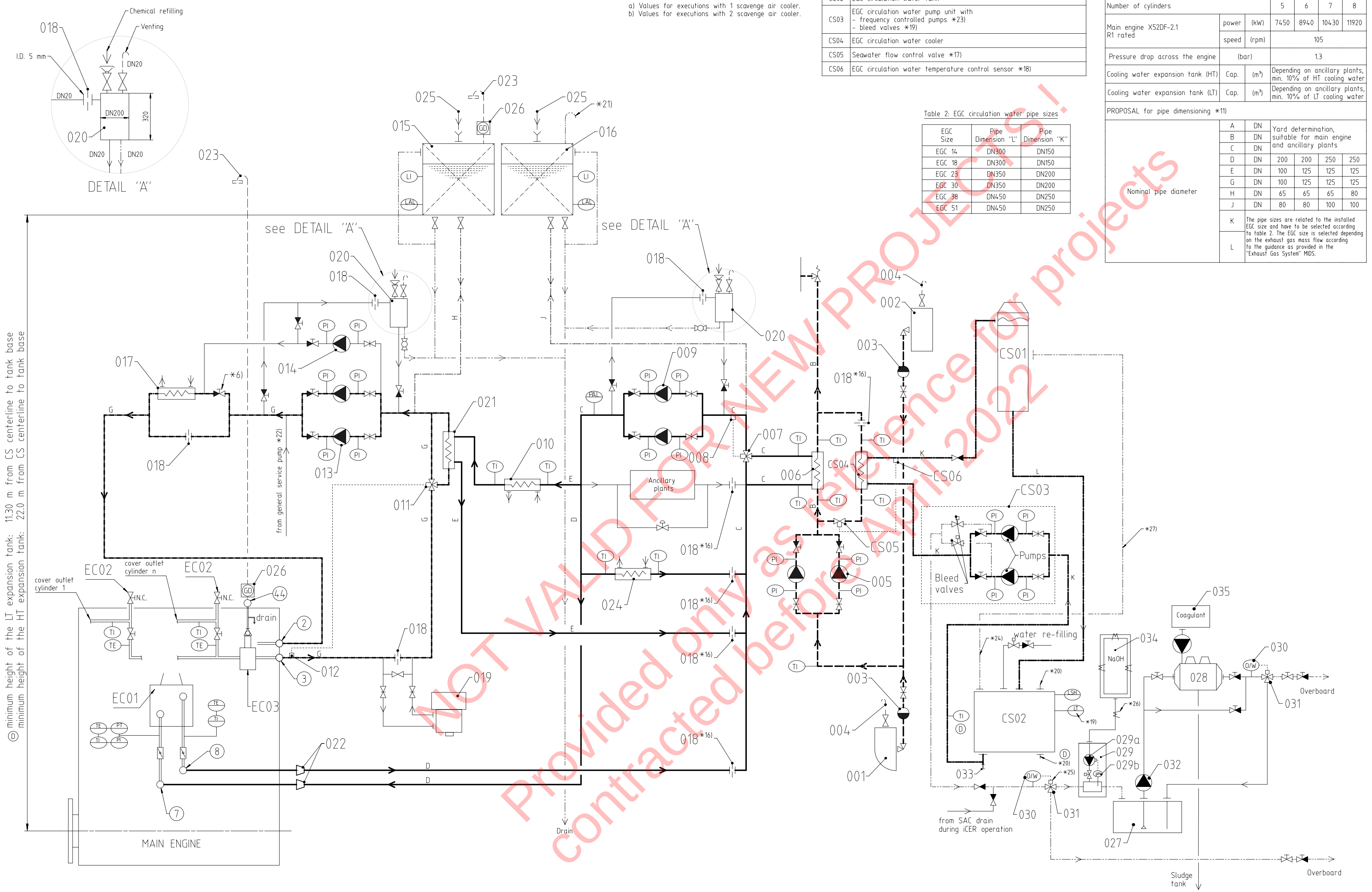


Table 1: Water content on engine side

Cylinder	HT circuit Cyl. C.W. Volume (l)	LT circuit SAC Volume (l)
5	450 l	370 l
6	540 l	400 l
7	620 l	480 l a) / 510 l b)
8	710 l	550 l

a) Values for executions with 1 scavenge air cooler.
b) Values for executions with 2 scavenge air cooler.

Pos.	ENGINE COMPONENTS *3)
EC01	Scavenge air cooler (SAC)
EC02	Manual vent valve, each cylinder *15)
EC03	Air separator

Pos.	COMPONENTS from certified suppliers *12)
CS01	Exhaust Gas Cooler (EGC)
CS02	EGC circulation water tank
CS03	EGC circulation water pump unit with - frequency controlled pumps *23) - bleed valves *19)
CS04	EGC circulation water cooler
CS05	Seawater flow control valve *17)
CS06	EGC circulation water temperature control sensor *18)

Table 2: EGC circulation water pipe sizes

EGC Size	Pipe Dimension "L"	Pipe Dimension "K"
EGC 14	DN300	DN150
EGC 18	DN300	DN150
EGC 23	DN350	DN200
EGC 30	DN350	DN200
EGC 38	DN450	DN250
EGC 51	DN450	DN250

Pos.	ENGINE CONNECTIONS *2)
(2)	INLET - Cylinder cooling water (HT water)
(3)	OUTLET - Cylinder cooling water (HT water)
(7)	INLET - Scavenge air cooler (SAC) cooling water (LT water) *7)
(8)	OUTLET - Scavenge air cooler (SAC) cooling water (LT water) *7)
(44)	OUTLET - Cylinder cooling water air venting *10)

Number of cylinders			5	6	7	8
Main engine X52DF-2.1 R1 rated	power	(kW)	7450	8940	10430	11920
	speed	(rpm)	105			
Pressure drop across the engine	(bar)		1.3			
Cooling water expansion tank (HT)	Cap.	(m³)	Depending on ancillary plants, min. 10% of HT cooling water			
Cooling water expansion tank (LT)	Cap.	(m³)	Depending on ancillary plants, min. 10% of LT cooling water			
PROPOSAL for pipe dimensioning *11)						
Nominal pipe diameter	A	DN	Yard determination, suitable for main engine and ancillary plants			
	B	DN				
	C	DN				
	D	DN	200	200	250	250
	E	DN	100	125	125	125
	G	DN	100	125	125	125
	H	DN	65	65	65	80
	J	DN	80	80	100	100
	K	The pipe sizes are related to the installed EGC size and have to be selected according to table 2. The EGC size is selected depending on the exhaust gas mass flow according to the guidance as provided in the "Exhaust Gas System" MIDS.				
	L					

Pos.	SYSTEM COMPONENTS *1)
001	Low sea chest
002	High sea chest
003	Seawater strainer
004	Air vent (air vent pipe or equal venting system acc. to shipyard's design)
005	Seawater circulating pump
006	Central seawater cooler
007	Automatic temperature control valve for LT circuit *13)
008	LT water temperature sensor *13)
009	Cooling water pump for LT circuit
010	Lubricating oil cooler
011	Automatic temperature control valve for HT circuit *14)
012	HT water temperature sensor *14)
013	Cylinder cooling water pump for HT circuit
014	Pre-heating circulating pump (optional), cap. 10% from cylinder cooling pump *8)
015	HT water expansion tank (link to detail drawing on the partlist of this drawing)
016	LT water expansion tank (link to detail drawing on the partlist of this drawing)
017	Pre-heater for main engine (HT circuit)
018	Throttling disc *5)
019	Freshwater generator
020	Chemical treatment refill unit *4)
021	HT cooling water cooler
022	Transition piece (adapter) *9)
023	Cylinder cooling water air venting line *10)
024	MDO/MGO cooler
025	Filling pipe / inlet chemical treatment
026	Gas detector *10)
027	EGC water drain tank
028	Oily water separator
029	pH-neutralisation dosing unit with 29a - NaOH dosing pump 29b - pH sensor
030	Oil-in-water monitoring sensor (UV-type)
031	3/2-way valve
032	EGC bleed-off water transfer pump
033	Manual bleed-off water bottom drain (DN25)
034	NaOH storage tank *26)
035	Coagulant dosing unit *28)

Remarks:

- Air vent and drain pipes are not shown on drawing. They must be installed where required.
- 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 installed by the shipyard.
*2) Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connection.
*3) To be delivered by the engine manufacturer, i.e. already equipped on engine side.
*4) To be installed for cooling water aftertreatment during regular engine operation. Convenient dimensions are provided in view "A". Other designs are possible.
*5) When using a valve, lock in proper position to prevent incorrect use.
*6) Only when pos. 014 is installed.
*7) The inlet and outlet pipes to SAC must be designed to allow engine thermal expansion, or be fitted with expansion pieces.
*8) For guidance only, final layout according to actual engine pre-heating requirements.
*9) Installed as required (check with "Pipe Connection Plan")
*10) To be vented to a safe area outside of engine room. In addition, depending on flag state and/or class requirement, the venting line must also be equipped with a gas detector.
*11) All given diameters are valid for the mentioned rating and serve just as an example. To make the layout for the project specific rating please refer to DG9730 "Fluid velocities and flow rates, recommended values for pipework of diesel plants" for selecting the appropriate pipe diameter. Rating specific flow rates are provided by GTD.
*12) To be supplied by a certified supplier. Ordering to be coordinated between shipyard and engine builder.
*13) A constant temperature at engine (SAC) inlet must be maintained. Controller set-point for main engine operation is 25 °C. If the ancillary plants require a greater or lower LT temperature a separate LT water supply with the different temperature set-point must be installed (please refer to the system proposals in the MIM).
*14) A constant temperature at engine outlet must be maintained. The controller set-point for main engine operation is 90 °C.
*15) Only to be used for manual venting of isolated cylinders after maintenance. To be kept closed during engine operation.
*16) Optional, only to be installed if needed for hydraulic balancing.
*17) Controlled by the iCER control system
*18) To be installed after the EGC circulation water cooler to transmit the EGC circulation water temperature to the iCER control system.
*19) If the value transmitted by the level transmitter exceeds the maximum value which is defined in the software, then the EGC circulation water pump will pump out water from the EGC circulation water tank to the EGC drain tank until a specific level has been reached. If required, the water removal can also be manually activated due to water contamination or other reasons. For safety purposes, in case the automatic drainage system fails, a high-level switch is installed to the EGC drain tank to initiate a shutdown.
*20) Connections for an optional water treatment system.
*21) If gas-driven auxiliaries are connected to the LT circuit, the LT expansion tank must be gas tight and vented to a safe area outside of the engine room.
*22) Optional connection to the general service pump. To be considered if requested by class rules for emergency engine cooling.
*23) The maximum permissible pump suction and delivery heights must be acquired from the suppliers specifications. In cases where alternative pump specifications are required the new selection must be agreed upon with the supplier.
*24) The degassing pipe must be connected to the EGC for degassing through it.
*25) Automatically controlled based on the oil content with manual override function if forced drainage to the EGC drain tank is required, e.g. in some ECA it is not allowed to pump obverboard even if the oil content is below 15 ppm.
*26) If the caustic soda water solution has a mass fraction of 50% m/m NaOH, then the tank and supply line must be trace heated and insulated to keep the caustic soda temperature in the range of 27 - 37 °C. If the caustic soda water solution has a mass fraction of max. 30% m/m NaOH then no heating is required.
*27) The piping between the EGC outlet and the circulation water tank inlet should be routed as vertical as possible. If a horizontal offset between the EGC outlet and the circulation water tank inlet cannot be avoided, then the circulation water return pipe must have the following minimum slope:
At least 5°, even under the maximum rolling and pitching angles as defined by the class rules (e.g. 22.5° rolling and 5° pitching at the same time).
*28) Depending on the type of oily water separator, a coagulant dosing unit may be required. For details please refer to the oily water separator supplier.

EGC circulation water pipes
Seawater pipes
LT freshwater pipes
HT freshwater pipes
Balance pipes
Ancillary equipment pipes
Drain/overflow pipes
Air vent pipes
Control/feed back
Pipes on Engine
Pipe connections

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

Change	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code		
	D	sde101	[illegible]	02.03.2022	CNAA001508	Drawing Updated	Approved	4 E	3 C

[mm] [kg] – NX A0 Item ID PAAD359155 Drawing Page/s 2/2

SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
2	1	PAAD369340	CENTRAL COOLING WATER SYSTEM			0.001
3	1	107.429.532.500	CONCEPT GUIDANCE			0.001

Prod.	5,6,7 X52DF-2.1			

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
-	dki021	mku019	08.12.2020	CNAA000233	main drawing introduced Approved	-	-	

WIN GD
Winterthur Gas & Diesel

CENTRAL COOLING WATER SYSTEM

HT_static-pressure: Buffer-unit, XDF-2.0: iCER Gas

Bill Of Material

Dimension						
Units	[m] [kg]	Basic Material			Net Weight	0.002
Main Design	Yes	Design Group	9721	Q-Code XXXXX	Standard	WDS
Qty per	Engine	A4	Item ID	PAAD368973	BOM Page/s	01/01

SEQ NO	QTY	Item ID	Item Name Dimension	Standard-ID	Basic Material	Net Weight
015	1	107.245.626.500	BUFFER			0.001
016	1	107.245.419.500	EXPANSION TANK			0.001

Prod.	X52DF-2.1							

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code	E	C
D	sde101	dst009	02.03.2022	CNAA001508	Drawing Updated	4	4	3
C	mhu019	dst009	20.12.2021	CNAA001054	Drawing Updated	4	4	3
B	mhu019	dst009	14.07.2021	CNAA000233	drawing updated	-	-	-
-	dki021	mhu019	04.12.2020		-	-	-	-

WIN GD
Winterthur Gas & Diesel

CENTRAL COOLING WATER SYSTEM

HT_static-pressure: Buffer-unit, X-DF2.0: iCER Gas

Bill Of Material

Dimension						
Units	[m] [kg]	Basic Material			Net Weight	0.001
Main Design		Design Group	9721	Q-Code XXXXX	Standard	WDS
Qty per	A4	Item ID	PAAD369340		BOM Page/s	01/01

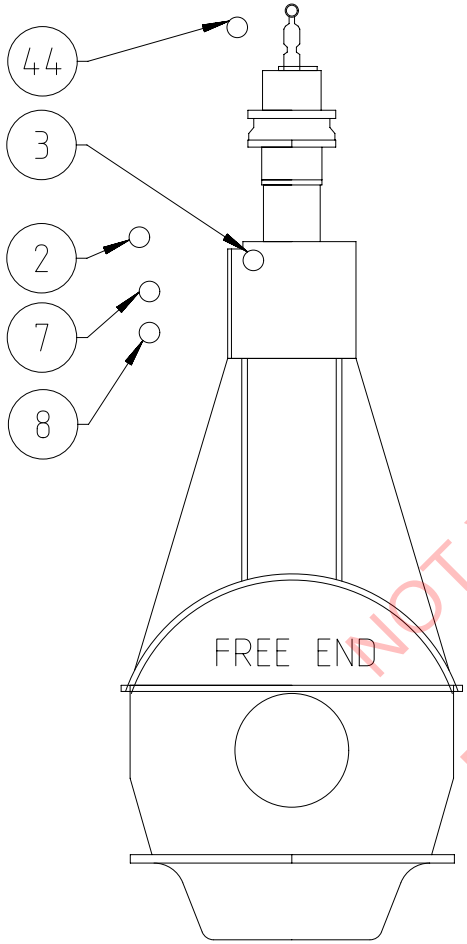
SPECIFICATION which must be met:

8 OUTLET - Scavenge air cooler (SAC) cooling water (LT water)

- Cooling water volume flow: As specified in the GTD, adjusted by an orifice in the outlet pipe on shipside.

44 OUTLET - Cylinder cooling water air venting

- To be vented to a safe area outside of the engine room.



2 INLET - Cylinder cooling water (HT water)

- Cooling water pressure: 3.0 - 5.0 bar
- Cooling water volume flow: As specified in the GTD
- Cooling water (freshwater) must be treated according to WinGD specification.
- A buffer unit must be installed.
- The static pressure at the engine inlet must be adjusted by buffer unit pressure setting.
- Before starting the engine, the engine must be heated-up to 60 °C via heated HT water.
- HT cooling water amount on engine side: Given in table 1 on page 2

3 OUTLET - Cylinder cooling water (HT water)

Cooling water temperature
- Controller set-point: 90 °C
- Steady state condition: 90 ± 2 °C
- Transient condition: 90 ± 4 °C

7 INLET - Scavenge air cooler (SAC) cooling water (LT water)

- Cooling water pressure: 2.0 - 4.0 bar
- Cooling water temperature: maximum 36 °C when the seawater temperature is at 32 °C. Controller set-point: 25 °C.
- Cooling water volume flow: As specified in the GTD
- Cooling water (freshwater) must be treated according to WinGD specification.
- LT cooling water amount on engine side: Given in table 1 on page 2.

Prod. X52DF-2.1

Change History

Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Approved	Activity Code	E	C
D	sde101	mhu019	02.03.2022	CNAA001508	Drawing Updated			4	3
C	mhu019	dst009	20.12.2021	CNAA001054	Drawing Updated			4	3
B	mhu019	dst009	14.07.2021	CNAA000233	drawing updated			-	-
-	dki021	mhu019	04.12.2020		-			-	-

WIN GD Winterthur Gas & Diesel

CENTRAL COOLING WATER SYSTEM

HT_static-pressure: Buffer-unit, X-DF2.0: iCER Gas

separate BOM available

Dimension

Scale - | dst009 02.03.2022 | NX | CNAA001508 | Units [mm] [kg] | Basic Material | Net Weight 4.001

SURFACE PROTECTION SEE GROUP 0344

TOLERANCING PRINCIPLE ISO8015

GENERAL TOLERANCES ACCORDING TO ISO2768-mK

Main Design	Design Group	9721	Q-Code XXXXX	Approved	Standard WDS
Qty per	A3	Item ID PAAD369340			Drawing Page/s 1/2

SYSTEM PROPOSAL

NOTE
Further installation details and variants can be found listed in the Marine Installation Manual (MIM), which also includes the acronyms used in this drawing set. The piping symbols are explained by the piping symbol key as included in the drawing set "Various Installation Items".

Table 1: Water content on engine side

Cylinder	HT circuit Cyl. C.W. Volume (l)	LT circuit SAC Volume (l)
5	450 l	370 l
6	540 l	400 l
7	620 l	480 l a) / 510 l b)
8	710 l	550 l

a) Values for executions with 1 scavenge air cooler.
b) Values for executions with 2 scavenge air cooler.

Pos.	ENGINE COMPONENTS *3)
EC01	Scavenge air cooler (SAC)
EC02	Manual vent valve, each cylinder *15)
EC03	Air separator

Pos.	COMPONENTS from certified suppliers *12)
CS01	Exhaust Gas Cooler (EGC)
CS02	EGC circulation water tank
CS03	EGC circulation water pump unit with - frequency controlled pumps *23) - bleed valves *19)
CS04	EGC circulation water cooler
CS05	Seawater flow control valve *17)
CS06	EGC circulation water temperature control sensor *18)

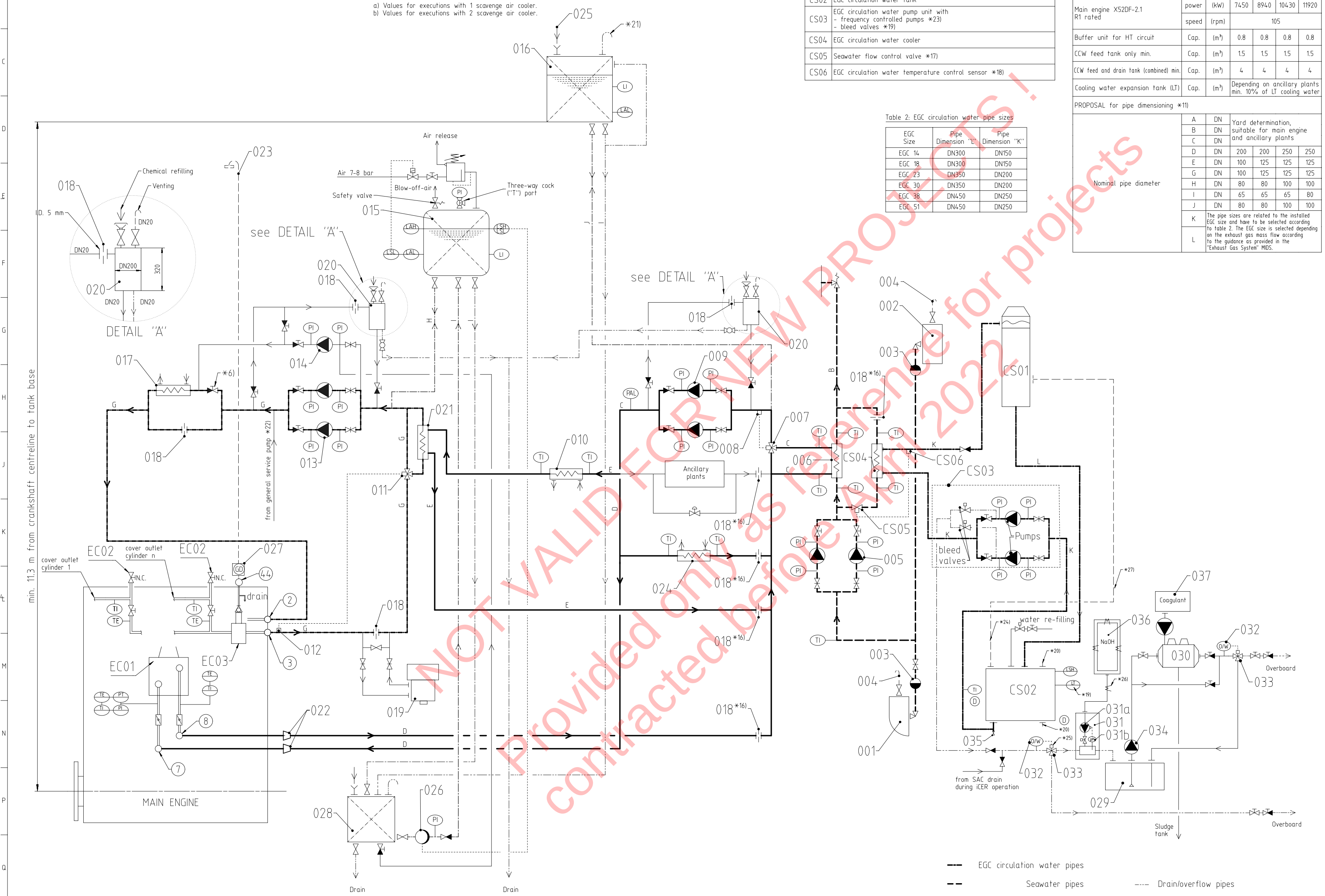
Table 2: EGC circulation water pipe sizes

EGC Size	Pipe Dimension "L"	Pipe Dimension "K"
EGC 14	DN300	DN150
EGC 18	DN300	DN150
EGC 23	DN350	DN200
EGC 30	DN350	DN200
EGC 38	DN450	DN250
EGC 51	DN450	DN250

Pos.	ENGINE CONNECTIONS *2)
2	INLET - Cylinder cooling water (HT water)
3	OUTLET - Cylinder cooling water (HT water)
7	INLET - Scavenge air cooler (SAC) cooling water (LT water) *7)
8	OUTLET - Scavenge air cooler (SAC) cooling water (LT water) *7)
44	OUTLET - Cylinder cooling water air venting *10)

Number of cylinders			5	6	7	8
Main engine X52DF-2.1 R1 rated	power	(kW)	7450	8940	10430	11920
	speed	(rpm)	105			
Buffer unit for HT circuit	Cap.	(m^3)	0.8	0.8	0.8	0.8
CCW feed tank only min.	Cap.	(m^3)	1.5	1.5	1.5	1.5
CCW feed and drain tank (combined) min.	Cap.	(m^3)	4	4	4	4
Cooling water expansion tank (LT)	Cap.	(m^3)	Depending on ancillary plants min. 10% of LT cooling water			
PROPOSAL for pipe dimensioning *11)						
Nominal pipe diameter	A	DN	Yard determination, suitable for main engine and ancillary plants			
	B	DN				
	C	DN				
	D	DN	200	200	250	250
	E	DN	100	125	125	125
	G	DN	100	125	125	125
	H	DN	80	80	100	100
	I	DN	65	65	65	80
	J	DN	80	80	100	100
	K	The pipe sizes are related to the installed EGC size and have to be selected according to table 2. The EGC size is selected depending on the exhaust gas mass flow according to the guidance as provided in the "Exhaust Gas System" MIDS.				
	L					

Pos.	SYSTEM COMPONENTS *1)
001	Low sea chest
002	High sea chest
003	Seawater strainer
004	Air vent (air vent pipe or equal venting system acc. to shipyard's design)
005	Seawater circulating pump
006	Central seawater cooler
007	Automatic temperature control valve for LT circuit *13)
008	LT water temperature sensor *13)
009	Cooling water pump for LT circuit
010	Lubricating oil cooler
011	Automatic temperature control valve for HT circuit *14)
012	HT water temperature sensor *14)
013	Cylinder cooling water pump for HT circuit
014	Pre-heating circulating pump (optional), cap. 10% from cylinder cooling pump *8)
015	Buffer unit for HT circuit (link to detail drawing on the partlist of this drawing)
016	LT water expansion tank (link to detail drawing on the partlist of this drawing)
017	Pre-heater for main engine (HT circuit)
018	Throttling disc *5)
019	Freshwater generator
020	Chemical treatment refill unit *4)
021	HT cooling water cooler
022	Transition piece (adapter) *9)
023	Cylinder cooling water air venting line *10)
024	MDO/MGO cooler
025	Filling pipe / inlet chemical treatment
026	Supply pump, automatic level control (0.5 m³/h at 4 bar)
027	Gas detector *10)
028	CCW feed and drain tank
029	EGC water drain tank
030	Oily water separator
031	pH-neutralisation dosing unit with 31a - NaOH dosing pump 31b - pH sensor
032	Oil-in-water monitoring sensor (UV-type)
033	3/2-way valve
034	EGC bleed-off water transfer pump
035	Manual bleed-off water bottom drain (DN25)
036	NaOH storage tank *26)
037	Coagulant dosing unit *28)



EGC circulation water pipes	Drain/overflow pipes
Seawater pipes	Air vent pipes
LT freshwater pipes	Control/feed back
HT freshwater pipes	Pipes on Engine
Balance pipes	Pipe connections
Ancillary equipment pipes	

Remarks:

- Air vent and drain pipes are not shown on drawing. They must be installed where required.
- 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 installed by the shipyard.
*2) Refer to the "Pipe Connection Plan" for the execution and location of the engine pipe connection.
*3) To be delivered by the engine manufacturer, i.e. already equipped on engine side.
*4) To be installed for cooling water aftertreatment during regular engine operation. Convenient dimensions are provided in view "A". Other designs are possible.
*5) When using a valve, lock in proper position to prevent incorrect use.
*6) Only when pos. 014 is installed.
*7) The inlet and outlet pipes to SAC must be designed to allow engine thermal expansion, or be fitted with expansion pieces.
*8) For guidance only, final layout according to actual engine pre-heating requirements.
*9) Installed as required (check with "Pipe Connection Plan")
*10) To be vented to a safe area outside of engine room. In addition, depending on flag state and/or class requirement, the venting line must also be equipped with a gas detector.
*11) All given diameters are valid for the mentioned rating and serve just as an example. To make the layout for the project specific rating please refer to DG9730 "Fluid velocities and flow rates, recommended values for pipework of diesel plants" for selecting the appropriate pipe diameter. Rating specific flow rates are provided by GTD.
*12) To be supplied by a certified supplier. Ordering to be coordinated between shipyard and engine builder.
*13) A constant temperature at engine (SAC) inlet must be maintained. Controller set-point for main engine operation is 25 °C. If the ancillary plants require a greater or lower LT temperature a separate LT water supply with the different temperature set-point must be installed (please refer to the system proposals in the MIM).
*14) A constant temperature at engine outlet must be maintained. The controller set-point for main engine operation is 90 °C.
*15) Only to be used for manual venting of isolated cylinders after maintenance. To be kept closed during engine operation.
*16) Optional, only to be installed if needed for hydraulic balancing.
*17) Controlled by the iCER control system.
*18) To be installed after the EGC circulation water cooler to transmit the EGC circulation water temperature to the iCER control system.
*19) If the value transmitted by the level transmitter exceeds the maximum value which is defined in the software, then the EGC circulation water pump will pump out water from the EGC circulation water tank to the EGC drain tank until a specific level has been reached. If required, the water removal can also be manually activated due to water contamination or other reasons. For safety purposes, in case the automatic drainage system fails, a high-level switch is installed to the EGC drain tank to initiate a shutdown.
*20) Connections for an optional water treatment system.
*21) If gas-driven auxiliaries are connected to the LT circuit, the LT expansion tank must be gas tight and vented to a safe area outside of the engine room.
*22) Optional connection to the general service pump. To be considered if requested by class rules for emergency engine cooling.
*23) The maximum permissible pump suction and delivery heights must be acquired from the suppliers specifications. In cases where alternative pump specifications are required the new selection must be agreed upon with the supplier.
*24) The degassing pipe must be connected to the EGC for degassing through it.
*25) Automatically controlled based on the oil content with manual override function if forced drainage to the EGC drain tank is required, e.g. in some ECA it is not allowed to pump obverboard even if the oil content is below 15 ppm.
*26) If the caustic soda water solution has a mass fraction of 50% m/m NaOH, then the tank and supply line must be trace heated and insulated to keep the caustic soda temperature in the range of 27 - 37 °C. If the caustic soda water solution has a mass fraction of max. 30% m/m NaOH then no heating is required.
*27) The piping between the EGC outlet and the circulation water tank inlet should be routed as vertical as possible. If a horizontal offset between the EGC outlet and the circulation water tank inlet cannot be avoided, then the circulation water return pipe must have the following minimum slope:
At least 5°, even under the maximum rolling and pitching angles as defined by the class rules (e.g. 22.5° rolling and 5° pitching at the same time).
*28) Depending on the type of oily water separator, a coagulant dosing unit may be required. For details please refer to the oily water separator supplier.

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

Change	Rev.	Creator	Approver	Approval Date	Change ID	Change Synopsis	Activity Code		
	D	sde101	[illegible]	02.03.2022	CNAA001508	Drawing Updated		4	3
						Approved		E	C

[mm] [kg] - NX A0 Item ID PAAD369340 Drawing Page/s 2/2

MIDS - WinGD X52DF-2.1 – Cooling Water System (DG9721)

TRACK CHANGES

DATE	SUBJECT	DESCRIPTION
2020-12-10	DRAWING SET	First web upload
2021-02-08	DAAD131999 DAAD137286	System drawings – new revision
2021-07-19	PAAD359251 PAAD368973 PAAD359155 PAAD369340	Main and system drgs. – new revision
2021-12-22	PAAD359155 PAAD369340	System drgs. – new revision
2022-03-11	PAAD359155 PAAD369340	System drgs. – new revision
2022-06-29	PTAA036934 PTAA036935 PTAA036713 PTAA036523	System and main drgs – new drgs as a replacement for the previous drawing set added
2022-08-24	PTAA036713 PTAA036523	System drgs. – new revision
2022-12-02	PTAA036713 PTAA036523	System drgs. – new revision
2023-03-31	PTAA036713 PTAA036523	System drgs. – new revision
2024-01-15	PTAA036523-E PTAA036713-E	New revision

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