



• PROJECT: AVANTE 2200  
• SHIPYARD: NAVANTIA S.A.  
• SYSTEM: HVAC



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**SHIPYARD:**   
Navantia

**SYSTEM: HVAC**

## SEA WATER COOLING COILS

**REF.: D-MO5462-015**

REV	DESCRIPTION	DATE	ISSUED BY	CHECKED BY	APPROVED BY
0	For information / and comments	31/03/2017	ASC	AMF	MRH
A	For information / and comments. Updated	19/05/2017	ASC	AMF	MRH
B	Updated	07/08/2017	JCR	MRH	MRH
C	Updated	24/08/2018	JCR	MRH	MRH
D	Full update according received comments	30/07/2019	JCR	MRH	MRH
E	Updated	02/08/2019	ATR	JMC	MRH
F	Updated	27/11/2019	AMG	AMF	MRH



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***Before carrying out any operation on the machines of the HVAC System, please read this installation and operation manual carefully.***

***Installation and maintenance must be carried out only by qualified personnel that is familiar with the provisions of law and local regulations and has been trained properly or has experience with this type of equipment.***

**WARNING**



***Avoid installing the HVAC System equipment in a place that could be dangerous during maintenance operations, such as (but not only) platforms without railings or areas not complying with the clearance requirements.***



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## INDEX

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<b>1. Functional Description .....</b>	<b>4</b>
1.1 ItemList.....	4
<b>2. Installation.....</b>	<b>5</b>
2.1 Installation location.....	5
2.2 Connecting the sea water.....	5
<b>3. Troubleshooting .....</b>	<b>6</b>

## ANNEXES

<b>Annex A</b>	Technical data sheets
<b>Annex B</b>	Drawings

## 1. Functional Description

The engine rooms, diesel generator rooms and auxiliary machinery room ventilation systems will have sea water/air heat that will allow maintaining maximum machinery rooms temperature below 45°C (sea water temperatures below 35°C).

The air inside these machinery rooms will be recalculated through the seawater/air heat exchangers to be cooled.

### 1.1 ItemList

Table 1. Item List

<u>TAG DESCRIPTION</u>	<u>TAG</u>	<u>MAKER</u>	<u>COOLING CAPACITY (KW)</u>	<u>Sea water flow (m3/h)</u>	<u>CLASSIFICATION</u>
Sea water coil	HEX-VES01001	3S	11,98	3,43	W
Sea water coil	HEX-VES01002	3S	85,00	26,11	W
Sea water coil	HEX-VES01003	3S	85,00	26,11	W
Sea water coil	HEX-VES01006	3S	100,00	30,71	W
Sea water coil	HEX-VES01007	3S	100,00	30,71	W
Sea water coil	HEX-VES02004	3S	85,00	26,11	W
Sea water coil	HEX-VES02005	3S	85,00	26,11	W
Sea water coil	HEX-VES02008	3S	100,00	30,71	W
Sea water coil	HEX-VES02009	3S	100,00	30,71	W

Table 2. Item List

<u>TAG DESCRIPTION</u>	<u>TAG</u>	<u>WEIGHT (KG)</u>	<u>DIMENSIONS (LxWxH) (mm)</u>
Sea water coil	HEX-VES01001	80	1190x355x810
Sea water coil	HEX-VES01002	590	2630x460x1810
Sea water coil	HEX-VES01003	590	2630x460x1810
Sea water coil	HEX-VES01006	730	1680x460x3350
Sea water coil	HEX-VES01007	730	1680x460x3350
Sea water coil	HEX-VES02004	590	2630x460x1810
Sea water coil	HEX-VES02005	590	2630x460x1810
Sea water coil	HEX-VES02008	730	1680x460x3350
Sea water coil	HEX-VES02009	730	1680x460x3350

## 2. Installation

### NOTE

*You must ensure that no mechanical deformation or twisting occurs during installation of all models in all installation locations.*

### 2.1 Installation location

This paragraph gives the conditions under which the units may be stored:

The type, condition and ambient temperature of the installation location must be suitable for the unit in question.

Observe the following points:

- Only install the unit in enclosed spaces.
- Mounting systems must be capable of bearing the weight of the unit.
- Ensure that suitable fixings (screws, plugs, etc.) are used which correspond.

### 2.2 Connecting the sea water

Before the on-site piping and the unit sea water connection is set up, the sea water system should be shut off and secured against being opened unintentionally.

Connection to the pipe system is made by the pipe contractor. Cooling coils must always be connected in counter flow (supply and discharge pipes are marked) and so that the own weight of the pipe system does not load the pipe connections of the coils. The connections of the coils are designed as flanged pipes and so they must be secured to avoid distortion and damage to the internal pipe system of the coil.

Cooling coils are equipped with a drip pan with drain through the base frame extended through the access side for condensate. Clean the cooling coils by flushing with water, also clean the drip pan as drain must be kept clean to avoid formation of algae.

When all connections have been completed, all screw connections should be tightened and checked that they are free of mechanical stress.



- *Unsuitable tool.*
- *Risk of damage to the unit.*
- *During fitting, the connection nut on the cooling coil should be countered using a suitable tool.*



- At the beginning of the fitting procedure, remove the covers of the water inlet and outlet pipes.
- Fit the connections, ensuring they are free of mechanical stress.
- Seal the connections.
- Screw on the connections.

### 3. Troubleshooting

Deviations from normal operating states of the sea water cooling coil units are evidence of malfunctions and must be investigated by maintenance personnel.

The following table should serve as a starting point for maintenance personnel regarding possible causes of trouble and their correction:

**Table 3 – Troubleshooting**

Troubleshooting Code	Fault	Possible cause of fault	Remedy	Associated Maintenance Task
TB-1	Unit does not cool / cools insufficiently (chilled water)	Dirty filter	Clean/replace the filter (mechanic)	PM-1
		Cooling medium is not cold	Check the chilled water system (mechanic)	--
		Water flow rate too low	Check the chilled water system (mechanic)	--
TB-2	Water leakage in unit area	Drip pan drain blocked	Clean condensate drain and check for sufficient gradient, clean and fill the the water trap if necessary (mechanic)	--
		Cooling coil or hydraulic connections leaking	Check the cooling coil, bleeding and valve connections for leaks If necessary, retighten connections, clean screw insert or reseal the connections (mechanic)	--

*If the malfunction cannot be fixed by the maintenance personnel, please consult FRIZONIA*



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## Annex A

### Technical Information



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## AUXILIARY MACHINERY ROOM

TAGS: HEX-VES01001

FIN SIDE			Fluid: AIR			
Quantity	m <sup>3</sup> /h	4600	Dry air	kg/h	4839	
Specific gravity	kg/m <sup>3</sup>	1,052				
Inlet	Dry bulb temp.	°C	46,4	Relative humid.	%	46
	Wet bulb temp.	°C	34,6	Enthalpy	kJ/kg	125,48
	Absolute humid.	g/kg	30,47			
Outlet	Dry bulb temp.	°C	38,0	Relative humid.	%	71
	Wet bulb temp.	°C	33,1	Enthalpy	kJ/kg	116,55
	Absolute humid.	g/kg	30,5			
Face velocity	m/sec	2,43	Pressure drop	Pa	92	
Capacity	kW	11,98	Sensible heat ratio		1,00	
TUBE SIDE			Fluid : SEA WATER			
Quantity	l/h	3434	Outlet temp.	°C	38,0	
Inlet temp.	°C	35,0	Pressure drop	kPa	40,8	
Velocity	m/s	1,33				
COIL TYPE <b>P40-16 AR 5R - 15T - 875A - 2,5Pa CuNi-10/Cu NC = 4</b>						
COIL CHARACTERISTIC				I3S Re18r (Tr0)-T0 -4,99-A0		
Surface	m <sup>2</sup>	64,9	- Fluid content	dm <sup>3</sup>	14,5	
Finned length	mm	875	- Finned height	mm	600	
Fouling factor	Cm <sup>2</sup> /W	0,00020				

Heat exchanger exempt from testing in conformity to PED 2014/68/EU directive - Art. 4.3  
Design pressure and temperature (inside tubes) 10,0 bar / 100,0°C

NOT tested according to Eurovent certification

MATERIALS							
Exchange tube	CuproNichel 10	- Diameter	mm	16,50	- Thickness	mm	0,70
Fins	Copper	- Thickness	mm	0,10			
Headers	CopperNichel 10	- Frame	Stainless steel A316L	- Connections	Flanged		
Flanges	Fe EN 1092-1 Type 11 - PN16 (ex UNI 2282 - ex DIN 2633)						



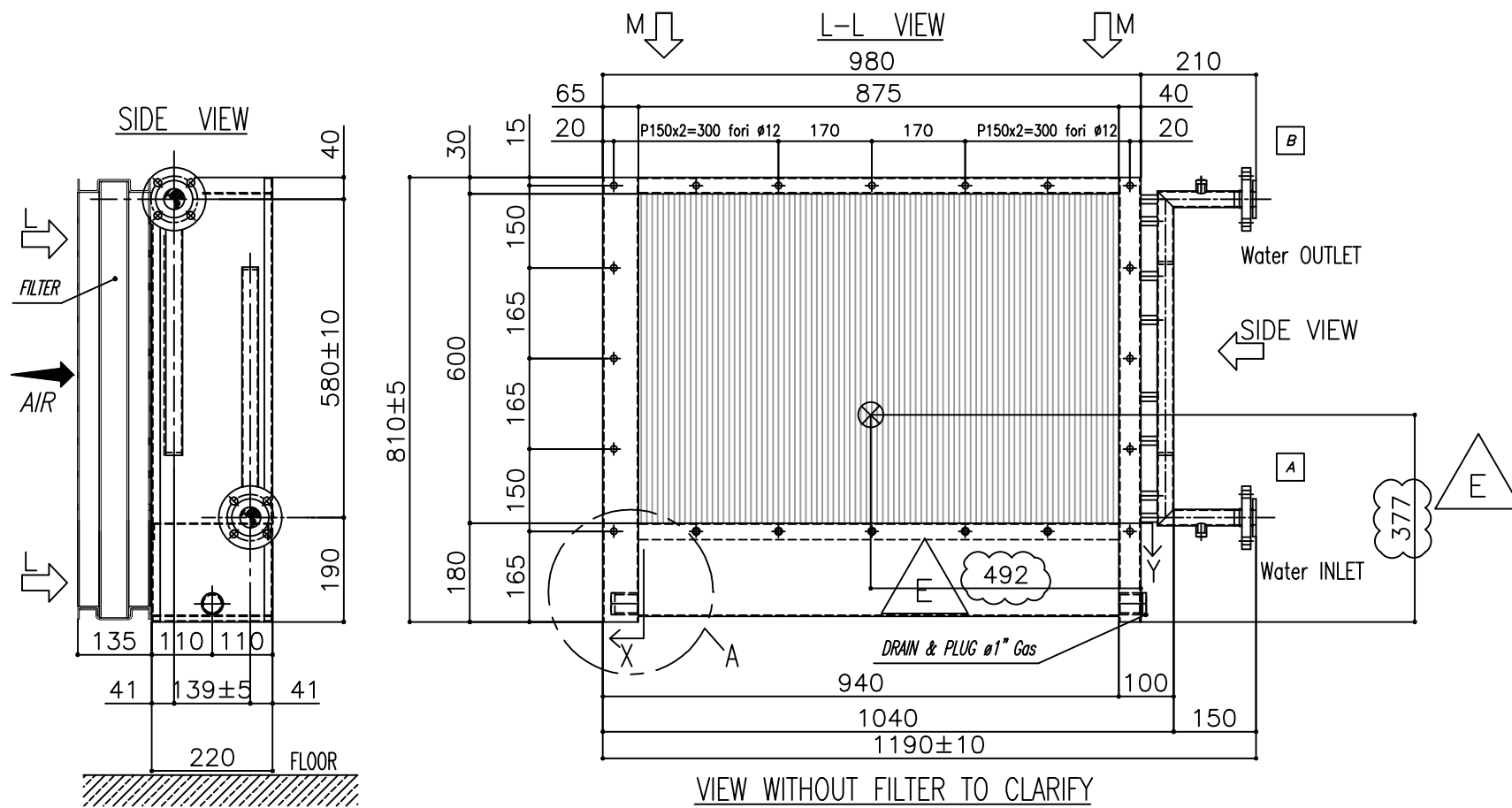


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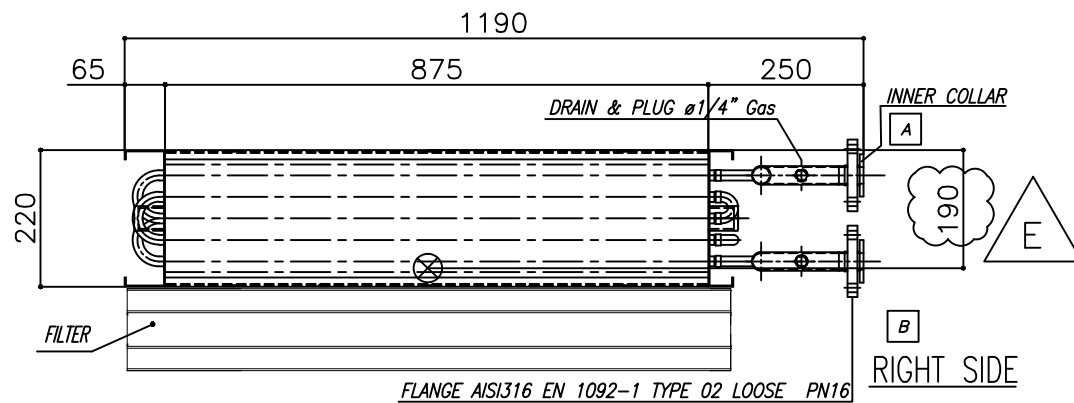


## Annex B

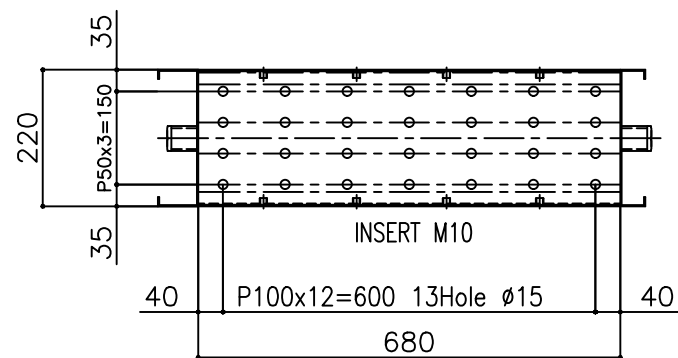
Drawings



VIEW WITHOUT FILTER TO CLARIFY



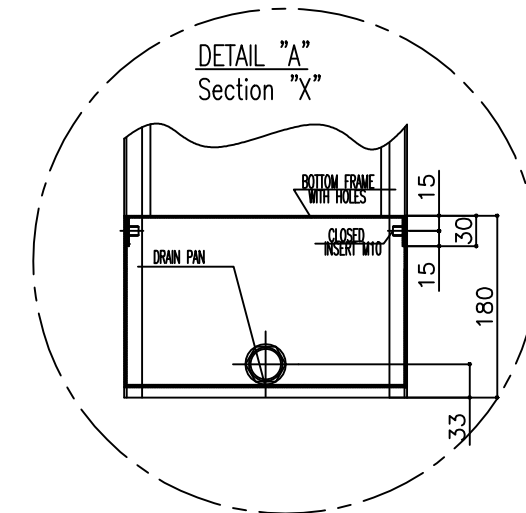
M-M VIEW



Section "Y-Y" WITHOUT FILTER TO CLARIFY

**COILS DESCRIPTION**

EXCHANGERS TYPE	P40-16 AR 5R 15T 875A CuNi-Cu 2.5Pa NC.4
AIR DIRECTION	HORIZONTAL
TUBES	CuNi90/10 - N°74 ø16x0.7
FIN	Cu - Thk. 0,10
FRAME	Aisi316 - Thk. 20/10
HEADERS & BRANCH	CuNi90/10 ø1" - FLANGE AISI316 EN 1092-1 TYPE 02 LOOSE PN16
WEIGHT	~80 Kg
PED TESTING	PED2014/68/EU - Art. 4.3



TAG	SERVICE	CLASSIFICATION
HEX-VES01001	AUXILIARY MACHINERY ROOM	W

CONNECTION SIDE
RIGHT CONNECTION

E	UPDATED	02/08/19	ATR	MRH	MRH
D	UPDATED	29/07/19	ATR	MRH	MRH
C	FOR INFO./COMMENTS	16/11/18	FSS	MRH	MRH
B	FOR INFO./COMMENTS	24/08/18	FSS	MRH	MRH
A	FOR INFO./COMMENTS	07/08/17	JCR	MRH	MRH
REV.	DESCRIPTION	DATE	DRAWN	VERIFIED	APPROVED

PROJECT:	AVANTE 2200				
DESCRIPTION:	SEA WATER COILS				
DRAWING NUMBER:	P-M05462-015				
SCALE:	NTS	FORMAT:	A3	SHEET:	03/07

