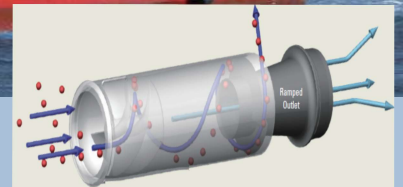




ALWO

-Marine Special Ventilation Solutions



HARK EQUIPMENT & ENGINEERING CO., LTD





Company Introduction

ALWO Ltd, located in Toruń, Poland, was established in 1988.

Today the company Alwo Ltd. is one of the largest manufacturer of ventilation equipment for the marine and offshore industry in the world.

Years in business	– 32
Em ployees	–100
m ² of roofed area	– 5000 m
m ² of total area	– 10000 ² m
Year sales	–10.000.000 EUR
FIXING ASSETS	–2. 740. 000, 00 EUR
Orders under production	–166 ship sets
Equipment on Board	–3495 vessels

ALWO products are approved by class society of ABS, DNV–GL, BV, CCS, LR, RS, KR, RINA and RMRS. Fire dampers are MED approved.

Technical standard for engineers and workers are EN ISO9001 and other relevant international standard, approved by DNV–GL.



We provide the world wide service.

PRODUCT OVERVIEW



Axial-flow Fans



Centrifugal Fans



Circular Duct Fans



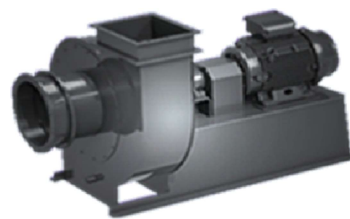
Square Duct Fans



Gas Freeing Fans



Water-Driven Fan



High Temperature Fans



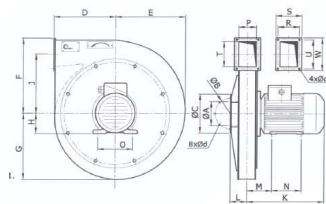
Portable Fan Heater



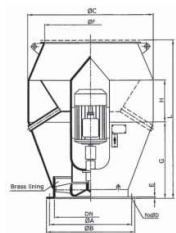
Fan Heater



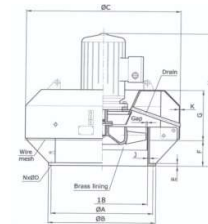
Smoke Extract Fan



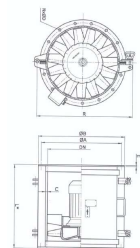
Dual fuel Fan



Explosion-proof Fan



Explosion-proof Fans



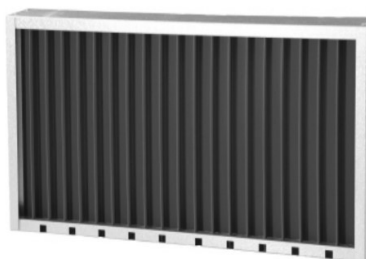
Swing-out type



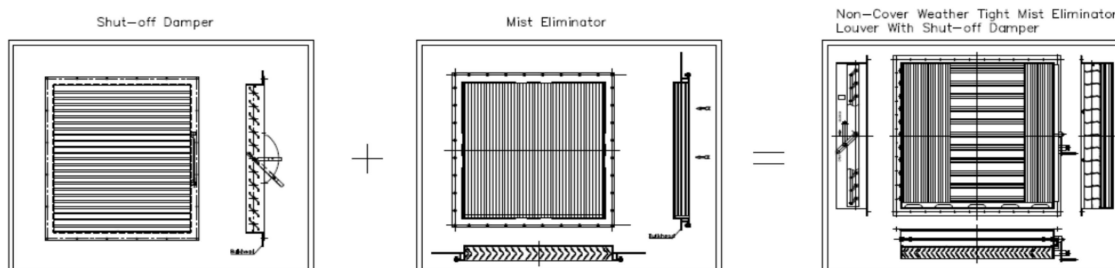
PRODUCT OVERVIEW



Rectangular Fire Damper Circle Fire Damper Rectangular Gas Damper Circle Gas Damper



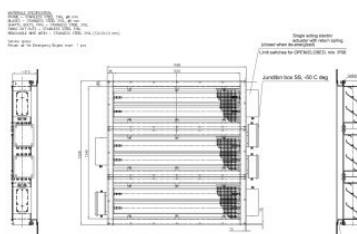
Ventilation Louver Louver Shutter Mist Eliminator Mist Eliminator with Heater



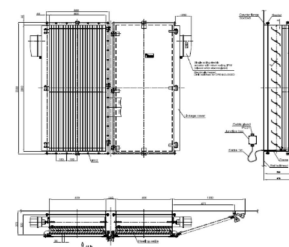
Non-cover weather tight mist eliminator louver with shut-off damper



Mist Eliminator
with self-regulation cable



Ventilation Louver with heater



Mist Eliminator for -50°C



PRODUCT OVERVIEW



Noise Silencer



Circular Duct Heater



Rectangular Duct Heater



Steam Heater



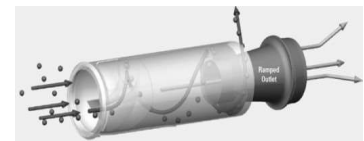
Air Filter



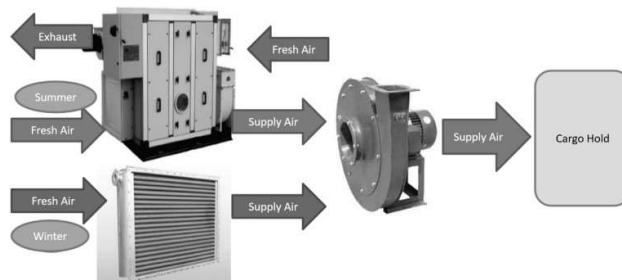
Bag Filter



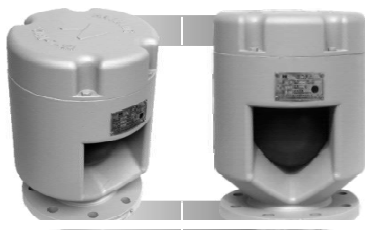
Cyclone-type Filter



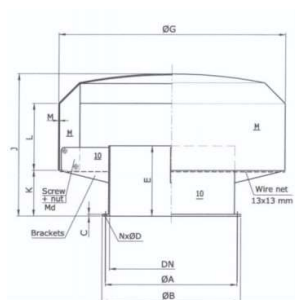
Galley Hood



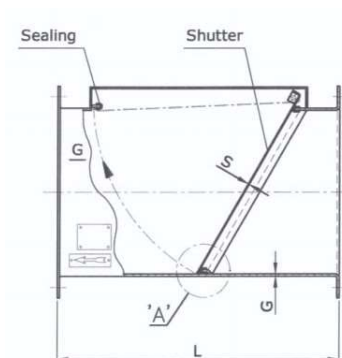
Dehumidifiers System



Ventilation Head



Ventilation hood with heater



No-return Flaps





Alwo Reference in China



Alwo Reference List in China						
No.	Shipyard	Description	Hull No.	Total Ships	Product	Shipowner
1	Huatai Heavy Industry (Nantong) Co., Ltd	37300dwt	H0001~2	2	FAN	Glory Wheels
2	Wison(Nantong) Heavy Industry Co., Ltd	VS483	S111~2	2	FAN	UP offshore
3	Sainty Shipyard	12000dwt	07STIG055~8	4	FAN	Juengerhans
4	Mingde Heavy Industry Stock Co., Ltd.	30000dwt Bulk Carrier	MD30000LBC-05~8	4	FAN	Polish Steam
5	COSCO Nantong Shipbuilding Co., Ltd	59000dwt	N265~6	2	FAN	Lauritzen Tanker
6	COSCO Nantong Shipbuilding Co., Ltd	Pipelay vessel	N448~49	2	FAN	Sapura
7	Wison(Nantong) Heavy Industry Co., Ltd	VS 465 FSV	S421	1	FAN	Sartor shipping AS
8	Kaiyangxing Shipbuilding Co., Ltd	2600DWT	801~6	6	FAN	Fehn Bereederungs Gmbh & Co., Ltd.
9	NTS	115000dwt BC	0111513A	1	FAN	Gestioni Armatoriali Apa
10	Kaiyangxing Shipbuilding Co., Ltd		KYX07-807~9	3	FAN	Fehn Bereederungs Gmbh & Co., Ltd.
11	Rongsheng		H1195~6	2	FAN	
12	COSCO Guangdong Shipbuilding Co., Ltd	Livestock vessel	N392~5	4	FAN	VROON
13	Shanghai Shipyard	Seismic vessel	s8002	1	FAN	SinoPec China
14	Ouhua		650~3	4	FAN	NORD Germany
15	Ouhua		658~9	2	FAN	NORD Germany
16	Ouhua		662~3	2	FAN	NORD Germany
17	Ouhua		660~1	2	FAN	AVIN Germany
18	Rongsheng		H1251~2	2	FAN	
19	Rongsheng		H1255~6	2	FAN	
20	AVIC Dingheng	25000DWT CT	AD0039~43	5	FAN	CTG Group
21	AVIC Dingheng	25000DWT CT	AD0050~4	5	FAN	CTG Group
22	Jinling shipyard	35000DWT BC	JLZ9110423~32	10	FAN	ARISTON NAVIGATION CORP.
23	Sainty	64000 DWT BC	SAM12017~20	4	FAN	PreciousShipping Thailand
24	Shanghai ZHENHUA HEAVY Industry Co., Ltd	ELEVATING ACCOMMODATION UNIT	ZPMC1080~1	2	FAN	National petroleum construction Com.
25	Sainty	64000 DWT BC	SAM12021~6	6	FAN	PreciousShipping Thailand
26	Guangdong BonnyFair Heavy Industry Co., Ltd	RA3200 Tug boat	BF-2241~4	4	FIRE DAMPER	
27	Guangdong BonnyFair Heavy Industry Co., Ltd	32m Tug Boat	BF-2257~8	2	Mist Eliminator	
28	AVIC International Ship	17500DWT CHEMICAL	AD0065~8	4	FAN Silencers	ThunTankers



Alwo Reference in China



Alwo Reference List in China						
29	AVIC International Ship	3600DWT CHEMICAL OIL	AD0059~64	6	GAS-FREEING FANS	GEFO
30	AVIC International Ship	3600DWT CHEMICAL OIL	AD0070~1	2	GAS-FREEING FANS	GEFO
31	China Merchants Heavy	Cruise	CMHI196-1	1	Mist Eliminator	Sunstone
32	China Merchants Heavy Industry	Cruise	CMHI196-1	1	Louver, Gooseneck ,Mushroom	Sunstone
33	China Merchants Heavy	Cruise	CMHI196-1	1	Fan	Sunstone
34	ContiOcean Environment		C018066~69	4	Flue Gas Fan	
35	Jiangnan Shipyard (Group) Co., Ltd	28,000m3LNG FRU	H2621	1	Fan	
36	Shanghai Marine Diesel Engine	Exhaust Gas Cleaning system of		10	Fan	
37	AVIC International Ship	7999DWT OIL &	AD0030~1	2	Mist Eliminator	Sirius Shipping
38	GUANGZHOU WENCHONG SHIPBUILDING	1100TEU	H5629~32	4	Mist Eliminator	Tropical Shipping
39	Shanghai Waigaoqiao	400K DWT Ore	H1447/48	2	Mist Eliminator	Ore Shipping
40	CSSC Huangpu wenchong	krill Factory Trawler	H5637	1	Heat type Mist Eliminator	Sunline
41	CSSC Huangpu wenchong	6000方耙吸式挖泥船	H5650	1	Heat type Mist Eliminator	Changjiang Waterway Bureau
42	AVIC International Ship	16300DWT Tanker for Oil	AD0026~9	4	Mist Eliminator &Air filter	Erik Thun AB
43	AVIC International Ship	16300DWT Tanker for Oil	AD0035~6	2	Mist Eliminator &Air filter	Erik Thun AB
44	GUANGZHOU SHIPYARD INTERNATIONAL	44,500DWT ARC7 ICE BREAKING CONDENSATE	15121031	1	MIST ELIMINATOR	Dynacom
45	GUANGZHOU SHIPYARD INTERNATIONAL	44,500DWT ARC7 ICE BREAKING CONDENSATE	15121031	1	Engine room Louver	Dynacom

We do trust many many shipowners already had our production on their vessels. Alwo already delivered far more than 3,000 shipsets equipments all over the world, and we do the productions for many of the most famous HVAC companies in Europe.



Typical Performance



Ship type: Adventure Cruise Vessels
 Shipyard: CMHI (Jiangsu)
 Shipowner: Sunstone from America
 Scope of supply : Ventilation fans
 Ventilation Louver with heater
 Mist Eliminator with heater(-25° C)



Ship type: 44500dwt ARC7 Ice Break Condensate Tanker
 Shipyard: CSSC-Guangzhou Shipyard International
 Shipowner: Dynacom from Greece
 Scope of supply:
 Mist Eliminator with heater(-50° C)
 Only reference in China



Ship type: Krill Factory Trawler
 Shipyard: CSSC Huangpu Wenchong
 Shipowner: Sunline from China
 Scope of supply :
 Ventilation Louver with heater
 Mist Eliminator with heater(-25° C)



Ship type: 25000 Dwt Chemical Tanker
 Shipyard: AVIC International
 Shipowner: CTG Group from USA
 Scope of supply:
 Fans with dehumidifiers
 10 shipsets delivered to owner

The real vessel we supplied equipment



The real vessel we supplied equipment



Factory Overview



Our mission is to provide the customers with technically innovative, advanced, safe, cost efficient and environmentally friendly solutions for marine and offshore market.



HARK Equipment & Engineering Co., Ltd.

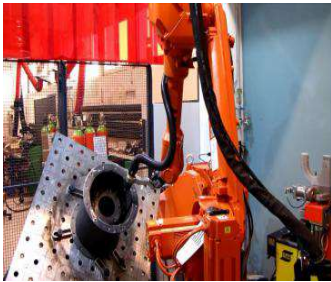


PRODUCT QUALITY ASSURANCE

The products quality has the priority in the Company. This is mainly to satisfaction of Customers and good reputation of our factory, but also to reduce minimum the guarantee services. (EN ISO 9001 certified by DNV-GL)

We design and manufacture our products in our premises ourselves, so the Customer can be sure to get high quality products.

Our reference list proves that our clients return to place orders again in company what shows our products reliable and of trouble free operation with good price.



Shock Grade A tests centrifugal fans according MIL-S-901D

Shock Grade A tests axial fans according MIL-S-901D



HARK Equipment & Engineering Co., Ltd.

New Development



CTO S.A. - RH RH-2016 Page 3

PROCEDURA SYMULACJI NUMERYCZNEJ

Obliczenia zostały przeprowadzone w pełnej skali dla prędkości obrotowej wentylatora równej 1800 obr/min.

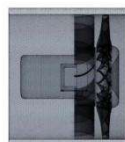
Obliczenia zostały wykonane dla modelu w skali przy użyciu metod RANSE. Do generowania siatki, przygotowania geometrii oraz obliczeń i wizualizacji wyników użyto programu STAR-CCM+.

Dotychczas obliczeniowa miała kształt walca o wymiarach okolo: 100 przed obiektem, 100 za obiektem, oraz średnica ok. 80, gdzie D oznacza średnicę wentylatora. Aby przyspieszyć obliczenia niektóre szczegóły geometryczne siatki wentylatora zostały uproszczone, co pozwoliło na znaczne obniżenie czasu obliczeń.

Do obliczeń została użyta siatka składająca się z ponad 10 000 000 elementów sześciokątnych. Poniżej przedstawiono wizualizację siatki obliczeniowej.



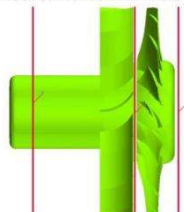
CTO S.A. - RH RH-2016 Page 4



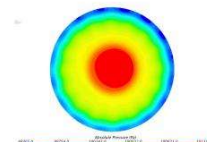
Rysunek 1. Siatka obliczeniowa

WIZUALIZACJE:

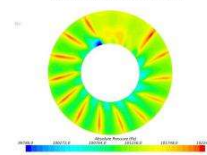
Wizualizacje zostały sporządzone w płaszczyznach oznaczonych poniżej jako 1,2,3



CTO S.A. - RH RH-2016 Page 5

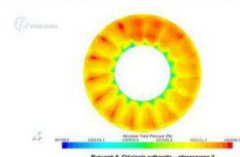


Rysunek 2. Ciśnienie statyczne - płaszczyzna 1

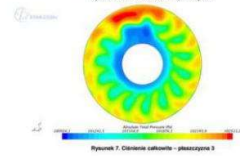


Rysunek 3. Ciśnienie statyczne - płaszczyzna 2

CTO S.A. - RH RH-2016 Page 7

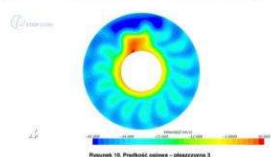


Rysunek 6. Ciśnienie całkowite - płaszczyzna 2

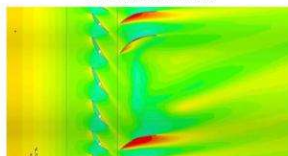


Rysunek 7. Ciśnienie całkowite - płaszczyzna 3

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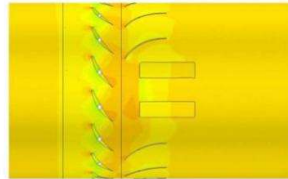


Rysunek 10. Prędkość całkowita - płaszczyzna 3

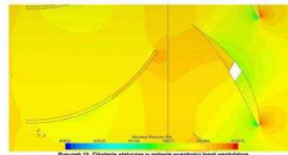


Rysunek 11. Prędkość całkowita w polu wylotowym łopatek wentylatora

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Rysunek 14. Ciśnienie statyczne w polu wylotowym łopatek wentylatora



Rysunek 15. Ciśnienie statyczne w polu wylotowym łopatek wentylatora

New axial flow fans with increased efficiency giving reduced power consumption and lower sound level.



HARK Equipment & Engineering Co., Ltd.



Innovation make us different, and we do special and customized ventilation to create added value for you to make a better world.



HARK Equipment & Engineering Co., Ltd.

Hark Equipment & Engineering Co., Ltd
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