

OCEAN IS OUR BEST PROPERTY

NK-O3BlueBallast | NK-O3 : 003/ R5 2013-03-29
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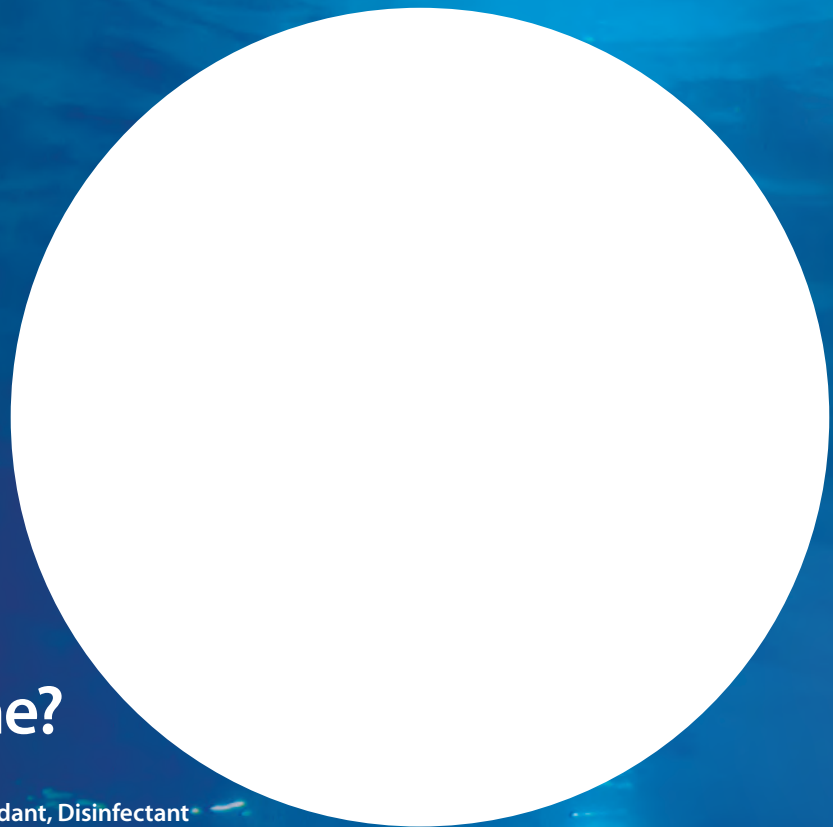


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Green Promise for the People 

Timely Installation with NK-O3 BlueBallast system

Global Premium Brand NK-O3 BlueBallast system



Why Ozone?

- S** **Safe & Strongest Oxidant, Disinfectant**
Especially in aqueous solution
- A** **Aqueous Solution for Life Matters**
3,000 municipal plants world-wide
- F** **Flexible Application**
Municipal & Industrial wastewater, medical, Food processing
- E** **Extremely Short Half-Life Time**
5.8 second in seawater, 30 minutes in fresh water and
54 minutes in gaseous state.
- T** **Technically Proven System**
First used as disinfectant by french municipality in 1899
and installed up to 1,000 for commercial and industrial use.
- Y** **Yes, NK-O3 BlueBallast system**
The NK-O3 BlueBallast system is masterpiece for ballast water treatment.

FUNCTION & DESCRIPTION OF NK-03 BLUEBALLAST SYSTEM

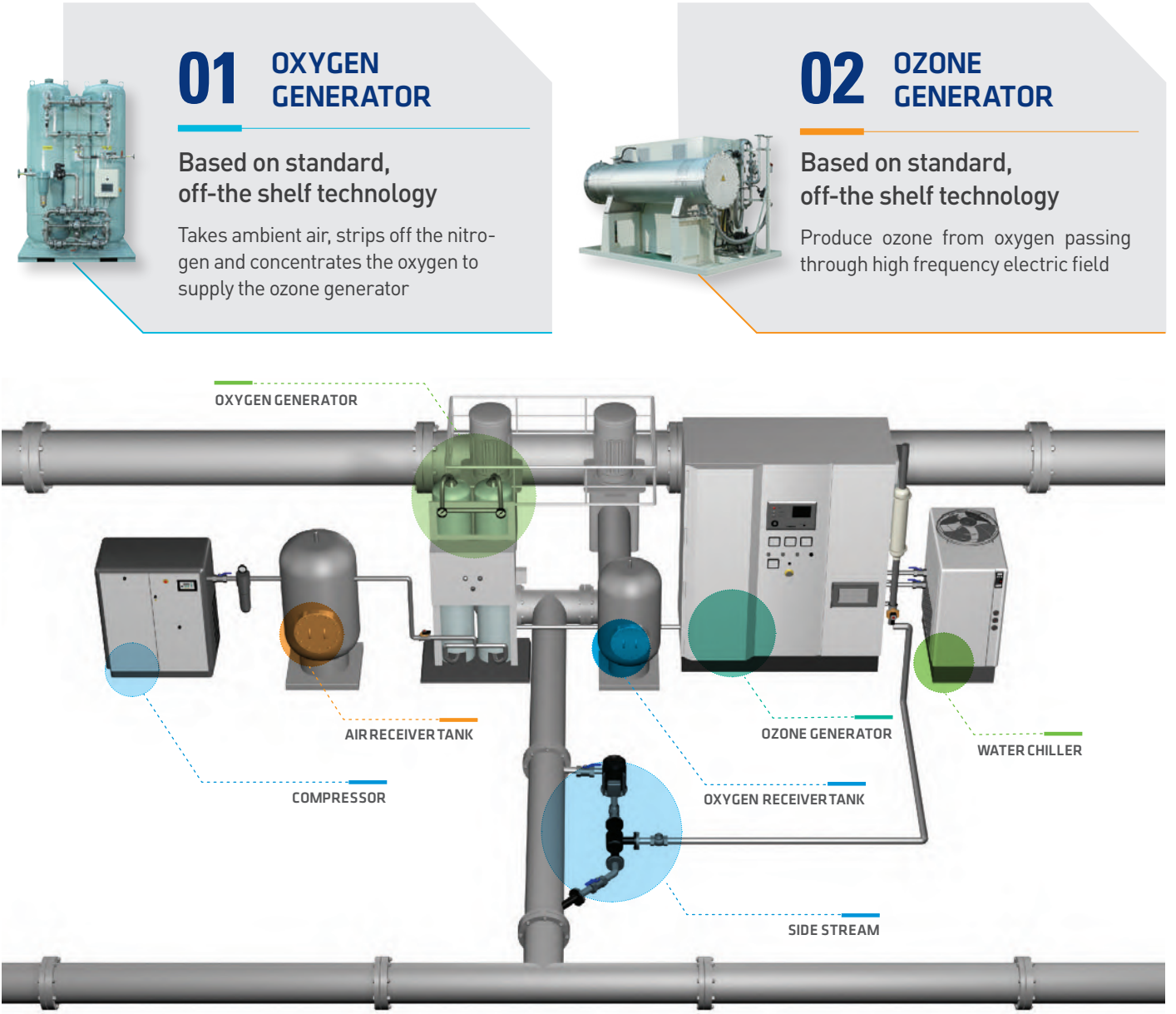
IN THE NK-03 BLUEBALLAST SYSTEM a ship-board Ozone generator takes ambient air and strips away the nitrogen, concentrating the oxygen content – which is then passed through a high voltage or high frequency electrical field to produce ozone. The ozone is then injected into the incoming ballast water to oxidize and neutralize any harmful aquatic species. A percentage of the aquatic species, especially any bacteria and viruses in the ballast water, are killed by direct contact with the ozone. The remainder are killed or neutralized when the ozone reacts with other chemicals that occur naturally in seawater, to form hypobromous acid, a highly effective disinfectant in its own right.

NK-03 BLUEBALLAST SYSTEM

R6.2.1 [2013_03]

Model Number	NK-03	15	30	50	75	100	150	200	250	300	400
Ballast Pump Capacity	m ³ /h	150	300	500	750	1,000	1,500	2,000	2,500	3,000	4,000
Total Ballast Capacity	m ³ /h	300	600	1,000	1,500	2,000	3,000	4,000	5,000	6,000	8,000
Total Footprint	m ²	5.8	8.6	10.3	13.0	17.0	20.7	23.8	27.5	29.2	43.3
Total Weight	kg	2,477	3,862	5,250	7,571	9,561	12,400	15,969	20,110	21,752	27,943
Total Power Consumption	kW	43.2	71.4	107.3	137.8	221.8	271.2	398.6	452.9	558.5	725.4
Total Cooling Water	m ³ /h	2.3	5.5	9.4	14.4	24.2	30.1	42.3	45.9	52.8	74.4

NEUTRALIZER When de-ballasting is carried out 48 hours later after ballasting, Neutralizer shall not be operated. If the level of TRO is exceed 0.1ppm, it shall be used.



01 OXYGEN GENERATOR

Based on standard, off-the shelf technology
Takes ambient air, strips off the nitrogen and concentrates the oxygen to supply the ozone generator

02 OZONE GENERATOR

Based on standard, off-the shelf technology
Produce ozone from oxygen passing through high frequency electric field

03 OZONE INJECTOR

Purpose-built, Patented side-stream injector
Diverts incoming ballast to sidestream and injects ozone before ballast re-enters main ballast stream. Ensure high kill rate through optimal dosage of ozone Eliminates potential for corrosion.

04 CONTROL & MONITOR

Based on standard, off-the shelf technology
Variety of sensors, meters, switched and alarms connected to central control software integrated to ship's overall ballast management system. Allows all aspects of the system to be monitored and controlled. Kept electronically all datas on system operation and performance. Includes automatic safety and cut-off switches.

SIDE STREAM INJECTOR

SIMPLE/FLEXIBLE
INSTALLATION

NO PRESSURE DROP
(NO BALLAST PUMP HEAD UP)

INJECTOR

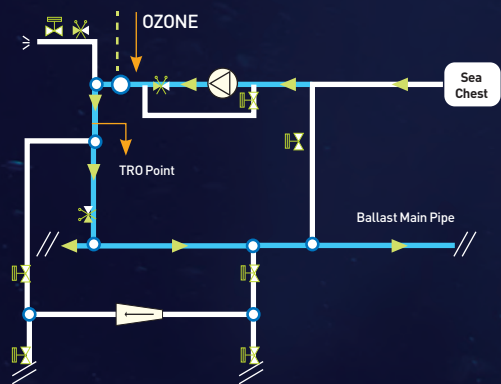
NO MODIFICATION ON
EXISTING BALLAST PIPE

GRAVITY OPERATION
(BALLASTING/DE-BALLASTING)



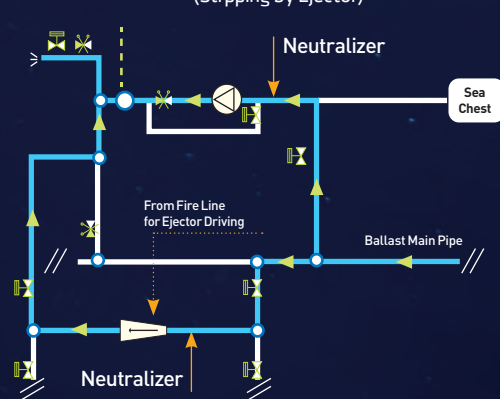
APPLICABLE FOR GRAVITY

Ballasting by Ballast Pump

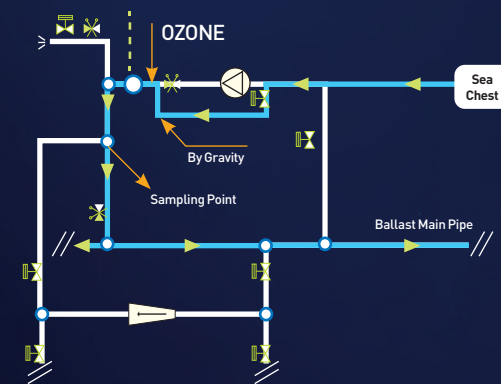


De-ballasting by Ballast Pump

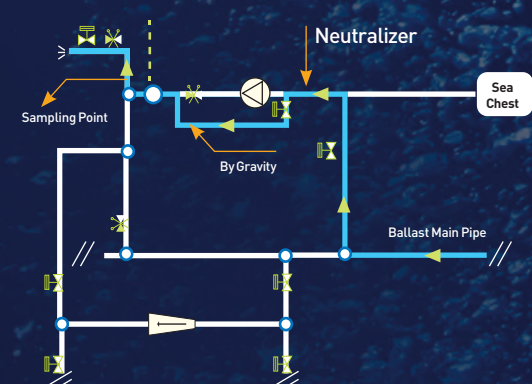
(Strpping by Ejector)



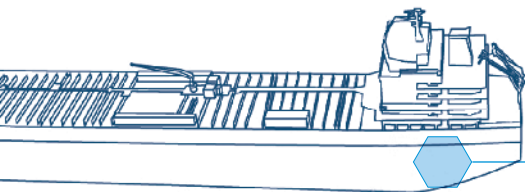
Ballasting by Gravity



De-ballasting by Gravity



SOLUTION & EXPERIENCE



PC _Submerged Ballast Pump

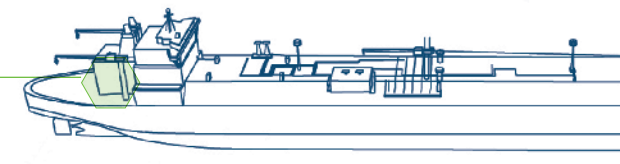
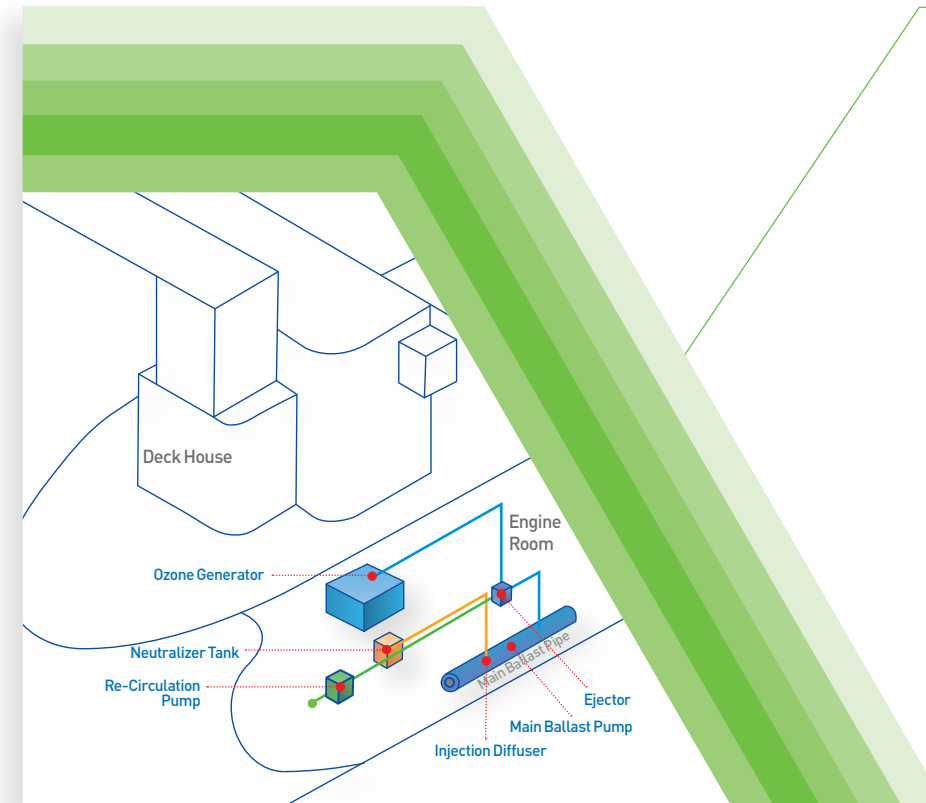
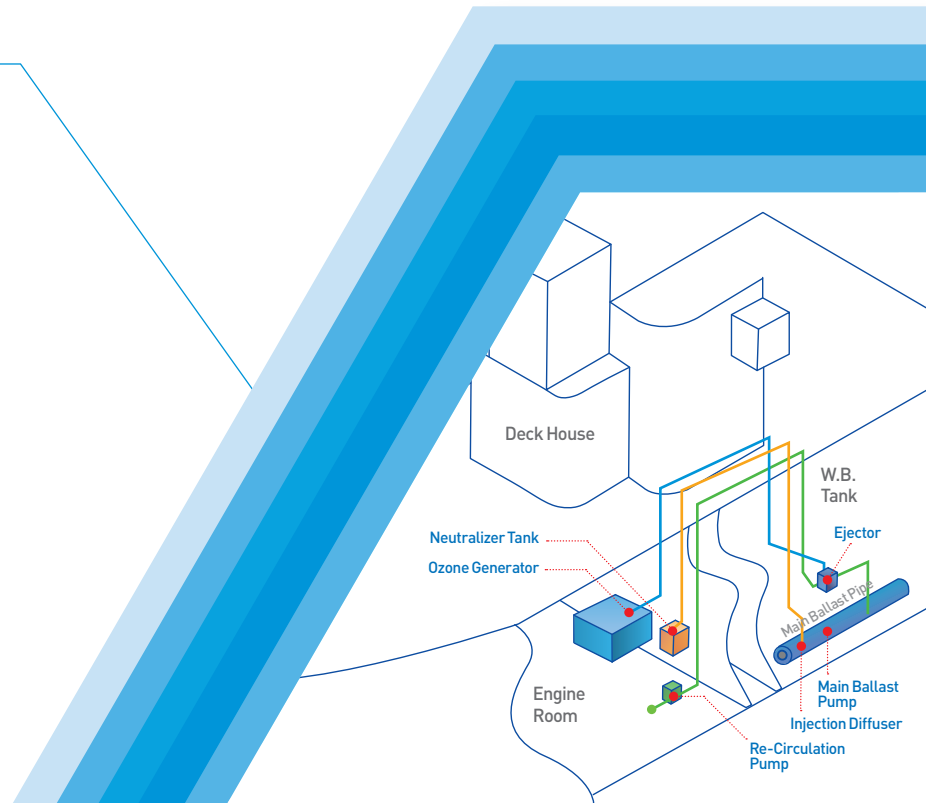
Class	DNV
Equip.Install	Engine Room
Pump Capa.	750m ³ /h×2



NK-03 075 Model Oxygen Generator



Ozone Generator Ejector and Jet Nozzle



LNG CARRIER

Class	LR
Equip.Install	Engine Room
Pump Capa.	3,000m ³ /h×2



NK-03 300 Model Air Compressor



Ozone Generator Ejector and Jet Nozzle

118K COT

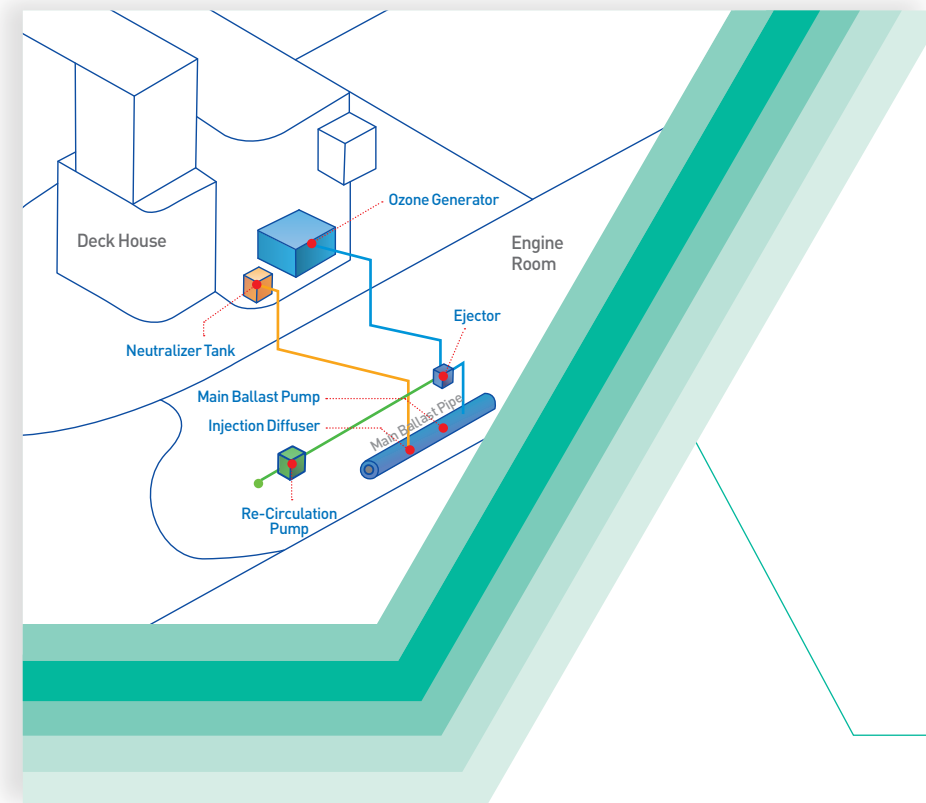
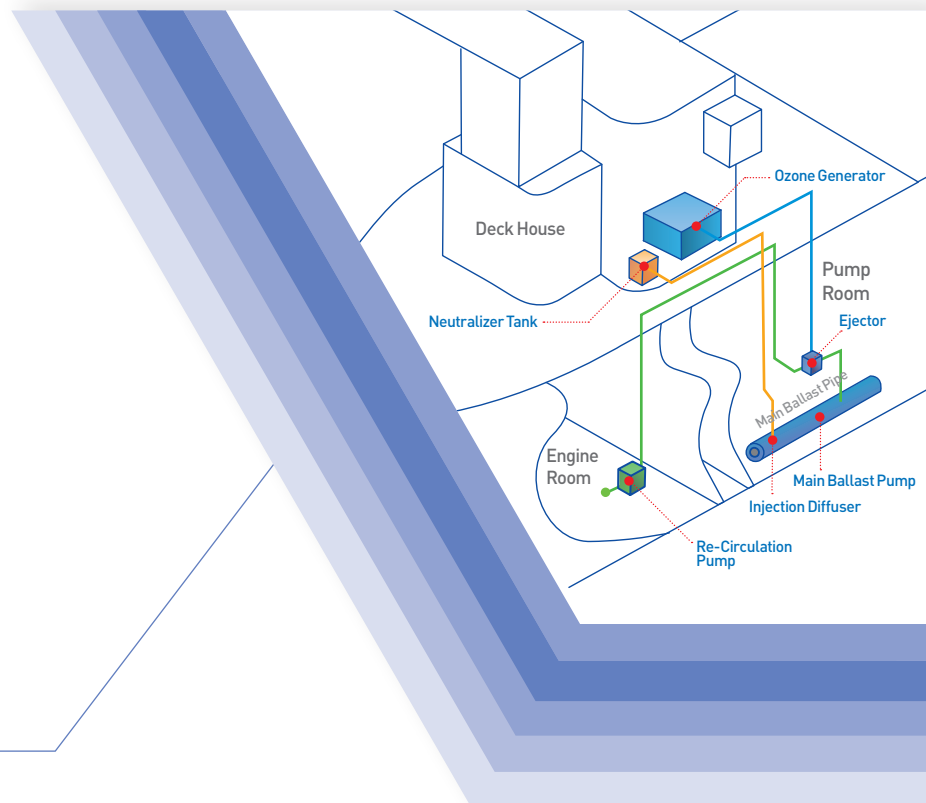
Class	LR
Equip.Install	BWT Room
Pump Capa.	2,000m ³ /h×2



NK-03 200 Model Air Compressor



Oxygen Generator Ejector and Jet Nozzle



VLOC

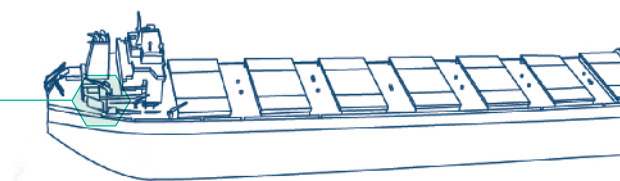
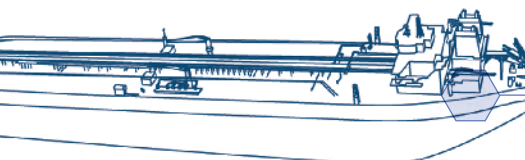
Class	NK
Equip.Install	BWT Room
Pump Capa.	3,500m ³ /h×2



Air Compressor Oxygen Generator



Ozone Generator Ejector and Jet Nozzle



EXCELLENT ECONOMIC SOLUTION FOR RETROFIT

TOTAL SOLUTION

Project consulting, Budgeting, Engineering, Manufacturing, Retrofit installation, Commissioning

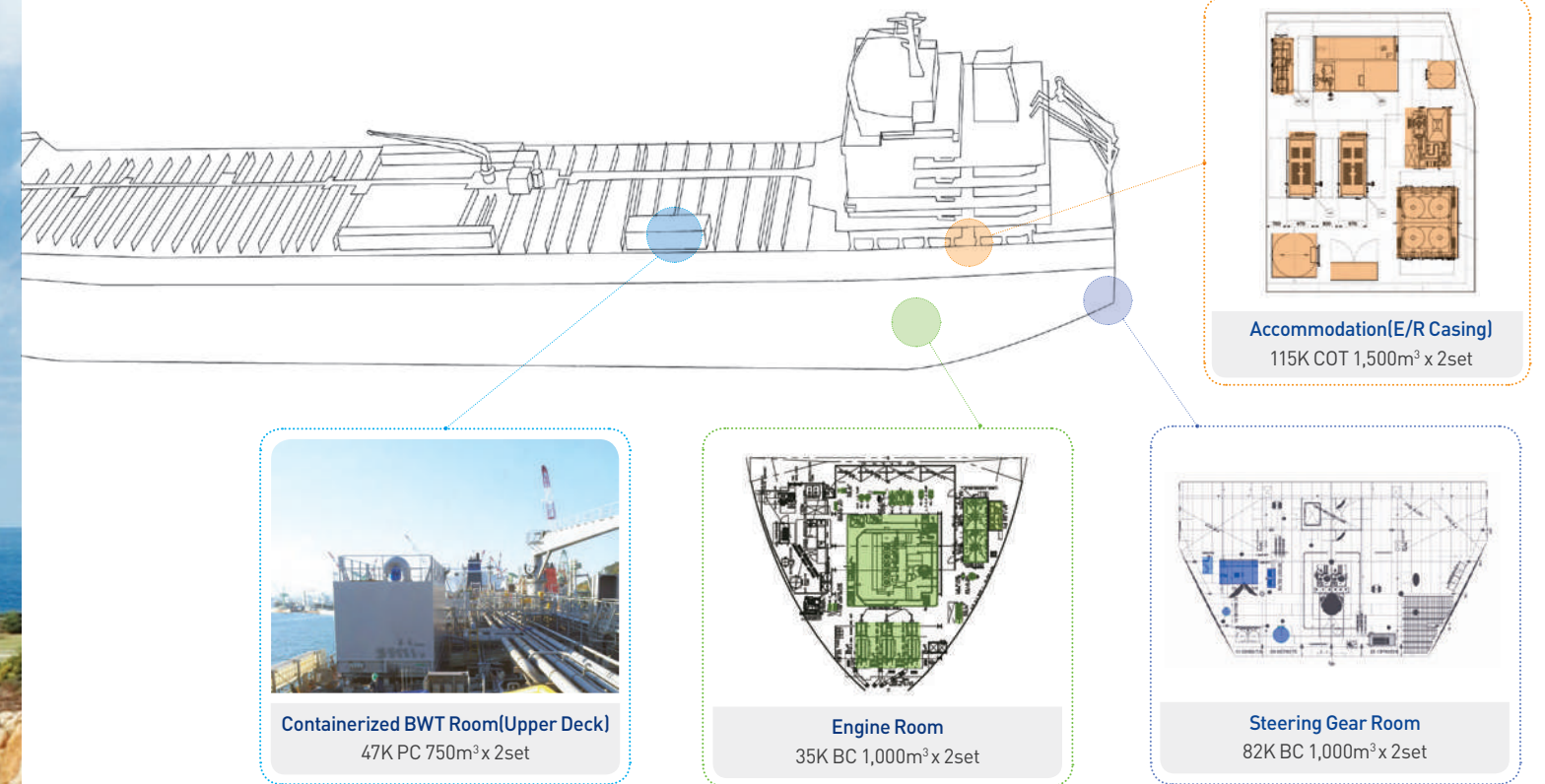
NK's capacity of undertaking the EPC Retrofit Service with the most economic cost and minimal time wherever the space are available saving modification of existing arrangemant.

BASED ON OUR TRIAL DESIGN ON EXISTING VESSELS

NK cooperative R&D project with Repairing shipyards.

Investigation of potential problem areas to ensure smooth implementation of BWM convention through examination of potential design related problems

PROCESS



Hot Tip 01

You can choose area or location for installation at available space on-board. More than 120 New buildings are prepared for the coming retrofit with NK-03 Blueballast.

Hot Tip 02

No necessary for replacement of original equipment (Extrremely easy to integrate NK-03 into existing ballasting system)

Hot Tip 03

Applicable for gravity operation

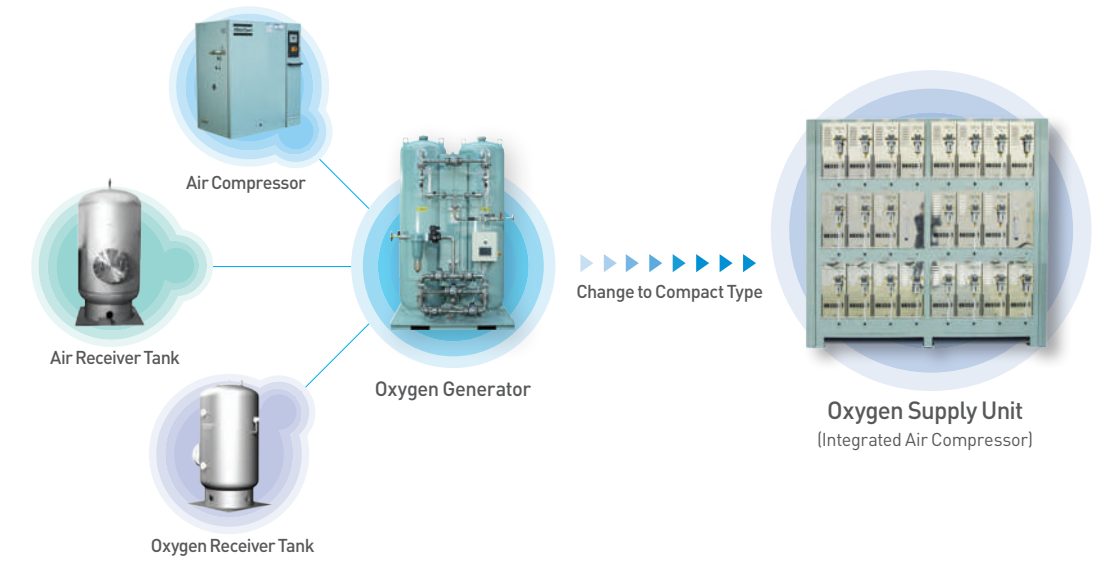
Hot Tip 04

No necessary for hull modification(Deck & Wall)

COMPACT MODEL OF NK-03 SYSTEM



DESCRIPTION FOR COMPACT MODEL OF NK-03 SYSTEM



SPECIFICATION OF COMPACT MODEL OF NK-03 SYSTEM

Ballast Pump Total Capacity	Division	Remark
300m ³ /hr (150m ³ /hr x 2set) NK Type : 015 Model	Power(kW) Foot Print(m ²) Weight(kg)	- 19.9% Down - 23.4% Down - 19.9% Down
600m ³ /hr (300m ³ /hr x 2set) NK Type : 030 Model	Power(kW) Foot Print(m ²) Weight(kg)	- 17.4% Down - 19.0% Down - 28.6% Down
1,000m ³ /hr (500m ³ /hr x 2set) NK Type : 050 Model	Power(kW) Foot Print(m ²) Weight(kg)	- 14.3% Down - 11.2% Down - 22.3% Down

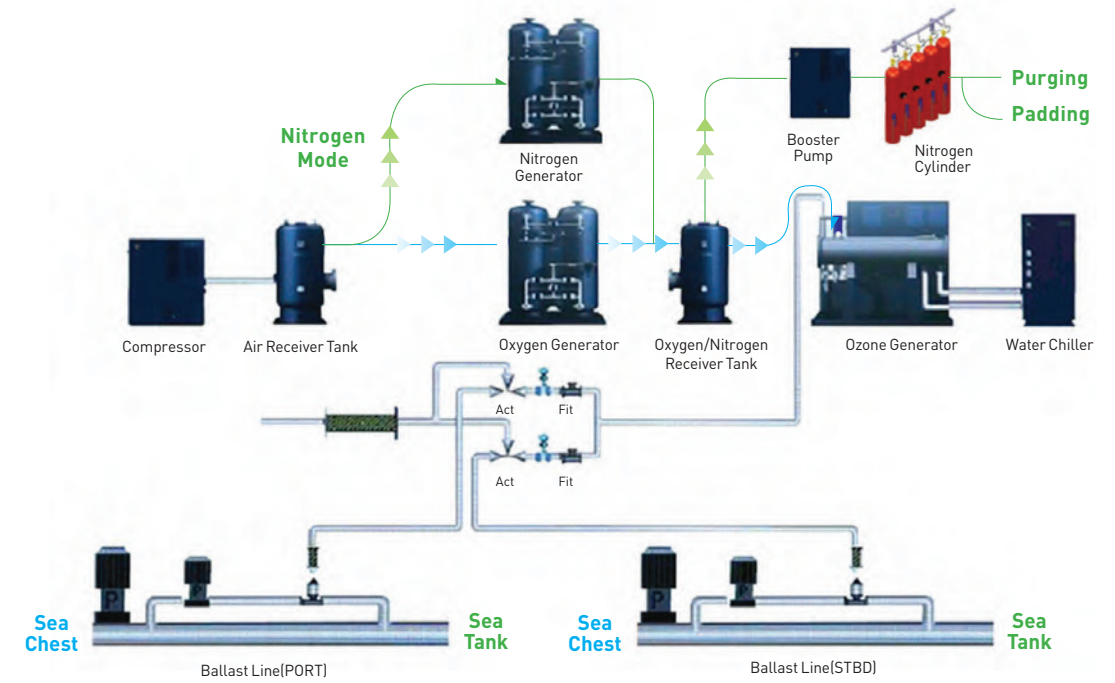
Hot Tip 01

Type Approval



N2 PURGING/PADDING by Common Source

N2 PURGING/PADDING BY COMMON SOURCE



FEATURES AND BENEFIT



- **Economic Cost** : Apply the air compressor of NK-03 BlueBallast system
- Fully automated unattended operation of BWT system & nitrogen generating system by the control panel
- On-site nitrogen generator
- **Saving Maintenance** : CMS (Carbon Molecular Sieve) can be semi-permanently used.

Model		Nitrogen Gas Purity		
		97%	99%	99.999%
Capacity of N2(Min~Max)	Nm ³ /hr	4.5~2296	3.2~1637	0.5~227
(Air-demand)	m ³ /min	0.16~80	0.13~65	0.07~36

APPROVAL STATUS

NK'S QUALITY MANAGEMENT SYSTEM has been certified according to Rule Requirement. Appropriate approvals for manufactured products have been acquired from authorized Inspection of each Class. Especially, the Country's first obtained DNV type approval and AMS acceptances because of faster technology than other competitors, NK is forecasted to increase sales.





GLOBAL NETWORK

NK PROVIDES service facilities covering the world's major cities and ports through network of international distributors and servicing. Service Network has been organized to afford emergency as well as regularity scheduled service.

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