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Προοπτικές ανάπτυξης για το  
2017

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Απολογισμός στη ναυτιλία

# BalClor BWMS is mainly consisted of Filtration, Disinfection, and Neutralization

By Vincent Li, Oversea Project Manager, SunRui Marine Environment Engineering Co., Ltd

There are three major units in BalClor Ballast Water Management System: Filtration Unit, Electrolysis Unit, and Neutralization Unit.



During ballasting process, ballast water is filtrated by an automatic back flush filter, marine organisms larger than 50 $\mu$ m will be removed during this process, then a side-stream of filtered ballast water is by-passed to electrolyzing unit to generate high concentrated oxidant (mainly sodium hypochlorite solution), which will be injected back into main ballast

stream to provide effective disinfection to meet D2 discharge standard. Active oxidant will remain in ballast tank for a certain period, preventing re-growth of microbes.

During de-ballasting process, ballast water will be discharged directly without repeating disinfection. TRO (total residual oxidant) sensor installed at pipe outlet will closely monitoring the concentration level of active oxidant.

However, if TRO level is higher than 0.1ppm, neutralization unit will be initiated automatically, injecting neutralizing agent to main ballast water pipe; if TRO concentration is lower than 0.1ppm, ballast water will be discharged to the sea.

**There are three major units in BalClor Ballast Water Management System: Filtration Unit, Electrolysis Unit, and Neutralization Unit.**

During ballasting process, full volume of Ballast water flows into an automatic back flush filter firstly after through ballast pump. During filtration, the water flows into the filter candle from both direction, which results that organic and inorganic particles being captured in the inside of filter candle. Clean water reaches the filter outlet through filter element slot.

During the backflushing cycle, initialed by differential pressure and/or time, the filter elements, which are open at both ends, are alternately flushed in sequence from above and below, without any interruption to the filtration operation.

Core component of electrolysis unit is tubular-plate type electrolytic cell

which is reliable, efficient, and compacted. It has a low power consumption and requires small installation space. During electrolyzing process, chlorine is generated from seawater and dissolves in the water rapidly, forming high concentrated Sodium Hypochlorite solution, which will be injected back to main ballast water pipe after by-product, hydrogen, is separated. Sodium Hypochlorite is an effective disinfection solution that can kill spores, larvae, pathogens to meet D-2 regulation.

BalClor BWMS has a comprehensive de-gas unit installed in the Electrolysis unit with a removal efficiency of about 99%, which can ensure the safety operation of the system. Hydrogen bubbles produced during electrolysis process goes into a cone-type cyclone with electrolyzed seawater to generate a turbulent flow.

Hydrogen bubbles are broken into smaller ones during high speed spinning and then rising with water vapor. After two-step separation process, vapor becomes fluid and flows back.

Meanwhile, hydrogen gas will be diluted by two blowers and discharged overboard through a de-gas pipeline. This very de-gas technology has been operating in the nuclear industry safely for more than 20 years, which fully satisfies the safety standards of nuclear industry.

Neutralization is used to neutralize TRO, neutralizing agent, Sodium Thiosulfate is used in this process, while doing can be controlled automatically.

The superiorities of SunRui BalClor Ballast Water Management System are:

- 1.Side- stream electrolysis technology provides low power consumption, as 1-2% of total volume of ballast water is need for electrolyzing purpose, thus the installation of the system will cause no change to vessel main pipe line arrangement.
- 2.Modular Design method provides flexible installation options on board, for both new builds and retrofits.
- 3.Low maintenance cost, as life span of core components reaches up to vessel's whole service life.
- 4.No repeat process of disinfection, reliable and effective.
- 5.Suitable for various type of voyage route, can be applied to fresh/ brackish water.
- 6.Effective solutions for fresh/ brackish water treatment.



## About SunRui

SunRui Marine Environment Engineering Company (hereafter called SunRui) is a wholly owned subsidiary company of China Shipbuilding Industry Company Limited (CSIC). SunRui is an integrated engineering company, is specialized in corrosion control, anti-fouling technologies and has more than 30 years' research and practical experience on water treatment technologies.

SunRui has been engaged in research and development of electrolysis technology for over 20 years and has successfully undertaken hypochlorite generation projects for 12 nuclear power stations and more than 100 power plants, chemical plants, vessels, and marine platforms.

SunRui's BalClor Ballast Water Management System is developed based on land-based electrolytic technology. The principle of this system is to electrolyze seawater onboard directly to produce a high concentrated sodium hypochlorite solution for Disinfection. A unique coating guarantees a life-time service of electrodes, reducing significantly the maintenance cost. SunRui owns the Independent Intellectual Property Rights of the core components.

BalClor BWMS has been approved at IMO's International 61st MEPC Conference in September 2010 and now SunRui already achieved Type Approvals from CCS, DNV-GL, LR, BV, NK, ABS and Liberian Registry. USCG AMS certificate was also achieved.

After successfully accomplished all required tests for USCG Type Approval, SunRui submitted the final report to USCG through DNV-GL in January 2017 as the no. 4th maker in the whole world. The USCG Type Approval will be achieved during March to April.

Now SunRui holds contracts of around 600 systems ordered (Newbuilding and Retrofitting Projects) by the clients worldwide (such as NYK Line, JO Tankers, MMS, TMS Tankers and Neda) for various vessels types and keeps delivering them. Among all those orders, there are quite a few big ships such as VLCC, Suemax, Aframax, VLOC, Valemax, Capsize and 174k m3 LNG.

To provide clients a good service in future, SunRui has always been focusing on building up an efficient service network. SunRui's contracted aftersales service agents now can cover all important ports around the world. Up to now, SunRui has a Tokyo office and a Singapore office built up and operated by our own local employees. SunRui's branch company in Hamburg and one more office in Hong Kong is well prepared and will be open in a few months. Offices in USA and Dubai are also under planning. Since 2015 Marine Plus SA represents, exclusively in Greece, SunRui BalClor BWMS.

