



METODE TRETMANA OTPADNIH VODA SA BRODOVA

METHODS OF TREATMENT WASTEWATERS FROM SHIPS

APSTRAKT

Postoji nekoliko kategorija otpadnih voda sa brodova. Najvažnije od njih su: kaljužna, balastna, siva i crna (sanitarna) voda. Upravljanje otpadnim vodama brodova i njihov tretman se sastoji od složenog sistema koji uključuje niz metoda sakupljanja i obrade, upravo zbog različitog porekla i sastava ovih voda. Predmet istraživanja u ovom radu je razmatranje mogućnosti savremenih tretmana otpadnih voda sa brodova i njihova sistematizacija u skladu sa zakonskim propisima.

Ključne reči: balastna voda, brodovi, kaljužna voda, sanitarna voda, tretmani vode.

ABSTRACT

There are several categories of wastewater from ships. The most important of them are: bilge, ballast, grey and black (sanitary). Ship's waste water management and their treatment consists of a complex system that includes a range of collection and treatment methods, precisely because of the different origin and composition of these waters. The subject of research in this paper is options consideration of modern treatments for waste waters from ships and their systematization in accordance with the legislation regulating.

Key words: ballast water, bilge water, sanitary water, ships, water treatments.

UVOD

Postoje tri glavne kategorije otpadnih voda koje proizvode brodovi: kaljužne (zauljene), sanitarne (crne i sive) i balastne voda. Sanitarne vode su otpadne vode nastale mešanjem sive i crne otpadne vode (kanalizacija). Velika količina sanitarnih otpadnih voda nastaju na putničkim brodovima i velikim krstaricama zbog izuzetno velikog broja ljudi na brodu. Kaljužne vode sa brodova su zauljene vode koje nastaju u različitim mašinskim prostorima, kao i otpadne vode iz broskog skladišta, proizvedene od odlaganja ostataka tereta i atmosferskih padavina.

ZAKONODAVSTVO KOJE SE ODNOSI NA OTPADNE VODE SA BRODOVA

Brojne međunarodne rezolucije i konvencije bave se pitanjima zaštite životne sredine u plovidbi, kao što su: Rezolucija 61, UNECE, Rezolucija 24, CEVNI, UNECE, Međunarodna konvencija o ADN - Evropske odredbe o međunarodnom prevozu opasne robe unutrašnjostim vodnim putevima (UNECE 2015), kao i Konvencija o plovidbi brodovima unutrašnje plovidbe, 1966. Takođe, Dunavska komisija je proizvela smernice za upravljanje otpadom i otpadnim vodama

INTRODUCTION

There are three main categories of wastewater produced by ships: bilge (oily), sanitary (black and gray) and ballast water. Sanitary water is waste water formed by mixing gray and black waste water (sewage). A large amount of sanitary waste water is generated on passenger ships and large cruisers due to the extremely large number of people on board. Bilge water on ships is oily water produced by different machine spaces, and also wastewater from the ship warehouse, produced from the disposal of cargo residues and atmospheric precipitation.

LEGISLATION RELATED TO WASTEWATER FROM SHIPS

Numerous international resolutions and conventions address the issues of environmental protection in navigation, such as: Resolution 61, UNECE, Resolution 24, CEVNI, UNECE, International Convention on ADN - European Provisions on the International Carriage of Dangerous Goods in Inland Waterways (UNECE 2015), as the Convention on calibrating inland navigation vessels, 1966. Also, the Danube Commission has produced guidelines for waste and waste water management with ships on the Danube (Danube Commission 2013). There

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