"More environmental protection with improved technology"

Proposal for a new testing regulation for the approval of bilge water de-oilers As per IMO MARPOL MEPC XXX

Waste water, oils as well as fuels from the bilge of shipping are the most frequent cause of environmental contamination of the seas.

Fauna and flora suffer long-term damage.

Most of the de-oiling systems used no longer live up to the modern day requirements in terms of the required separation technology.
In recent years oils and fuels have changed to a very great extent in terms of their composition and can no longer be separated from water so easily. In this respect one should also know that bilge water de-oilers were originally not developed for environmental protection but rather served shipping safety and the protection of crews against the risk of fire.
Not until 1950 were the first bilge water de-oilers introduced for environmental protection (residual oil content 20 mg/l) in inland shipping by the German Filter Company (as from 1965 NFV).

Almost 20 years later the first bilge water de-oiler for maritime shipping was brought onto the market with a residual oil content of 15 mg/l (FRAM-NFV).
A development for military ships but this new technology was the basis for the IMCO (today (IMO) declaring the testing resolution A393 X as international standard.

In 1994 the IMO resolution MEPC 60 (33) came into force as "tighter test". However the "tightening" was only the inclusion of a further testing fluid.
This was a heavy oil without precise definition, identified only by a density of at least 980kg/m^3.

One must take a straight look at the facts and determine that as a result no improved technology was made available to shipping and more harm than good resulted to the image of the bilge water de-oiler than suits the very few manufacturers of good de-oilers.

In order to separate good technology from poor "sales achievers" we urgently require a new test regulation for bilge water de-oilers.

Based on the IMO MARPOL resolution MEPC 60 (33) and the knowledge from various tests with the most varying oils and combustibles as these are used in shipping, but also with other substances such as cold cleaners and dirt which occur in ship operation, a new test regulation has been developed and presented to the responsible expert bodies.

The necessary improvements in the separating technology were initiated by military demands, however solely for environmental protection reasons.

As mentioned, in practice not only the water/oil mixtures required by the old test regulations occur but also modern highly additive oils and combustibles with a completely different separating behaviour.

Since cold cleaners, corrosion protection materials and contamination in the bilge water also occur a new test regulation must take account of this mix of "contamination forms" in bilge water.

Fundamentally it would be ideal to use real bilge water for the tests. However since in practice this always differs in its composition and it is difficult to make genuine and always identical bilge water available to all testing stands, a solution should be found which enables a uniform simulation of approximately real bilge water compositions for all testing stands so that bilge water de-oilers to be tested are tested under the same conditions everywhere.

Account should be taken of the fact that bilge water de-oilers work in accordance with the mechanical-physical principle with the result that **no chemical separation processes** are carried out.

At this point reference should be made to the fact and point 1.1.3 of the IMO MEPC 33/20 recalled that the use of certain substances on board is fundamentally reconsidered.

Thought must also be given as to whether by means of a sensible selection of substances used (INPUT) in a closed system as is represented by a ship, the avoidance of errors can be optimised and as a result can lead to clean waste water in the sense of the bilge water processing which is de-oiled without problems and then thrown overboard (OUTPUT).

The reference to the fact that gravity de-oilers are not in a position to separate over the spread of the media used and in particular mechanical emulsions, is wrong!

Unfortunately this paragraph applies to a very great number of bilge water de-oilers since they are not in a position to reliably separate very small oil droplets in the range of 1-100 micron. There are however systems on the market which today already have the technical possibilities for separating oil droplets up to the solubility threshold.

Shipyards and ship owners could therefore make use of this good technology were the price not to be so often the deciding factor instead of ability to function and economic efficiency.

In a new IMO MARPOL test for checking the ability to function of bilge water processing systems account should be taken of the actual ships operation and instead of just one type of oil or combustible respectively a mixture of possible "forms of contamination" which can occur in bilge water should be added to the test water. These substances include:

- Waste water from various leaks, perspiration, condensation and cooling water
- Oils from various lubrication processes or areas of use i. e. lubrication oils, hydraulic oils, gear oils etc.
- Combustibles of all forms: heating oil, heavy oil, diesel etc.
- Cold cleaners
- Solid matter i. e. muck and dirt particles
- Corrosion protection materials

Since the main phase of the bilge water is aqueous the waster waters from leaks stated first which can be burdened with all of the substances set out below constitute the main contamination.

In terms of frequency these are followed by corresponding oils and combustibles but also cold cleaners and solid matter.

As a result, under consideration of the use relations of various oils, combustibles and other "forms of contamination" the regulation set out below would result for the composition of the "artificial bilge waters" which concerns itself with the addition of an "oil and other component mixture" instead of with the addition of a single oil.

The basis for the trials is however still the trial run described in the MEPC 60 (33) which requires only one change for the performance of the testing alternative proposed.

In ships operation the waste waters in the bilge are subject to a mechanical application of energy and on the way to the bilge water de-oilers pipelines, dirt catchers and valves are further points which lead to turbulence and thus to very small oil droplets in the bilge water. Therefore every de-oiler manufacturer should prescribe binding pipeline diameters for each bilge water de-oiler to be tested and, in addition when testing, a pipe stop plug should be built in before the entry of the de-oiler. This should simulate the bilge water drainage system.

With regard to the pump capacity set out under annex 10 in point 1.2.5 reference must once again be made to the fact that for bilge water de-oilers which work in accordance with the suction principle the pump capacity must be 1.5 x nominal capacity! For example a device with a specification capacity of $5m^3/h$ requires a 7.5 m^3 pump in order to live up to the IMO requirement.

This factor does not apply for pressure de-oilers since pressure de-oiler pumps correspond to the capacity of the pressure de-oilers.

Resume: Modification of the IMO MARPOL test for checking the ability to function of oil separation installation as per MEPC.60 (33) under more realistic conditions.

In order to check realistic conditions in the testing of bilge water de-oiling systems as they occur in practice (i. e. mixed components in the bilge and not just a single oil as is thus far to be deduced from the test regulation), as a third test the performance of the test should be carried out with a "test mixture" so as to live up to the simulation of more realistic conditions.

Composition test fluid for the testing of bilge water de-oilers

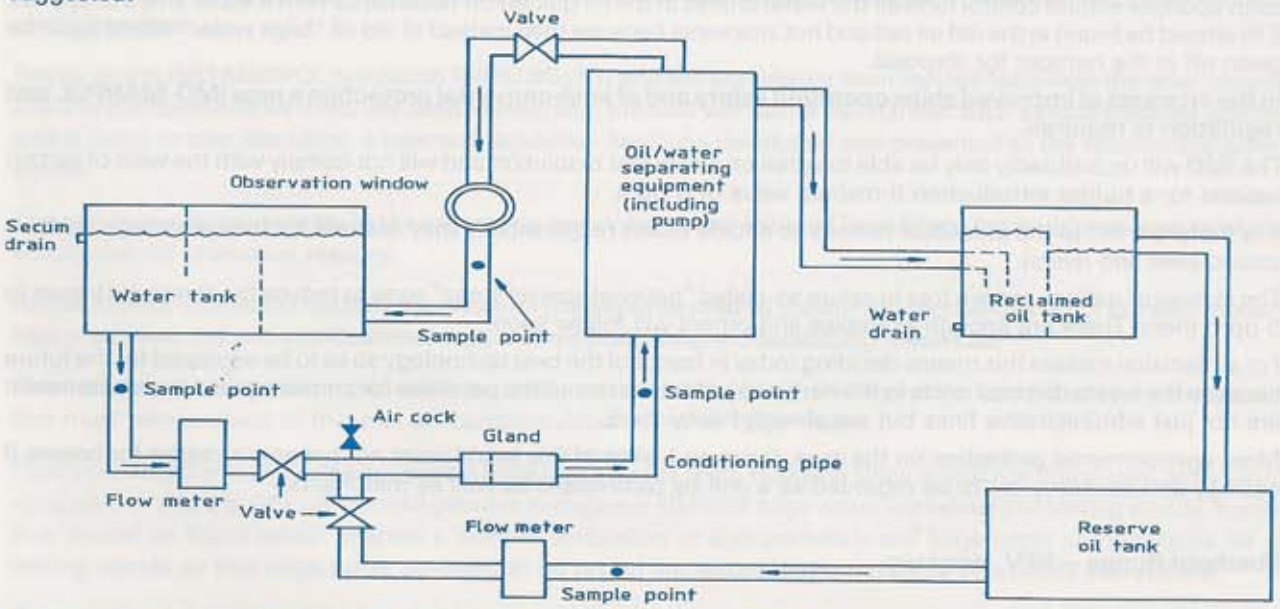
Media temperature (water with a density of 1015 kg/m³ and oil) during the test: max. 20°C

Serial No.	Test medium				Modification
	Relative share in [%]	**Name**	**Viscosity at 40°C [cSt/mm²/s]**	**Density at15°C [kg/m³**	
1	30	Lubricating Oil	100	900	High alloy Lubrication oil e.g.: - Castrol TLX 3 - Elf Aurelia XT - 4055 - Chevron Delo 2000/30 SAE grade 4
2	2.5	Hydraulic oil	50	850	On the basic of Mineral oil
3	30	Diesel	7	890	
4	30	Heavy oil	>440	>990	
5	0.1	Cold Cleaner	-	-	Cold cleaner type as per recommendation of the de-oiler manufacturer who indicates with which cold cleaner he has tested his installation
6	0.01 *	Test dust	-	-	e.g. air cleaner dust + black iron oxide Fe2O3 as in the test of the oil in water Monitors
7	0.1	Corrosion Protection Material for Cooling water			

* Remarks: concentration in the water admission

Time sequence: as per old model

For more realistic test conditions which are similar to ships operation a modified testing stand as described above is suggested:



Mains water or rain water with a density of max. 1015 kg/m³ (15°C) should be prescribed as test water.

With regard to the water supplies or to the water admission in the test for checking the ability to function of oil-water-separation installations some observations are important: Point 1.2.7 in annex 10 of the MEPC.60(33) talks of a heating of the bilge water to a maximum of 40°C for de-oiling systems which require these temperatures and at the same time of a "normal ships bilge water temperature range of 10-40°C". Temperatures of 40°C do not constitute realistic average temperatures in the bilge area. The average temperatures in the bilge area are 10 to a maximum of 25°C.

An artificial temperature increase of the bilge waters to 40°C constitutes an enormous waste of energy in particular against the background of the sparing of resources. There is no technical justification for this since it is not necessary as a result of temperature independent systems for bilge water de-oiling. Therefore in this point too the adherence to realistic conditions must be striven for.

High water temperatures are a further environmental problem since with high temperatures the solubility of hydrocarbons in the water increases. In practice this can lead to a situation in which a bilge water is pumped overboard with more than 15 ppm and an oil film develops upon cooling in the sea which can lead to problems and fines.

Real average temperatures are in the range from approx. 10°C to 25°C, at these temperatures oil-water separation installations which are classified as "Environmentally friendly installations" or as "installations for the protection of the environment" should be in a position to work effectively.

Therefore in future the water admission in the IMO test structure should also contain waters with realistic temperatures. With the implementation of this proposal point 1.2.8 of annex 10 of the MEPC.60(33) would cease to apply.

The content of the oil tank should contain the mixture set out in the table and whose percentage shares are based on the entire capacity of the supplies storage tank. In this respect the individual "forms of contamination" should be homogenised mechanically in accordance with standard procedures. Of this mixture either 100 %, 1–5 % or 25 % oil is added to the test water during the test procedure in order to be separated in the device to be tested. The homogenisation should be repeated every 10 minutes in order to avoid creaming of individual components.

The time sequence of the test can be carried out in accordance with the regulation MEPC.60(33).

The test procedure for the checking of the ability to function of bilge water de-oilers is carried out based on the IMO MARPOL regulation, annex 10.

In this respect the first step of the test procedure constitutes the production of the mixture of "forms of contamination".

Following homogenisation of this mixture in the oil supplies container and the preparation and setting up of the bilge water de-oiling system as per the corresponding operating instructions of the de-oiler manufacturer, the working off of the artificially created bilge water is carried out with the device to be tested as per MEPC.60(33), annex 10, point 1.2.9 to 1.2.14ff.

During the performance of the test attention must be paid to ensuring that the stated capacity of the bilge water de-oiler is monitored continuously over the prescribed test period. In this respect the insertion of flow meters in the entrance lead of the de-oiler and in the oil lead is required.

It must be ensured that the test de-oiler adheres to the waste disposal capacity for which it is to be approved. For de-oilers which work in accordance with the suction principle this means that the admission of bilge water interrupted by reverse flow intervals must be taken into consideration in the capacity stated. Influencing of the capacity through reverse flow or other system steps does not occur with a pressure de-oiler system.

Each operator should control himself the water shares in the oil guided off because oil with a water share of approx. 5 % should be found in the old oil cell and not vice versa because then instead of old oil "bilge water" would again be given off in the harbour for disposal.

In the interests of improved ships operating safety and of environmental protection a new IMO-MARPOL test regulation is required.

The IMO will undoubtedly only be able to agree on a new test resolution and will not comply with the wish of certain nations for a tighter introduction threshold value of 5 ppm.

It is therefore left to the individual nations to decide which responsibility they assume for their sovereign territory (coast, seas and rivers).

The individual nations remain free to set up so-called "national special areas" so as to reduce the threshold values to 5 ppm there. There are enough examples and others will follow soon.

For all decision makers this means deciding today in favour of the best technology so as to be equipped for the future because the waste disposal costs in the harbours will increase and the penalties for crimes against the environment are not just administrative fines but are already heavy fines.

More environmental protection on the seas, rivers and lakes of this world must not become a matter for bosses if ecology and economy are to be regarded as a unit by technicians as well as merchants.

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