



## Performance Analysis Of Fuel Oil Purifier Filtration Process On Ships MV. TANTO LUAS

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### Abstract

*Fuel oil purifier on board is one of the auxiliary aircraft that plays an important role in separating fuel from water and dirt. The use of clean fuel is to support the operation of the main engine in producing complete combustion. Therefore, it is necessary to analyze the problems that may occur with the performance process of the F.O purifier such as the abnormality of the Fuel Oil filtration process on the F.O purifier to anticipate the influence that arises if this aircraft has problems cleaning the fuel from liquid and solid impurities. This research was carried out on board the MV. TANTO LUAS fleet owned by pt. TANTO INTIM LINE, which was carried out for approximately 9 months. The data collection method used in this research is the observation method (observation research method). Primary data here are obtained from direct observations and secondary data are obtained from documents and literature related to this study. The results obtained from this study show that damage occurs and improper installation of the gravity disc can adversely affect the performance of the purifier. This is characterized by the abnormality of the F.O purifier purification process which results in unclean fuel being wasted out and accommodated in the sludge tank. The corresponding temperature is 85°C and viscosity is 37.8°C (100°F).*

*Keywords: Filtration, Fuel Oil Purifier, Ship Fuel*

### 1. Introduction

Every engine that uses fuel as a power plant through the combustion process of the engine, needs to get regular maintenance, both fuel and the engine in order to function properly.

To avoid the occurrence of a problem in engines that use fuel as a power source, it is necessary to clean the fuel starting from the double base tank, settling tank, discharging tank until before entering the injector.

The separation process is carried out by settling before entering the discharging tank. The use of oil must go through a separator called a purifier, where this tool serves to separate oil, water and sludge. In addition, this tool also functions to clean fuel and lumas oil from dirt and water content before being used in the engine.

Therefore, the role of the purifier on board is very important in the fuel cleaning process, so that damage to the engine due to the use of less clean fuel can be reduced.

In operation, the purifier does not always work properly. Purifiers experience disturbances that can interfere with the fuel purification process, and can even thwart the purification process so that the filtration results are less than optimal.

To maintain the work process of the purifier, it is necessary to carry out periodic maintenance, thus damage to the filtration process in an operation can be suspected, this is the background for the author to take the title: PERFORMANCE ANALYSIS OF THE FUEL OIL PURIFIER FILTRATION PROCESS ON THE MV SHIP. TANTO IS SPACIOUS.



## 2. Research Methodology

The type of research used is qualitative research. Qualitative research is research that presents data in verbal (oral / word) form and not in the form of numbers. Qualitative research according to Koentjaraningrat (1993: 89) means that qualitative research is a research design that has three formats. The three formats include descriptive research, verification and grounded research formats. Qualitative research is one of the studies that is more suitable for use for unpolated research. Because it is patterned, you can use this design to help in research. According to David Williams (1995), qualitative research is an effort by researchers to collect data based on a natural background. Of course, because it is done naturally or naturally, the results of the research are also scientific and can be accounted for. In this qualitative descriptive method, the research that researchers conduct during marine work practices is about problems in F.O purifier which includes the performance process of the F.O purifier. The study was conducted by researchers during their time on board the ship. There are examples of problems that researchers encountered on the F.O purifier auxiliary aircraft on board the MV. TANTO LUAS is the filtration process of fuel oil in the F.O purifier so abnormal.

## 3. Results and Discussion

The ability of the purifier is to separate between water, fuel oil and sludge, this is greatly influenced by the size of the gravity disc because in the oil purifier it will rotate, then the gravity disc is attached. If the specific gravity of the fuel oil entering the purifier changes, then the midline ratio (diameter) must be changed and the ring is a gravity disc. So that the fuel oil and water do not come together or re-mix when the water and oil come out, a gravity disc is attached.

Gravity discs work on the basis of differences in the specific gravity of liquid substances received in this case fuel oil that enters the purifier which is carried out in the centrifugal field. Due to the specific gravity and centrifugal force, part of the water is successfully pressed by the oil so that the water comes out and the separation limit shifts outwards, until it reaches a balance, where the separation limit will remain as long as the specific gravity of the oil is fixed and the additional oil will come out in line, especially the oil exit.

Below are some of the causes of over flow in slugging port due to the presence of component parts in the purifier that do not work perfectly, as for these components are:

### a. Damage to the Main Seal Ring

Seal ring is a bowl body device with a main cylinder so that when the purifier operates, normally water (closing water) can push pressing the main cylinder down and vice versa.

### b. Installation Factors

At the time of installation of the seal ring should be accompanied by thoroughness and correct technique. The installation of a seal ring that is not tight or partially twisted (rotating) will cause between the bowl disc and the main cylinder there is a gap. so that fuel oil that has not had time to separate with water and dirt will come out through the cracks between the bowl body and main cylinder as a result of which fuel oil that has not been clean comes out through the sludge port and causes an over flow purifier.

### c. Age Factor

Damage to the main seal ring is influenced by age factors because this component is made of rubber material which over time will become tenuous and when it has passed the maximum working limit automatically the properties caused by the seal ring no longer function as a good sealer. Sometimes even though the age of the seal ring has not passed



the maximum limit, it has already been damaged or is not functioning properly.

This can be because the quality and material of the ring seal are of low quality or improper maintenance planning (periodic maintenance) will cause leaks in the system so that the filtration process of the fuel oil purifier becomes abnormal

#### **d. Jamming of the Pilot Valve Cover**

This tool serves to regulate the exit of the closing water flow in the pilot valve, during the opening process of the operating water bowl. The process of opening water entering presses the pilot valve inwards so that the pilot valve which used to function to close the closing water press chamber opens and drains the closing water, but with the scale attached to the pilot valve causes a closure bottleneck. The pilot valve cannot close the closing water press chamber so that the closing water flows out and causes a leak.

The scale that blocks the movement of the pilot valve comes from the use of water from the press on the cylinder valve when operating, it is this water that contains lime substances and other materials. The process of stepping / stacking scale on the pilot valve so that it covers the closing water press chamber, as a result of which the leak occurs because the closing water is unable to press the cylinder valve upwards this results in a less normal fuel oil purifier filtration process in producing clean oil.

The filtration (separation) process in the fuel oil purifier is supported by several factors, namely: the specific gravity of the fuel oil, water dam, gravity disc, rotation of the bowl disc which produces centrifugal force, viscosity and temperature.

Starting from the inclusion of water through the distributor which then through the legs of the water distributor will be thrown out by centrifugal force and attached to the wall of the bowl (the purpose of filling water is to make a water seal or water dam that can hold oil from escaping into the waterway) after the water flows out through the waterway.

Then the dirty oil that is put through the distributor because the specific gravity of the fuel oil is smaller cannot penetrate the water dam. While the water contained in the oil will join the water dam and by the insistence of the oil and water will part the water flows along the top of the top disc and passes the bowl through the gravity disc, the water exits the water channel while the oil will flow towards the center through the top of each bowl disc which eventually leaves the bowl as clean oil through the ring level and pumped out through the outlet.

This dividing line can be adjusted through the physics lesson approach, which is to create a balance by installing a water dam ring or gravity disc that can affect the fixed location of the dividing line. This gravity disc varies in size in its inner diameter, the larger the size of the inner diameter the more out of the position of the dividing line, on the contrary, the smaller the inner diameter of the gravity disc will shift the dividing line inwards.

if we install a gravity disc that is the smallest inner diameter so that it closes a special water road, then what happens is that this purifier will change its function to a clarifier.

To produce optimal fuel oil filtration and avoid lube in the purifier, the wait for the gravity disc must be adjusted to the gravity specifications and viscosity of fuel oil given at the time of the bunker, so that the temperature obtained is as desired.

To get the perfect fuel oil filtration results and avoid the occurrence of subsidizing fuel oil in the purifier. The wait for the gravity disc must be in accordance with the gravity disc specifications and the viscosity of fuel oil received at the time of the fuel bunker.

so that we determine the temperature of the fuel oil when it is separated through the purifier. Fuel oil with 180 Cts temperature 110°C – 112°C or fuel oil 380 Cts temperature 125°C – 145°C.



The installation of a gravity disc adjusted to this specific gravity is very important because of its large influence with the separation limit between oil and water. If the installation of the gravity disc does not match between the size of the old diameter and the diameter of the new gravity disc will be installed. If this happens, the result of fuel oil removal is not optimal because the larger the inner diameter of the gravity disc, the more out of the dividing line position.

The type of gravity disc is determined in the table below. This can be seen the difference in gravity discs in diameter from various gravity discs. Here is a comparison of Gravity Discs with their specific gravity.

No.	Gravity Disc Diameter (mm)	Comparison (Specific Gravity)
1	63	0,900
2	64,5	0,965
3	60,5	0,956
4	68	0,930
5	70	0,920
6	73	0,880
7	78	0,870
8	84	0,840

Specific gravity ( specific gravity )

For this gravity (bj) specification obtained when the bunker (certificate of quality) issued by the bunker, the results of this gravity specification are issued by the laboratory. This is usually expressed as fuel density depending on the density of individual components kg/m<sup>3</sup> or g/cm<sup>3</sup> at 15°C. Fuels can have very identical densities but various components of individual density. In addition to the specific gravity indicator of the fuel. when measured with a hydrometer the specific gravity can be used to calculate the amount of fuel in the tank according to the given dimensions. Here's The Standard Value For Fuel.

Fuel	SG (g/cm <sup>3</sup> )	Flash Point (°c)	Lower CV (kj/kg)
Gas oil	0.82 - 0.86	65 - 85	44000 - 45000
Diesel oil	0.85	65	44000
Heavy fuel	0.9 - 0.99	65	40000 - 42000
( 200) secs Redwood No. 1-3500 secs Rewood No.			

## 4. Closing

### a. Conclusions

Based on the results of the discussion analysis, it can be concluded that several things are as follows:

- 1) The result that can be analyzed from the performance of the purifier is that the filtration performance process is abnormal, so the suitability between the gravity disc, the specific gravity of the viscosity and temperature of the fuel oil here is still not appropriate which greatly affects the production of fuel oil cleaning.



- 2) Because the operation of the purifier is not considered, especially in temperature and viscosity than the fuel.

#### **b. Suggestion**

- 1) If there is damage to the gravity disc, immediately wait according to the standard size that has been determined by the maker.
- 2) If the fuel oil temperature is not right to clean the oil in the purifier, then immediately make adjustments / adjustments to the heater.

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