

Oil Care on FISHING VESSELS



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Preventive maintenance through
more efficient oil filtration



Compendium

Clean Oil - Bright Ideas

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Sept. 2007



www.cjcdk



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Oil Care on Fishing Vessels

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PREVENTIVE MAINTENANCE THROUGH MORE EFFICIENT OIL FILTRATION

1. Perfect Oil Care for the Fishing Fleet

As a Skipper choosing the right oil cleaning equipment can be difficult. Just look at the following example (fig. 1).

This system is equipped with two highly effective in-line filters. Anyhow the hydraulics is causing problems at full load and after less than 3,500 hours an oil change and system cleaning are due.



Fig. 1: Hydraulic oil tank on offshore-application

The Offline Principle

An off-line filter (see fig. 2) is the kidney of an oil system; working under constant low pressure and low flow it is ensuring effective filtration and total protection of the oil and the machine components 24 hours a day.

By taking the oil from the lowest point and returning it to the top of the tank you ensure that all particles, water and oxidation deposits are removed, cleaning both oil and tank at the same time.

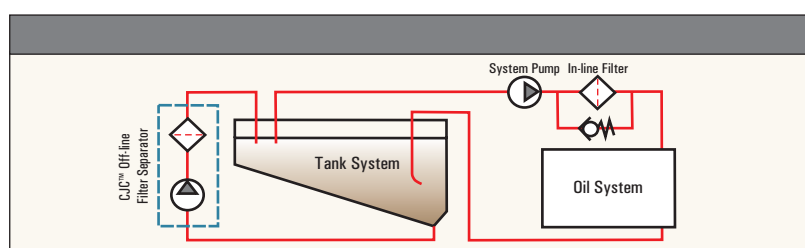


Fig. 2: Off-line installation, hydraulic system

An in-line filter is designed to work under varying flow and pressure conditions. Due to this it requires an extremely low differential pressure drop over the filter insert in order to be efficient. This, however, results in a very low dirt holding capacity and expensive replacement elements. An in-line filter mounted in an off-line circuit would block constantly. An off-line filter, however, combines fine filtration with a high dirt holding capacity, offering long service intervals and low operating costs.



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Every CJC™ Insert can hold 4 litres of contamination. On a lube oil system this amounts to approximately 10 kg per element and up to 160 kg in total.

The secret of the CJC™ Filter Insert is that it uses both the surface and the depth of the insert to remove contamination. See fig. 3, below.

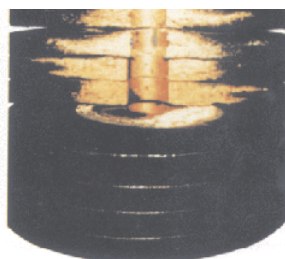


Fig. 3: Cut in a used CJC™
A 27/27 Filter Insert

The CJC™ Insert removes/absorbs:

- * PARTICLES
(down to 0.8 µm)
- * WATER
- * OXIDATION PRODUCTS
(Resin)



Fig. 4: Various CJC™
Filter Inserts

There is a suitable off-line filter for all of the oil systems you have onboard your vessel. Some have automatic water discharge, some pre-heaters and some are just units with filter and pump but there is always one that suits your needs and your wallet.

Fig. 5: Various CJC™ Products



CJC™ Fine Filter
HDU 27/27 P



CJC™ Fine Filter
HDU 27/54 GP-E2PT



CJC™ Filter Separator
PTU 15/25 PV



CJC™ Filter Separator
PTU1 27/54 P-E2PW



CJC™ Filter Separator
PTU2 27/27 PV-E2W

The following pages will give you an introduction into the world of filtration. The information is focused upon the oil systems on board your vessel. But remember the best contact is always personal, so if you have an oil-related problem or just wish to extend the life time of your components and oil, please do not hesitate to contact us.



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2. Diesel Engine Lube Oil Filtration

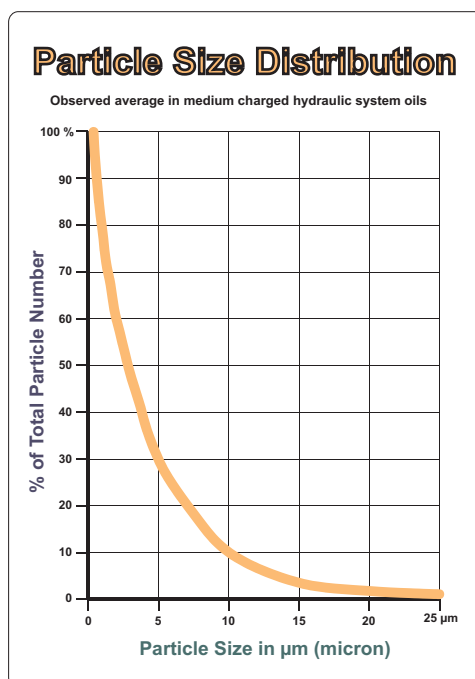


Fig. 6: Normal size distribution of particles in an averagely contaminated oil

The lube oil of a diesel engine is constantly contaminated by combustion blow-by debris and metal particles. The smaller combustion particles damage the oil, accelerate oxidation and thereby lead to decreased TBN, increased viscosity and oil change. However, most harmful to the engine parts are the solid 3-15 µm particles, causing wear, blockage, fatigue and bore polishing in bearings, liners, camshafts etc.

The factory mounted full-flow filters are always coarse, filtering in the range of 25 µm, only gives very little protection as less than 2% of the particles in an engine lube oil is 25 µm or larger.

When filtering diesel engine lube oil it is very important that you take the high contamination ingress into consideration. You have only two options: centrifuges or filters with extremely high dirt holding capacities.

When used right, the centrifuge can remove particles smaller than the mechanical filter is able to. However, only if it is adjusted very accurately, which rules out self driven centrifuges. Due to improved dispersant additives in the oil, the oil has to be heated for the centrifuge to be effective. This has a negative effect on oil life time and increases running costs.

Comparisons show that centrifuges are 2-3 times more expensive than the equivalent CJC™ Filters; both in purchase - but also in running costs.

By using a cellulose filter element it is possible to remove both combustion debris, particles and water at normal working temperature.

On top of this the cellulose filter insert reduces the problem with liner lacquering.



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CJC™ Fine Filter HDU 27/27

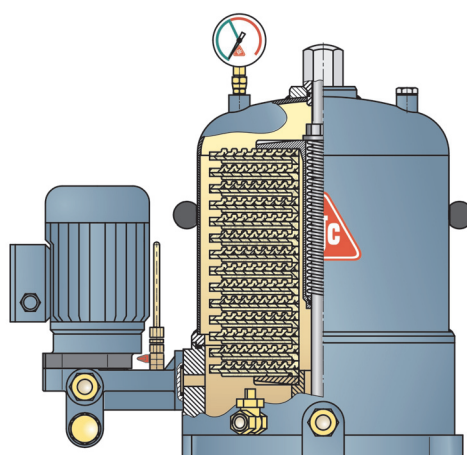


Fig. 7: Cut drawing of CJC™ Fine Filter

The largest CJC™ Off-line Fine Filter has a dirt holding capacity of 160 kg and an internal surface of more than 18 m². This ensures you service intervals of up to 12 months, and during this period no additional service is needed.

Furthermore, the large surface makes it possible to absorb large amounts of oxidation products (resin).

Dimensioning Table

Engine kW	CJC™ Fine Filter	Dirt Holding Capacity
> 500	HDU 27/54 PV	20 kg
500 - 700	HDU 27/81 PV	30 kg
700 - 1200	HDU 27/108 PV	40 kg
1200 - 1800	HDU 2*27/81 P	60 kg
1800 - 2400	HDU 2*27/108 P	80 kg
2400 - 5000	HDU 427/108 P	160 kg

Fuel: Gas Oil M1/Marine Diesel Oils M2-3

Results:

Tests show that using a CJC™ Fine Filter on your engine will prolong the life of your engine parts by four times or more. Contact us if you would like to see copies of the test documentations (see last page for contact details).



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3. Filtration and Water Separation from Light and Medium Diesel Fuel

As skipper you are never able to control the quality of the fuel you are bunkering. The quality conscious skipper takes samples and keeps them for a year, but yet contamination in terms of particles, micro bacteria and water is not inspected before bunkering.

This means that the most important component of your vessel, the engine, is exposed to fuel contaminants that will severely damage engine parts such as fuel pumps and injection valves, leading to engine break down, expensive repairs and most importantly: lost days at sea.

No matter the size of your engine it is highly recommended to give fine filtration and water separation of fuel high priority.

There are several installation principles to choose from for fuel filters. Based on experiences and tests we always recommend installing our filters between the settling tank and the day tank as illustrated in fig. 8 This way you get continuous filtration even when the engine is not running, and that ensures permanently dry and clean tanks.

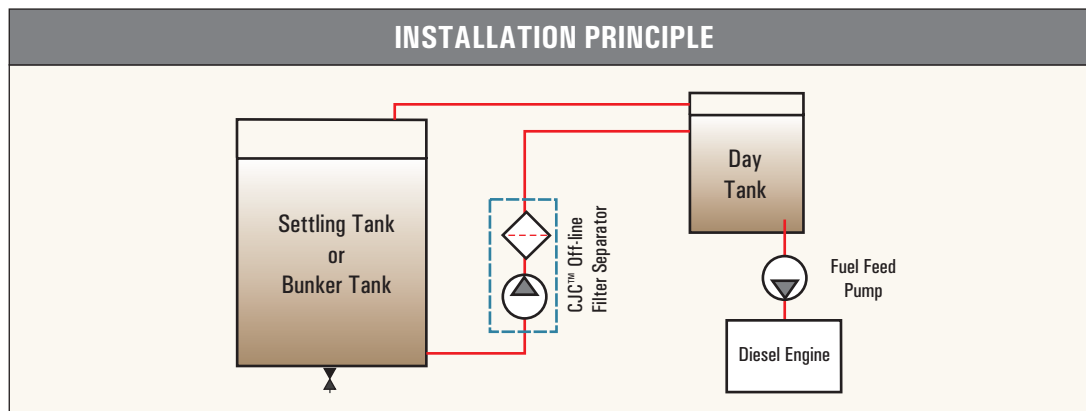


Fig. 8: Installation principle for fuel oil filter separator

However the most important reason for this installation principle is the fact that fishing vessels very often are exposed to bacteria, yeast, moulds and fungi development in fuel tank systems. Entering through air vents and other tank openings, they are always present in the fuel, normally without causing problems, but if they are allowed to reproduce and multiply the problem can rapidly turn out to be severe.

To reproduce the bacteria needs water, nutrients such as sulfate and nitrate and temperatures between 10°C and 25°C.



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Bacteria will result not only in inside-out corrosion in tanks but also a sludge from dead cells in the bottom of the tank in a glutinous form. If ingressed and condensated water is not drained regularly from the tank and if the vessel is exposed to heavy swell and rolling these dead cells will be disturbed and carried over into the fuel injection system. The low capacity full-flow duplex filter blocks both chambers instantly and fuel supply to the engine is cut. If a by-pass is installed the sludge will be introduced directly into the engine, and injectors and crankcase will be exposed to rapid inside-out corrosion.

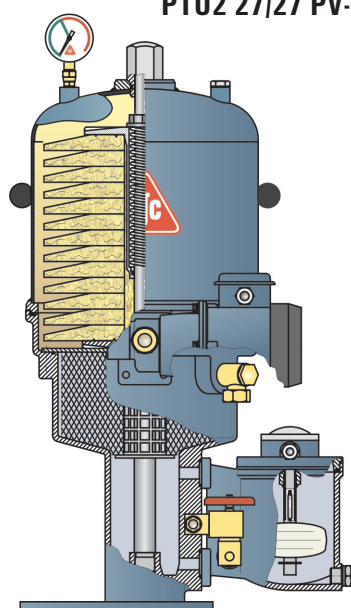
Several instances have been reported where ships entering a harbour with tough waters have had an instant fuel cut due to bugs or water contamination. In some cases the skippers were not able to restart before the next wave at high force slammed the vessel into the quay.

The CJC™ Filter Separator removes both water, particles and bacteria in one and the same operation. Installed before the day tank, it ensures a water free fuel tank and entering bacteria will die in very short time. The bacteria are actually starved to death without any use of chemicals.

This is the environmental friendly debug system.

The efficiency of systems separating by means of gravity, like centrifuges, is dependant on the flow of the supply pump. Is the flow set too high, particles, bacteria and water will pass through without being separated. This, however, is not possible in a system based on a mechanical filter with a fixed filtration rate.

CJC™ Filter Separator PTU2 27/27 PV-E2PW



Hence the CJC™ Filter Separator is a preferred alternative to centrifuges and purifiers, as it offers more efficient operation and less maintenance at very competitive prices. A fact that 80-90% of the Danish fishing fleet have acknowledged and benefited from, particularly on gas oil filtration.

The CJC™ Filter Separator is dimensioned on the basis of the vessel's total gas oil consumption per hour in max. load. Flow capacities from 45 - 11,000 l/h are available. Please consult the table next page.

Fig. 9: Cut drawing of CJC™ Filter Separator



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Dimensioning Table		
Diesel Engine kW	CJC™ Filter Separator	Pump Flow
180	PTU 15/25 PV	45
360	PTU2 27/27 PV-E2W	90
480	PTU2 27/27 PV-E2W	120
800	PTU2 27/27 PV-E2W	200
1600	PTU1 27/54 P-E2PW	400
2400	PTU1 27/81 P-E2PW	600
3200	PTU1 27/108 P-E2PW	800
4800	PTU1 2*27/54 P-E2PW	1200

In order to secure dry and clean oil not only in the day tank, but also in the bunker tank, a return flow between the tanks of 50% of the fuel consumption in max. load is required.

Results:

3 µm absolute particle removal and water separation will result in up to 5 times extended component lifetime on fuel pumps, injection nozzles and engine in-line spin-on filters, higher operational reliability, improved combustion and reduced fuel consumption.



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4. Filtration and Water Removal from Hydraulic Oil

Hydraulic equipment is a very essential part of many fishing vessels of today. Characterized by high flow and very small tolerances, it stresses the oil more than any other oil system on board. Stressed oil needs, as stressed people, patience and regular care and attention in order not to break down.

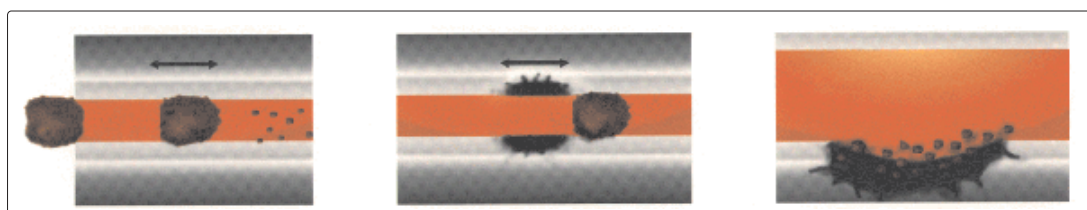


Fig. 10: Example of seizing on oil lubricated surfaces

On fishing vessels all hydraulic equipment is often driven by one central pump station. This means that a break-down in a secondary system is able to contaminate the oil in all other systems, resulting in similar break-downs. No pressure filter can protect the central pump, only an off-line filter can control the level of both particles, water and resin.

With tolerances between 1 and 5 μm the hydraulic components are very sensitive, and a particle sized as the tolerance can enter and damage the surface of components (see fig. 10).

Larger particles cannot enter and the smaller particles only cause a sand blasting effect that, contrary to seizing, does not lead to immediate break-downs (see fig. 11).

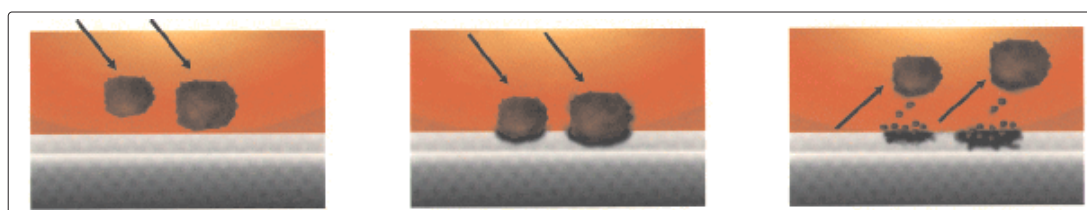


Fig. 11: Example of the "sand blasting" effect of particles on inside component surfaces

On fishing vessels water contamination is often sea water which accelerates the corrosion process. Also, small water droplets, due to the extreme pressures in the hydraulic system, may cause implosions and consequently cavitation. Such an implosion can be compared to an explosion that blows off metal parts and creates serious wear and eventually break-downs.



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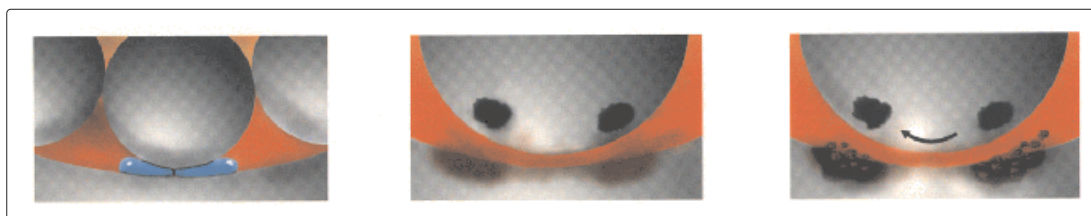


Fig. 12: Example of implosion

Typical for these wear problems due to particle and water contamination is the fact that particles generate new particles.

Have you ever experienced hanging valves and net haulers that run askew?

80% of all break-downs in hydraulic systems are related to contaminated oil, but above mentioned problems are due to break-down additives and oxidation products that are normally referred to as resin. The resin is deposited around the system on valves, cylinder liners etc., forcing the equipment to operate under different flow rates and pressure drops than it was designed for.

To remove it you need to stop fishing, dismantle the valve and clean it. Or you may install a CJC™ Fine Filter that absorbs resin.

Result:

A break-down in your hydraulic system will prevent you from fishing. A large scale survey including more than 700 hydraulic systems proves that it is possible to prevent 66% of all break-downs when using an off-line fine filter on the system. The same survey shows that it is possible to reduce the yearly maintenance costs by 50%.



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5. Gear Oil Filtration and Water Absorption

The most important gear box on your vessel is the reduction gear. Without one you lose propulsion.

Due to the heavy loads in this gear the oil film thickness is reduced to below 1 µm. Larger particles and water present in the oil will immediately lead to gear teeth pitting when exposed to these pressures and eventually to break-downs. At the same time the high pressures produce heat that, if not removed from the system, will lead to oxidation and oil change.

Therefore, fine filtration and water absorption are required, however, not to the same cleanliness levels as in your hydraulic system. The reduction gear operates perfectly with an ISO 15/13 (up to 32,000 particles per 100 ml oil). Therefore it is possible to control the contamination level in a gear box with a small CJC™ Fine Filter, even though the viscosity of the oil is high.

Dimensioning Table	
Oil Sump Volume	CJC™ Fine Filter Type
> 100 ltr.	HDU 15/25 PV
100 - 300 ltr.	HDU 15/25 PV
300 - 600 ltr.	HDU 15/25 PV
< 600 ltr.	HDU 27/27 PV

Results from real life:

The Danish registered vessel M/S Viking R suffered from contamination problems in a gear box and an oil sample was taken. The analysis showed heavy particle and silt contamination and therefore a CJC™ Fine Filter type HDU 15/25 PM, was installed.

Within the first month the problems disappeared and a second oil sample was taken. The results are obvious (fig. 13 and 14 below).

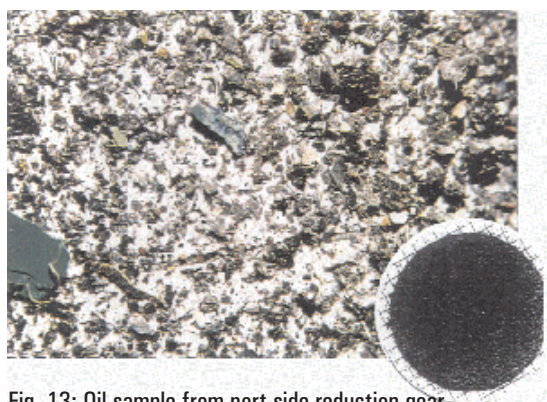


Fig. 13: Oil sample from port side reduction gear,
- without CJC™ Filter

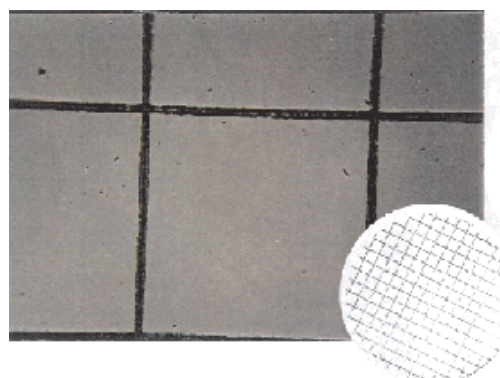


Fig. 14: Oil sample from starboard side reduction
gear - with CJC™ Filter

We have many more of these stories if you are interested in seeing others, or even better why don't we look at your gear ?



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6. Oil Sampling and Analysis

All the above-mentioned oil systems are operating with fine tolerances. Tolerances and clearances so small they are not visible to the human eye.

It is sophisticated equipment and should be treated accordingly. The first step towards reduction in repair is analysing the present situation through an oil sample that indicates both a precise particle count and a water level in ppm.

In order to get a true picture of the contamination level of the oil, you need to use a clean and a particle free bottle, preferably one of glass.

We can supply you with both glass bottles and a thorough instruction.

The oil sample should be analysed for particles according to number and size as in the ISO 4406 system. The standard oil sample stating a content of, for instance, iron in ppm has no value if it does not state the sizes of the particles. Remember it is only the smaller particles in the oil that enters and damages the valves in your deck machinery.

Max. number of particles per 100 ml of oil		
More than	Till	Class
8,000,000	16,000,000	24
4,000,000	8,000,000	23
2,000,000	4,000,000	22
1,000,000	2,000,000	21
500,000	1,000,000	20
250,000	500,000	19
130,000	250,000	18
64,000	130,000	17
32,000	64,000	16
16,000	32,000	15
8,000	16,000	14
4,000	8,000	13
2,000	4,000	12
1,000	2,000	11
500	1,000	10
250	500	9
130	250	8
64	130	7
32	64	6



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Example:

100 ml of oil is tested and the result is as follows:

Number of particles per 100 ml	> 2 µm	1,801,000
	> 5 µm	270,000
	> 15 µm	54,000

Using the table on previous page the results are transformed to ISO codes:

1,801,000 particles > 2 µm is equivalent to an ISO code 21

270,642 particles > 5 µm is equivalent to an ISO code 19

54,000 particles > 15 µm is equivalent to an ISO code 16

The ISO code according to ISO 4406 is in this case ISO 21/19/16.

The codes are built up logarithmically; an increase of only one class is a doubling of the number of particles. A one-class increase is therefore of dramatic importance.

N.B. If an ISO code only contains 2 figures these correspond to > 5 and > 15 µm.

ISO codes are used by producers of machinery to determine the maximum contamination levels acceptable to system components.

The following table is a guideline for the oil systems on board your vessel:

Oil System	Recommended ISO Code	Max. Water Content
Lube oil, diesel engine	17/14	2000 ppm or (0.2%)
Gas oil / marine diesel	16/13	300 ppm or (0.03%)
Deck hydraulics	14/11	300 ppm or (0.03%)
Reduction gear	15/13	500 ppm or (0.05%)
Thruster gear	15/13	500 ppm or (0.05%)
Steering gear	14/11	300 ppm or (0.03%)
Stern tube	17/14	500 ppm or (0.05%) ¹⁾

¹⁾ Dependant on the oil type with or without dispersant additives



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The diagram on previous page states the recommended maximum contamination level based on our and leading equipment manufacturers' experience. However, it is important to remember that every reduction in the ISO-code by one, doubles the life time of the component.

The right oil cleaning equipment will result in increased life time of components, high reliability and reduced production stops. This will earn you money in the long term, but a lot skippers report pay-back times as short as a few months after the purchase of a fine filter based upon the extended life of oil and in-line filter element replacements.

If you need expert advice on oil maintenance, C.C. Jensen A/S is at your service. Trust us - we have been in the oil care business since 1953.

Manufacturer

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Diesel Fuel Fishing Vessel - Diesel Engine

CJC™ Application Study

Application Study
written by:

Bryan Holden
C.C.JENSEN Ltd.
United Kingdom

2001

CUSTOMER

Vessel: "Natalie B"
Shipowner: Hatton & Westerman
Region: Isle of Man
Contact persons: Mr. Steve Hatton and Mr. Jim Westerman

THE SYSTEM

Deutz diesel engine, type KHD 650 HP

THE PROBLEM

After experiencing a number of engine breakdowns relating to fuel contamination Mr. Jim Westerman decided to fit a CJC™ Filter Separator for the fuel oil.

THE SOLUTION

A CJC™ Filter Separator PTU2 27/27 P with pump flow rate of 120 ltr/hr using CJC™ Filter Insert F 27/27 (3 µm absolute).

The function of the filter separator is to remove water and particle contamination from the fuel.

THE RESULT

Since the installation of the CJC™ Filter Separator Steve Hatton and Jim Westerman have not experienced any engine breakdowns.

Due to the success with the filter separator for the fuel oil Hatton & Westerman have also purchased a CJC™ HDU Fine Filter for the engine lube oil and a CJC™ HDU 15/25 for a hydraulic system.

After all three installations had been in operation for more than 18 months, no breakdowns had been experienced with any of the systems.

COMMENTS

Owner Mr. Jim Westerman:
"The fuel has never been so clean" and "It is as good as red wine".



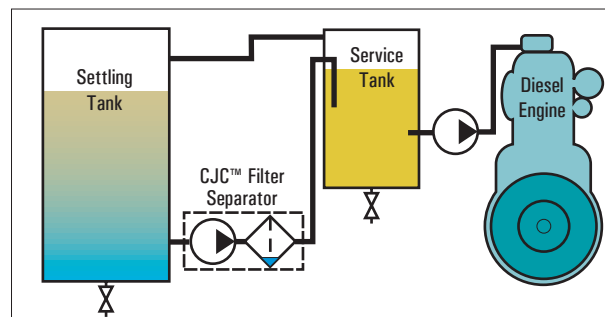
"Natalie B"



PTU2 27/27 P
for gas oil separation



HDU 27/54 P
for lube oil treatment



Installation principle for CJC™ Filter Separators
in marine diesel fuel systems.



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**Application Study
written by:**

Otto Kristiansen
Øvre-Johnsen AS
Trondheim

2004



Hydraulic Oil and Diesel Oil Fishing Vessel, Hydraulic Systems and Fuel Tank

CJC™ Application Study

CUSTOMER

M/S "Paul Senior"

KR: Paul Kåre Aandahl, Averøy.

PROBLEM

The vessel had a lot of water in the hydraulic oil and chose to install a **CJC™ Filter Separator PTU 15/25 PV** with water discharger and **CJC™ Filter Insert BLA 15/25**.

RESULT

After operating 3 days with the new filter, approximately 20 litres of water had been removed.



CUSTOMER

M/S "TOJAKO"

Shipowner: Kåre Gården, Averøy.

PROBLEM

The vessel struggled with a lot of seawater in the hydraulic oil, during hectic herring fishery in the Westfjord of Norway.

RESULT

After installing a **CJC™ Filter Separator PTU 15/25 PV**, with **CJC™ Filter Insert BLA 15/25**, the ship was able to complete the entire season without a single interruption or docking. The shipowner points out that this investment is one of the most profitable he has ever made.



CUSTOMER

M/S "SKLINNABANKEN"

KR: Jan Erik Johnsen, Toftsundet.

SYSTEM

Fuel tanks for storage of ballast.

PROBLEM

Ballast which gave off ore particles that further polluted the diesel oil.

RESULT

After the installation of a **CJC™ Filter Separator PTU1 27/54 P-EPW**, with **CJC™ Filter Insert 2 x F 27/27** for filtration of oil between the bottom tank and day tank, the diesel oil has been free of particles, and expenses for nozzles and diesel pumps have been reduced.

The vessel has also installed a **CJC™ Filter Separator** in the hydraulic system with a very good result.



COMMENTS

The CJC™ Filter Separator is used on all types of oil systems where water ingress is a constant or regularly problem. Often inserts intended for removing unwanted particles, must be replaced because they are saturated with water.

With a CJC™ Filter Separator running costs are reduced considerable because the filter removes particles even though it has absorbed as much water as possible.



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Hydraulic Oil Fishing Vessel - Hydraulic System

CJC™ Application Study

Application Study
written by:

Jacek Błazczak
C.C.JENSEN A/S
Poland

2002

CUSTOMER

Vessel: m/t "ATRIA"
Shipowner: Dalmore S.A., Gdynia
Country: Poland
Contact Person: Mr. Edmund Wojciszke

THE SYSTEM

Central hydraulic system 3,500 ltr. Castrol HYPIN AWHM 68 oil.

THE PROBLEM

The shipowner had experienced problems with the hydraulic system represented by hanging valves and trapped pistons. An investigation traced this back to high oxidation levels and particle contamination. Physically the oil was black.

THE SOLUTION

A **CJC™ Fine Filter HDU 27/54 MZ** with pump flow rate 590 L/h using **CJC™ Filter Insert B 2 x 27/27** (3 µm absolute).

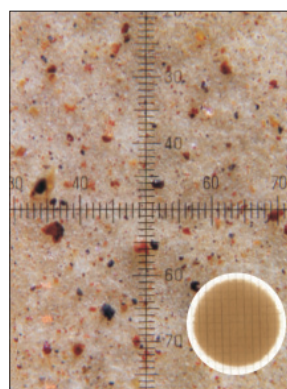
THE RESULT

Since the installation the CJC™ Fine Filter has been running 24 hours a day in order to effectively retain both particles and resin. The resin has been effectively removed by absorption into the filter insert.

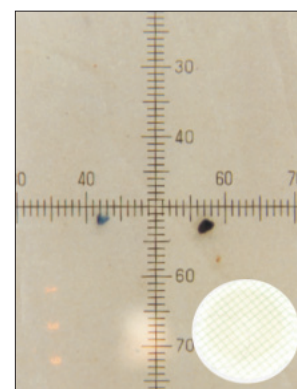
During 10 months of filtration the oil has been cleaned from ISO 4406 21/20/17 to 15/14/9. After the oil has been cleaned the hydraulic system operates without problems and the vessel's engineers can concentrate on other problems.



Fishing trawler and fish processing plant m/t "Ateria" in Gdynia Port.



Before filtration



After filtration

THE RESULT

Sample date:	09.11.00	11.11.00	23.11.00	07.12.00	22.10.01
Particle > 2 µm	1,508,416	1,392,976	700,336	801,374	19,246
Particle > 5 µm	559,240	357,814	147,592	132,098	11,073
Particle > 15 µm	76,928	20,747	24,413	14,278	351
ISO 4406 code	21/20/17	21/19/15	20/18/15	20/18/14	15/14/9
Colour membrane	Brown	1. brown	1. brown	1. brown	White
TAN mg KOH/g	0.871	0.757	0.717	0.737	0.548



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Hydraulic Oil Fishing Vessel - Hydraulic System

CJC™ Application Study

Application Study
written by:

Kim Kjær
C.C.JENSEN A/S
Denmark

2000

CUSTOMER

Vessel: E.443, M/S Britta Brock
Ship Owner: Mr. Kaj Brock, Esbjerg, Denmark

THE SYSTEM

Traditional hydraulic system
System volume:
500 litres of STATOIL, Hydraway HV 46 oil

THE SOLUTION

CJC™ Fine Filter HDU 15/25 PM, with pump
flow rate = 120 ltr/hour and containing one
CJC™ Fine Filter Insert BG 15/25 (3 µm abs.)

THE TEST

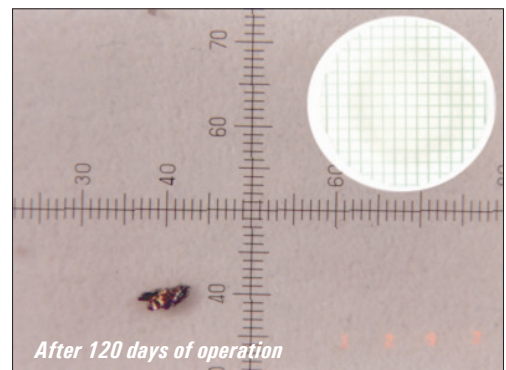
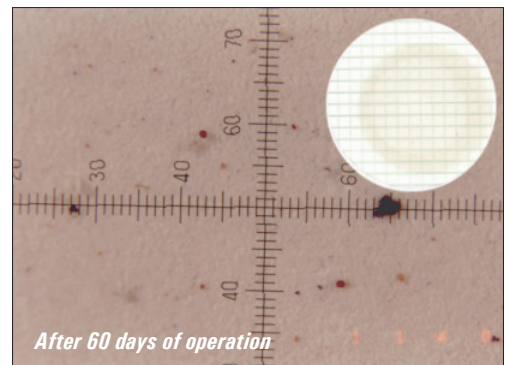
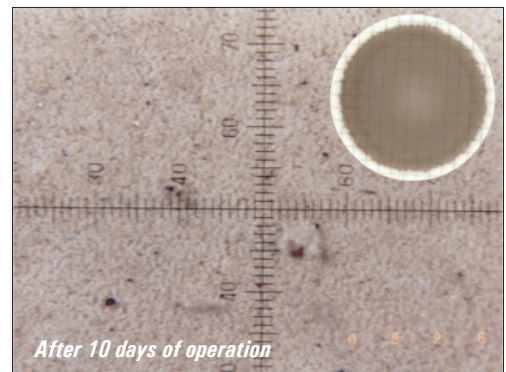
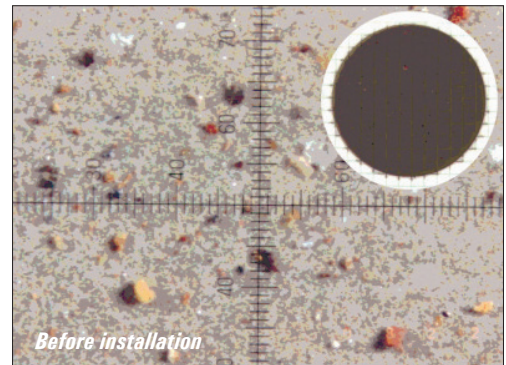
After having experienced several breakdowns in the hydraulic system, skipper Kaj Brock decided to optimise the oil filtration system. An oil analysis showed contamination 6 times higher than the acceptable level. The oil was categorised as "extremely contaminated with metal, sand and plastic particles, as well as heavy formation of oxidation products and water". Hence after the off-line filter was installed.

THE RESULT

Samples taken after 10, 60 and 120 days all showed dramatic reductions in contamination levels. Not only was it possible to clean the oil but also the oxidation deposits on valves, pipes and tank walls were removed. Even so the skipper only had to change the first insert after 160 days. The life time of the second insert is estimated at 12 months.

THE EFFECT

The achieved contamination level is well below the guidelines for hydraulic systems with proportional valves of ISO 17/15/12 recommended by, amongst others, the Danish Technological Institute. A survey on 700 hydraulic systems demonstrated that effective off-line filtration may prevent 66% of all breakdowns and reduce maintenance cost by up to 50% on oil systems.





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LIFE EXTENSION METHOD (LEM) - HYDRAULIC SYSTEMS

Current Machine Cleanliness (ISO)	Life Extension Factor (LEF)					
	2	3	4	5	6	7
26/24/21	23/21/18	22/20/17	21/19/16	21/19/15	20/18/14	19/17/14
25/23/20	22/20/17	21/19/16	20/18/15	19/17/14	19/17/13	18/16/13
24/22/19	21/19/16	20/18/15	19/17/14	18/16/13	18/16/12	17/15/12
23/21/18	20/18/15	19/17/14	18/16/13	17/15/12	17/15/11	16/14/11
22/20/17	19/17/14	18/16/13	17/15/12	16/14/11	15/13/11	15/13/10
21/19/16	18/16/13	17/15/12	16/14/11	15/13/10	15/13/9	14/12/9
20/18/15	17/15/12	16/14/11	15/13/10	14/12/9	14/12/8	13/11/8
19/17/14	16/14/11	15/13/10	14/12/9	14/12/8	13/11/8	

Source: Diagnostics, Inc.

The reductions achieved on M/S Britta Brock will extend the life time of the hydraulic equipment by a theoretical factor of 4 and improve oil life time accordingly.

ANALYSIS REPORTS

Date	> 2 µm	> 5 µm	> 15 µm	ISO 4406	Water Content
05.07.99	2,187,320	365,560	66,420	19/17	281.5 ppm
15.07.99	902,356	121,853	7,835	17/13	265.8 ppm
27.09.99	115,440	54,641	9,235	16/14	153.7 ppm
19.11.99	29,501	8,408	992	14/10	101.3 ppm

80% of all breakdown are caused by contamination in the oil.

With a CJC filter these are avoided!



The filter used on M/S Britta Brock is the HDU 15/25

The CJC Product line includes Fine Filters and Filter Separators for particle, water and resin removal from:

- Gas Oil
- Lube Oil
- Hydraulic Oil
- Gear Oil

Remember, there is a CJC Filter for all oil systems on board your vessel.



CLEAN OIL
BRIGHT IDEAS

Application Study
written by:

Jón A. Jónsson
Framtak Marine
Engineering
Iceland

2005

Hydraulic Oil Stern Trawler - Deck Winch

CJC™ Application Study

CUSTOMER

Vinnslustöðin Vestmannaeyjum
Stern Trawler: B/V "Jón Vidalin"

THE SYSTEM

Winch system type Fukusama medium-pressure oil system, 3,000 litres hydraulic oil, viscosity 100.

THE PROBLEM

The system was heavily contaminated with water and dirt. The oil was judged unfit for further use.

THE SOLUTION

To solve the problem a **CJC™ Filter Separator PTU2 27/27 PV** with a flow of 90 litres was used, together with a **CJC™ Filter Insert BLAT 27/27**. To save money on the installation, waste heat from the ship's central heating system was used to heat up the oil. The filter suction was taken from the bottom of the system's coarse filter, and the oil was returned to the system through the pipe from the expansion tank which is positioned on top of the bridge.

THE TEST

Three samples were taken: the first just after the installation, the next one month later, and the last one after seven months.

THE RESULT

The status of the oil went from unfit for use to fit for use without any comments in just 30 days. Water contamination dropped from 539 ppm to 57 ppm. The amount of particles also dropped. Three CJC™ Filter Inserts were used to remove the particles. Earlier, changes of inserts took place once a year. The payback time of the unit was one day, as the cost of renewing the oil was higher than the price of the unit!

COMMENTS

*Chief Engineer on B/V "Jón Vidalin" says:
"The CJC™ Filter Separator fulfils what was promised.
I don't hesitate to recommend the use of it to clean a dirty system with water problems and to keep it clean."*

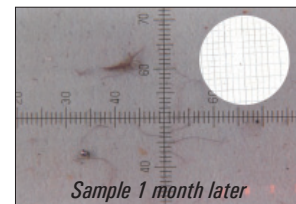
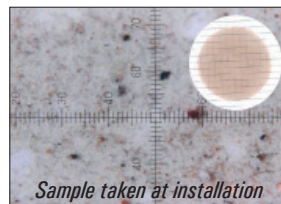


B/V "Jón Vidalin"



CJC™ Filter Separator
PTU2 27/27 PV

OIL SAMPLES



THE RESULT

	25.05.05	23.06.02	03.01.03
> 2 µm	1,254,327	54,680	43,641
> 5 µm	357,861	44,367	22,789
> 15 µm	84,656	20,086	2,193
Water, ppm	539.3	152.3	57.5



CLEAN OIL
BRIGHT IDEAS

Hydraulic Oil and Gear Oil Fishing Vessel, Hydraulic Systems and Thrusters

CJC™ Application Study

Application Study
written by:

Otto Kristiansen
Øvre-Johnsen AS
Trondheim

2004



CUSTOMER

Fishing Vessel: M/S "RAV"
Peter Hepsø Shipping Company Limited
Sandviksberget, Trondheim

PREVENTIVE MAINTENANCE

The shipowner had so good experiences with the CJC™ Off-line In-depth Filters on M/S "TRÅL" that it was decided to install similar filters on M/S "RAV".

CJC Off-line In-depth Filters have the ability both to remove particles and to remove water and oxidation deposits.

The CJC Filters are to maintain the oil and thereby the machinery.

The built-in in-line filters are not capable of functioning as a maintenance filter but secludedly as safety filters.

THE SOLUTION

System 1 & 2:

In the hydraulic systems a CJC™ Fine Filter HDU 27/27 P is installed and a CJC™ HDU 27/54 P with CJC™ Filter Insert B 27/27.

System 3:

To protect the Thrusters 2 CJC™ Thruster Units PTU2 27/27 PV-DEH1PW are installed with 2 heaters and automatic water dischargers plus CJC™ Filter Insert BLAT 27/27.

THE RESULT

Result Thruster 1 & 2:

Oil samples taken after 1 year of operation showed the following analysis results with method NAS 1638 with an oil cleanliness of NAS 2: Water content was measured to 70 ppm.

The tests were analysed by Cotax in Larvik.



M/S "RAV"

Modern trawler built by
Eidsvik Shipyard, constr. No 71.

Copyright: Photographer Harald M. Valderhaug



HDU 27/27 P



HDU 27/54 P



PTU2 27/27 PV



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Hydraulic Oil Fishing Vessel, Hydraulic System

CJC™ Application Study

**Application Study
written by:**

Kim Kjær
C.C.JENSEN A/S
Denmark

and

Jón Rasmussen
P/f Mekanik
Faroe Islands

2001

CUSTOMER

Vessel: F/V Sardis
Shipowner: Jonsvein Knudsen,
The Faroe Islands

THE SYSTEM

Hydraulic system with 2000 litres Shell Tellus 46.

THE PROBLEM

The shipowner experienced several breakdowns in the hydraulic system. An oil sample was taken and analysed by an independent laboratory.

The oil showed to be heavily contaminated with metal, sand, plastic particles, oxidation and water. The contamination level was 6 times higher than the acceptable level.

THE SOLUTION

CJC™ Fine Filter HDU 27/27 P containing a **CJC™ Filter Insert B 27/27 - 3 µm** absolute dirt holding capacity in litres.

THE RESULT

Samples were taken at time of installation, after 60 days and after 360 days.

The analysis showed that the CJC™ Fine Filter not only removed the particles from the oil but also the oxidation and water contamination.

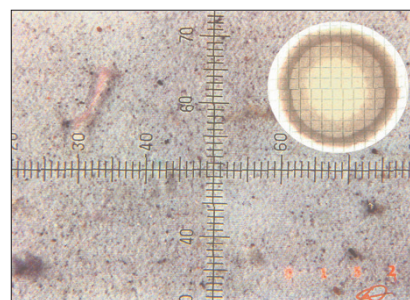
In the last sample the contamination level was reduced to ISO 12/11/6 and water content to 139 ppm. The first filter insert was changed after 160 days of operation.

The recommended contamination level is ISO 17/15/12. The results achieved with the CJC™ Fine Filter are better than the cleanliness levels recommended by Danish Technical Institute.

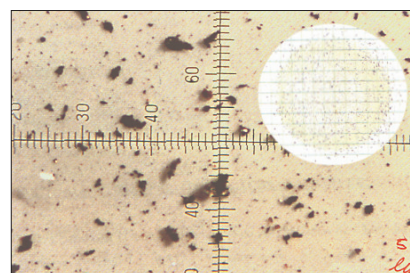
It is estimated that the lifetime of the hydraulic components as a direct consequence will be extended 10 times. The shipowner has also installed systems on the vessels F/V Topas, F/V Ametyst and F/V Smaragd.



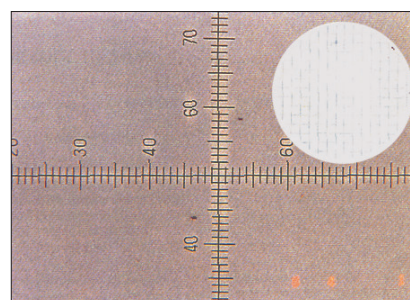
F/V Sardis



Test 1:
January 2000 - Without filtration



Test 2:
March 2000 - Filtration after 60 days



Test 3:
March 2001 - Filtration after 360 days



**CLEAN OIL
BRIGHT IDEAS**

Hydraulic Oil Deep Sea Trawler - Winch

CJC™ Application Study

Application Study
written by:

Jón A. Jónsson
V.S.Framtak
Iceland

2004



CUSTOMER

Skip: F/V Viking
Customer: Fiskafurðir (Fish Products), Iceland
Type: Deep Sea Trawler

THE SYSTEM

Hydraulic system: Winch
Volume: 3,000 L.
Type of oil: Caltex Rando HDZ 46

THE PROBLEM

Problems in the winch had resulted in a breakdown and particles had entered the oil. The goal was to try to save the oil.

THE SOLUTION

CJC™ Fine Filter HDU 27/27 P with a pump flow rate of 400 l/h, and a **CJC™ Filter Insert B 27/27**, which has a dirt holding capacity of 4 litres.

THE TEST

Oil was removed from the system and returned via the filter after the repair. The filter was then connected to the system offline. A sample was taken from the system after the filter had been running for an hour and then two more samples were taken later.

THE RESULT

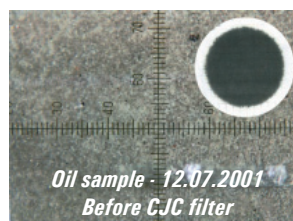
The oil was saved and the payback on the cost of the filter was one day. Today the Viking has a filter on the net winch hydraulic system, the pitch propeller, the lubrication oil system on its Cummins generator sets, the hydraulic system on the processing deck and also on the gearboxes of the big trawl winches.

COMMENTS

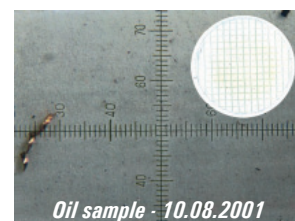
*Stefán Gunnarsson, Fish Products commented:
"After my experience with the equipment I can recommend it without hesitation."*



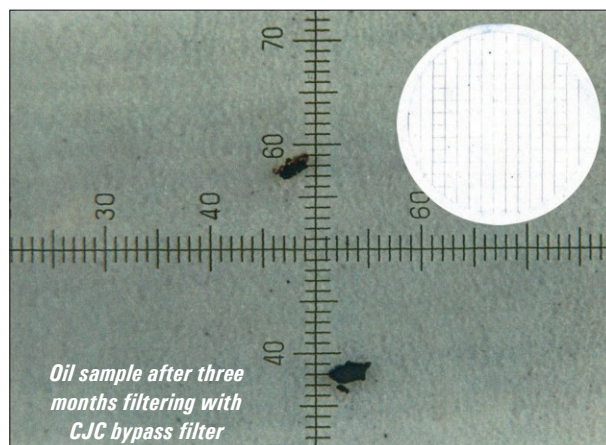
Deep Sea Trawler, F/V Viking



Oil sample - 12.07.2001
Before CJC filter



Oil sample - 10.08.2001



Oil sample after three
months filtering with
CJC bypass filter

THE RESULT

Date	12.07.01	10.08.01	25.10.01
Particles > 2 µm	919,672	378,375	45,828
Particles > 5 µm	91,069	74,392	20,006
Particles > 15 µm	3,815	4,136	739
ISO Code	20/17/12	19/17/13	16/15/10
Water, ppm	305.8	196.5	72