

SUBSEA FLUIDS PTE LTD

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RE : INTRODUCTION TO PELAGIC BOP CONTROL FLUIDS

I would like to take this opportunity to introduce the Pelagic range of BOP Control fluids.

For large volume semi-submersibles we offer **Pelagic 50 BOP Fluid Concentrate** (for onward dilution with fresh or potable water) and for small volume topside systems including Jackups and Barges, we offer **Pelagic V18** premixed hydraulic control fluid (already diluted and ready for use).

Both products are based on the same technology and I have put a short summary of the key properties of each product below.

[Pelagic 50 BOP Fluid Concentrate](#) *(For Large Volume Systems e.g. Semi-Submersibles/Drillships)*

Pelagic 50 BOP Fluid has been performing seamlessly in the Offshore market for approximately 7 years and is widely considered to be the best BOP Fluid on the market.

KEY CHARACTERISTICS

- Excellent Environmental Profile.
- Outstanding lubricity, corrosion protection and all round technical performance.
- 2-3% Dosage Ratio in fresh or potable water.
- Does not form 'insoluble slime deposits

[Pelagic V18 Hydraulic Fluid](#) *(For Smaller Volume Systems e.g. Jackups and Drilling Barges)*

Pelagic V18 Hydraulic Fluid is designed for small volume Topside BOP systems and boasts similar performance to Pelagic 50 BOP Fluid. Pelagic V18 is supplied pre-mixed with increased viscosity and stability additives for long term system use.

KEY CHARACTERISTICS

- 5 years field experience in topside BOP Systems on Jackups and Drilling Barges.
- Outstanding lubricity, corrosion protection and all round technical performance.
- Pre-mixed for extra long term stability in service.
- Does not form 'insoluble slime deposits

Pelagic 100 Subsea Control Fluid

Pelagic 100 is a water based subsea control fluid specifically designed to replace traditional, non-environmentally acceptable alternative to standard competitor Brands.

KEY CHARACTERISTICS

- Excellent Environmental Profile
- UK OCNS Class E with no substitutable components
- Outstanding lubricity, corrosion protection and all round technical performance
- Four Years Mixed Fluid compatibility data with mainstream competitor products
- Extensive material qualification data.
- Extensive equipment qualification data.
- Upper temperature capability of 170°C.
- Extensive Field Experience over several years.

I have enclosed a technical summary for this product range and please feel free to contact us if you require further information.

Yours Sincerely

NEIL FENTIE
MANAGING DIRECTOR



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Certified ISO 9001-2000
For the Development, Manufacture
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Pelagic 50 BOP Fluid Concentrate

Pelagic 50 is a synthetic BOP hydraulic fluid concentrate, designed for use at 2- 3% v/v in fresh or potable water.

Key Competitive Parameters:

Lubrication and Anti-Wear Properties Far in excess of Any Water based BOP Fluid on the Market Today (Falex Test Protocol)

Corrosion Protection In Seawater Far Superior to other Market Leading Products (Modified IP287 Test Protocol).

Environmental Profile fully in line with OSPARCOM legislation for subsea discharge.

Significant field experience gained on a wide variety of Offshore Drilling Rigs.

Lubrication

Lubrication testing (Falex Test Protocol) has shown that a 2% v/v solution of Pelagic 50 exhibits approximately 50% less torque and 95% less wear than main competitor products when tested at a steady load of 500lbs (approx 15,000 PSI) for 30 minutes.

Material Compatibility

Pelagic 50 is broadly compliant with available industry specifications and has significant field experience in Hydril and Cameron BOP's.

Individual Metal testing conducted in-house by accelerated weight loss, shows Pelagic 50 to be fully compatible with metals commonly used in Subsea Hydraulic Systems.

General corrosion testing conducted in-house (using a modified IP287 protocol), indicates that Pelagic 50 offers approximately 5 times greater protection in seawater than competitor products tested.

The fluid will also have no adverse effect on the seal packing compounds generally used in the construction of Subsea hydraulic systems.

Pelagic 50 will not form insoluble 'slime' deposits within BOP control systems.

Typical Physical Properties

Appearance	Clear Fluid
Colour	Pale Yellow
Pour Point	<-20 °C
pH of Concentrate	10.3
pH at 2% v/v Dilution	9.4
Specific Gravity	1.11

Dilution

Pelagic 50 is recommended for use in BOP systems at a concentration of 2% v/v. Under circumstances such as high contact loads, sensitive pumping equipment, or where there is a potential for significant seawater ingress, a 3% v/v dilution is advised.

Microbiological Protection

Pelagic 50 BOP fluid contains an inorganic bacterial and fungal growth inhibitor designed to prevent bacteria and fungus growing, as well as killing cultures as they form. This inhibitor is also not consumed as part of the protective mechanism, leaving it better able to defend the fluid in the longer term.

The product also has a very strong ability to 'buffer' against pH drop, significantly reducing corrosion levels during acid attack.

Environmental Parameters

Pelagic 50 is designated as "Yellow" for discharge in Norwegian Water and has a Grade E classification for use in UK waters.

For Further Information

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Information given in this publication is based on Technical Data gained in our own and other laboratories and is believed to be true. However, if the material is used in conditions beyond our control, we can assume no liability for results obtained or damaged incurred through the application of the data present herein.

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Pelagic V18 Water Based Hydraulic Fluid

Pelagic V18 Water Based Hydraulic Fluid is suitable for use in a wide range of applications, including use as a Pre-Mixed BOP Hydraulic Fluid and as a Heave Compensator/ Tensioner Fluid.

Key Competitive Parameters:

Pelagic V18 is an environmentally friendly, high technology alternative to current BOP and Heave Compensator products on the market today.

Pelagic V18, being water based, gives a high degree of resistance to fire and explosion in high-pressure air operated units.

Pelagic V18 has excellent Lubrication and Anti-Wear Properties (Falex Test Protocol).

Pelagic V18 is extremely stable and has excellent corrosion protection properties.

Corrosion Protection

Individual Metal testing conducted in-house by accelerated weight loss, shows Pelagic V18 to be fully compatible with metals commonly used in Hydraulic Systems. The product also has the ability to protect metals in the presence of significant levels of seawater.

The fluid will also have no adverse effect on the seal packing compounds generally used in the construction of hydraulic systems and has the ability to protect metal surfaces in non-wetted parts of the system.

Please contact us for a full technical manual outlining detailed test results.

Microbiological Protection

Pelagic V18 contains an inorganic bacterial and fungal growth inhibitor designed to prevent bacteria and fungus growing, as well as killing cultures as they form. This inhibitor is also not consumed as part of the protective mechanism, leaving it better able to defend the fluid in the longer term.

Typical Physical Properties

Appearance	Clear & Bright
Specific Gravity (20°C)	1.05
Freeze Point	<-30°C
pH (20°C)	9.40
Viscosity at 40°C	18 cS
Upper Operating temp	60°C

Environmental Parameters

A Full HOCNF (Harmonised Offshore Chemical Notification Format) document is available for submission to Government and Environmental protection agencies where required.

Application Information

Pelagic V18 is acceptable for use in several types of BOP system and is particularly well suited to BOP Systems on Jackups/Barges currently using water based fluids.

Pelagic V18 is also suitable for use in compensator/tensioner systems currently running on Erifon 818/ Houghtosafe products.

Pelagic V18 is also suitable in some compensator/tensioner and BOP systems currently running on mineral oil, although a full system flush will be required prior to changeover.

Please contact Niche technical staff for full details on application and changeover.

Further Information

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Pelagic 100 Production Control Fluid

Pelagic 100 is a Low Viscosity Water Based Hydraulic Fluid, specifically designed for operation in Subsea Production Control systems.

Key Competitive Parameters:

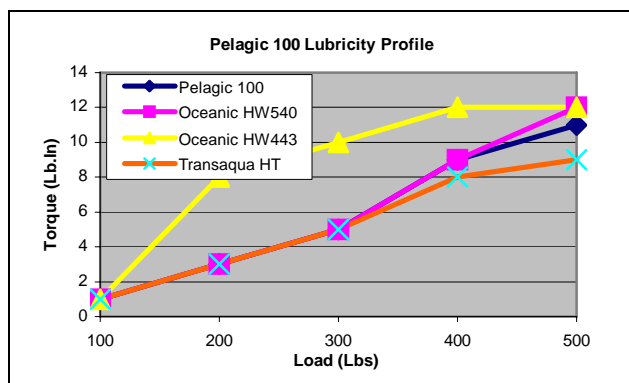
Pelagic 100 is believed to be the most environmentally acceptable, technically competent water based Production Control Fluid on the market today.

Pelagic 100 is fully compatible with the majority of water based production control fluids on the market.

Pelagic 100 demonstrates excellent lubricity/anti-wear, corrosion protection and all round technical performance.

Lubrication

Lubrication testing on Pelagic 100 Production Control Fluid was conducted independently using Falex Lubricity Test Equipment.



Test Data at 500lb Load for 30 mins:

Product	Torque (Lb.In)	Wear Teeth
Pelagic 100	7	5
Transaqua HT	7	5
Oceanic HW540	12	2
Oceanic HW443	17	29

This lubricity testing shows that Pelagic 100 has a very similar lubricity/ anti-wear profile to both Oceanic HW540 and Transaqua HT. All products tested were superior to Oceanic HW443 in terms of both torque reduction and anti-wear.

Typical Physical Properties

Appearance	Clear Mobile Liquid
Colour	Colourless
Pour Point	-30 °C
pH	9.5
Specific Gravity	1.052
Bulk Modulus	2.60 (Nm ⁻² X 10 ⁹)

Environmental Parameters

All environmental testing was conducted by an independent and certified laboratory.

Summary of figures obtained:

- No component has a biodegradation <20% on (OECD 306- 28 day test).
- No component within the product exhibits a tendency to bioaccumulate.
- OSPARCOM testing has shown Pelagic 100 to be of extremely low toxicity to marine life.

As a result of this independent testing, Pelagic 100 is believed to be the most environmentally acceptable, technically competent Production Control fluid on the market today.

Competitor Product Compatibility

Pelagic 100 was specifically developed to be fully compatible with Oceanic HW540, Oceanic HW443 and Transaqua HT.

Testing conducted in-house at 4°C, 20°C and 70°C, with varying fluid concentration and seawater contamination levels, has proven Pelagic 100 to be fully compatible and miscible in all proportions with the above fluids.

Pelagic 100 Physical properties have also been matched closely to the above products.



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Corrosion Protection

General corrosion testing conducted in-house (using a modified IP287 protocol), indicates that Pelagic 100 offers comparable protection in seawater to competitor products tested.

Individual Metal testing conducted in-house by accelerated weight loss, shows Pelagic 100 to be fully compatible with metals commonly used in Subsea Hydraulic Systems.

Pelagic 100 Metal Compatibility							
Test Metal	%Seawater			Test Metal	%Seawater		
	0	5	10		0	5	10
Inconel 625	√	√	√	Steel 431	√	√	√
Incoloy 825	√	√	√	416-S21	√	√	√
Monel K400	√	√	√	Duplex	√	√	√
Titanium	√	√	√	Sup Duplex	√	√	√
SS 316	√	√	√	17-4PH	√	√	√
SS 304	√	√	√	13Chromium	√	√	√

Testing on Carbon Steels show that they tend to be susceptible to corrosion in the presence of >5% seawater. Seawater ingress should therefore be minimised where possible.

Aluminium Bronze materials have variable compatibility and advice should be sought from Niche Products when using such materials.

Seal Compatibility

In-house Seal Compatibility testing has demonstrated that Pelagic 100 Production Control Fluid will have no adverse effect on the seal packing compounds generally used in the construction of Subsea hydraulic systems.

This testing was conducted at 70°C and included swell and shore hardness monitoring on many seal types including Viton, Nitrile, EPDM, Silicone, PTFE, Nylon 11 and PEEK.

Upper Temperature Stability

Pelagic 100 is currently specified to an upper temperature of 170°C in the field, with testing currently underway at 190°C to see if this limit can be raised.

Microbiological Protection

Pelagic 100 Production Control fluid offers a very high level of fungal and biocidal protection, without the use of environmentally damaging biocidal additives.

The Fluid contains an inorganic bacterial and fungal growth inhibitor designed to prevent bacteria and fungus growing, as well as killing cultures as they form.

This inhibitor is also not consumed as part of the protective mechanism, leaving it better able to defend the fluid in the longer term.

If a severe attack by acid forming bacteria does succeed, the product has a second line of defence in that it has a very strong ability to 'buffer' against pH drop, significantly reducing corrosion levels during acid attack.

Glycolic Acid Buffer

Glycolic Acid is known to form in high temperature SSSV applications when using water/glycol-based fluids. This acid can affect corrosion protection of the fluid in service by lowering the pH and potentially turning the product acidic.

Testing in-house has shown that Pelagic 100 can withstand attack from approximately 3.5% Glycolic Acid, before reaching a neutral pH. This result is significantly higher than that achieved with any competitor product tested to date.

Packaging Options

Pelagic 100 Production Control Fluid is available in 210 Kilo L-Ring Drums, 1050 Kilo IBC Containers, 2200 Litre Offshore Transportation Tanks and Bulk Road Tanker.

Further Information

For further information on Pelagic 100, or any other product enquiries, please contact us.

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Subsea Fluids Division

PELAGIC 100 COMPATIBILITY & PERFORMANCE SUMMARY

DATA SUMMARY

Extensive testing on Pelagic 100 vs. HW540, HW443 and Transaqua HT, covering areas such as metal, elastomer, mixed fluid, brine, completion fluid and seawater compatibility along with lubrication, high temperature and microbiological/ buffer protection, has identified Pelagic 100 as fully compatible and technically comparable/superior to the best performing competitor products in all performance areas tested.

MIXED FLUID COMPATIBILITY

MAINSTREAM FLUIDS TESTED

Oceanic HW540 (HW500 Series)
Oceanic HW443
Transaqua HT

MIX RATIOS TESTED:

75:25. 50:50, 25:75

TEMPERATURE AND DURATION

4°C- Duration 3 years (ongoing)
RT (~20°C)- Duration 3 years (ongoing)
70°C- Duration 3 Months

MORE RECENT FLUIDS UNDER TEST

Transaqua EE1
Aqualink 300
Oceanic HW740

LUBRICITY TESTING

Testing on Falex and Shell 4 ball lubricity/ wear test equipment has identified Pelagic 100 as having a very high lubricity performance profile in comparison to competitor products. Testing of Pelagic 100 base in the field (on drilling rigs) and data gained from equipment manufactures also backs up this data.

ELASTOMERIC COMPATIBILITY

Tested with more than 25 different elastomeric compounds sourced from over 20 equipment manufactures. Testing has included individual changes in hardness, swell, elongation, tensile strength etc. and has been conducted at various temperatures and timespans up to 170°C in some cases.

MICROBIOLOGICAL TESTING

Extensive testing conducted on a wide range of microbiological agents, sometimes at concentrations 1,000,000 times higher than minimum recommended levels, has revealed a remarkable ability to protect against microbiological attacks.

OEM COMPATIBILITY

TREES/CONTROLS

Kvaerner Oilfield Products Group Ltd
FMC Kongsberg Subsea AS
Rotator AS (HCV Type 10 & 15)
Vetco Gray U.K. Ltd

STEEL/THERMOPLASTIC UMBILICALS

Duco Ltd
Nexans Norway AS
Kvaerner (Moss) AS
Subsea Cables AS

SUB SURFACE SAFETY VALVES (SSSV'S)

Schlumberger Reservoir Completions
Baker Oil Tools
Halliburton

PUMPS/ACCUMULATORS

Fawcett Christie Hydraulics Ltd
Haskel Energy Systems Ltd (ASF/GSF)
Marshalsea Hydraulics Ltd
Graco Pumps (206-796 Series D)

METAL COMPATIBILITY

Tested with over 50 varying metallic compounds sourced from over 20 equipment manufactures. Work conducted has included individual metal corrosion, testing in presence of seawater, galvanic interactions and high temperature testing to 170°C in some cases.

HIGH TEMPERATURE TESTING

Testing to date at 170 and 150C with up to 10% seawater has identified Pelagic 100 as the most stable high temperature fluid ever developed, capable of sustained operation at 170C over long periods.

BUFFER PROTECTION

Testing conducted on the buffer capability of Pelagic 100 vs. mainstream competitor products Oceanic HW540, HW443, Aqualink and Transaqua HT/EE1 have proven that Pelagic 100 has the best buffer protection capability of all products on the market.

NICHE PRODUCTS LTD CONTACT DETAILS

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