

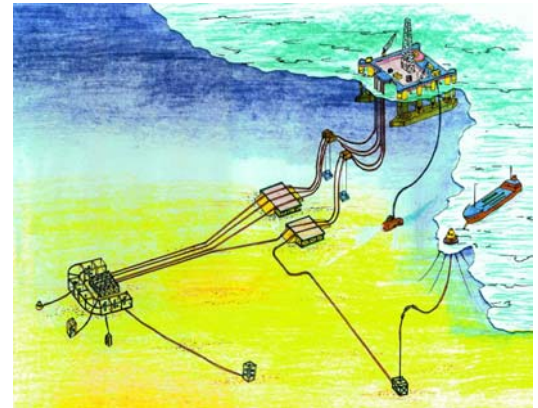
Oceanic HW700 Series

720R & 740R Subsea Production Control Fluid

General Description

Oceanic HW fluids are water based hydraulic media specifically formulated for use in subsea production control systems. Their low viscosities promote optimum system response, while a sophisticated additive package provides a high degree of protection against wear, corrosion and microbiological degradation. The Oceanic HW fluids have been developed in close consultation with component manufacturers, and are now in worldwide use, helping to achieve maximum production system safety and reliability.

Oceanic HW720R & HW 740R have been developed due to higher temperatures and more demanding well conditions. Long-term high temperature research has been performed during the development of Oceanic HW 720R & HW 740R. Extensive environmental research has led to a biodegradable red dye, hence "R" designation.



Oceanic HW700 series fluids offer:

- Operation to at least 160°C (320°F)
- Vapour phase and liquid corrosion protection
- Compatible with low levels of Calcium brines
- Sea-water intrusion protection
- Excellent lubricity
- Low Toxicity
- High biodegradability
- OCNS Class D (Nov. 2007)
- Resistant to microbiological attack
- Low viscosity for speedy response
- Biodegradable, high visibility leak tracing dye included
- Full technical support for engineering and laboratory assistance.



Physical Properties

Low Viscosity Oceanic HW 700 fluids, being water based, offer an extremely low viscosity when compared with mineral oil or synthetic hydrocarbon types. This allows systems to be designed with optimum response, particularly where control is required over long distances, and through small bore control lines.

Oceanic HW	720R	740R
Appearance	Red/Pink Fluorescent liquids	
Viscosity (cS) @ -20°C -4°F	Solid	24.9
0°C 32°F	4.4	8.9
20°C 68°F	2.3	4.3
40°C 104°F	1.4	2.5
Pour Point °C (°F)	-6 (21.2)	-31 (-23.8)
Specific Gravity 15.6°C (60°F)	1.038	1.070
Specific Gravity 20°C	1.039	
pH Value	9.2	9.2
Cleanliness Level (as filled into container)	NAS 1638 Class 6	
Thermal Conductivity W.m ⁻¹ .K ⁻¹	0.562	0.441
Specific Heat Capacity J.kg ⁻¹ .K ⁻¹	3998	3597
Bulk Modulus (Nm ⁻² x 10 ⁹)	2.175	2.3
Coefficient of Thermal Expansion. (Volumetric per °C)	0.00042	0.00052

Fluids for all Conditions By providing two fluids, MacDermid has allowed the choice of the fluid that will give the best response in the environment in which it is to be used. For low temperatures, the higher glycol content is required, and here a penalty has to be paid in the form of a slightly higher viscosity due to the necessarily increased glycol level. The correct fluid to use is, therefore, the one having the correct pour point for the worst ambient conditions to be encountered, while still having the lowest possible viscosity.

In general Oceanic HW720R is to be used in slightly warmer climates than Oceanic HW740R where the temperature seldom falls below 0°C (32°F) (e.g. Gulf of Mexico, Australia or Brazil). Oceanic HW740R is used where temperatures drop to -20°C (-6°F) (e.g. North Sea), a further fluid could easily be formulated (Oceanic HW760R) that would be suitable for those areas where temperatures can go as low as -50°C (-58°F) (e.g. Northern North Sea and Canada).

High Temperature Stability All the fluids in the HW700 range have been tested at 170°C (338°F) to ensure safe long-term operation at 160°C (320°F). Longer term testing may increase this limit as further results become available. It should be noted that the fluid is water-based and a static pressure head should be maintained in areas where the fluid is operating over 100°C (212°F). MacDermid staff can advise what pressure or water depth will be required.





High Lubricating Ability Particular care has been taken to give the Oceanic HW700 fluids good anti-wear properties, especially in the case of metal to metal sliding contact situations such as are encountered in modern shear seal type control valves or piston pumps. The Oceanic HW700 fluids also provide low coefficients of friction between elastomeric seals and packing and metal surfaces. For customers who are familiar with the Oceanic HW500 series fluids they should see equivalent performance with the HW700 range.

Corrosion Resistance The Oceanic HW700 fluids have excellent protection for a wide range of metals used in the oil and gas industry. Even with high seawater intrusion the metals of the control circuit and valves will be protected. Oceanic HW700 fluids are ideally suited for use in steel line umbilicals.

Not only will immersed materials not corrode but also metal in voids above the surface, Oceanic HW700 fluids contain a vapor phase inhibitor that produces a protective gas in any voids that will prevent oxidation and galvanic attack of condensation.



Stability Oceanic HW700 fluids are extremely resistant to the effects of contamination by seawater and micro-organisms such as bacteria and fungi, although every effort should be made to avoid these conditions from occurring. Improvements compared to the HW500 series have been made in this respect. The high stability of the additive pack reduces the possibility of flocculation and precipitation taking place, and if a monitoring program is operated, advanced warning of impending problems will allow corrective action to be taken well before the system safety reliability can be seriously impaired.

Discharge into marine environments The Oceanic HW700 range of subsea production control fluids has been formulated to have extremely low toxicity with a high degree of biodegradability. This has resulted in the range expecting to be awarded an OCNS Class D usage parameter for use in UK waters. Oceanic HW 700 Series complies with the U.S. Legislation in the Gulf of Mexico. Appropriate documentation is available from our Technical staff.

Material Compatibility MacDermid recommends extended testing for materials not tested. Many materials have been tested at high temperatures pursuant to I.S.O. 13628-6 as well as cooperative O.E.M. materials studies. Please contact our Sales or Technical Staff for more details.

Metals Oceanic HW700 Fluids are compatible with all ferrous and yellow metal alloys. The fluids can also be used with aluminium and aluminium alloys, this is a further improvement over the old HW500 series. The only common metal used in subsea systems, which may be slightly affected, is zinc.

Elastomers and Plastics Common O - ring materials such as Nitrile, common Fluoroelastomers, Buna N, Buna A, Silicone and Neoprene are all acceptable. Common Fluoroelastomers should be limited to 70°C (158°F) maximum temperature. For higher temperatures, Peek, Chemraz or HNBR can be utilized.



Seal materials such as Teflon (P.T.F.E.) are also acceptable, but composites such as common Fluoroelastomers impregnated cotton should be avoided, as they may absorb moisture and swell over extended periods. Polyurethane and Porous gasket materials should be avoided.

Thermoplastics as used as linings in umbilical hose bundles are acceptable.

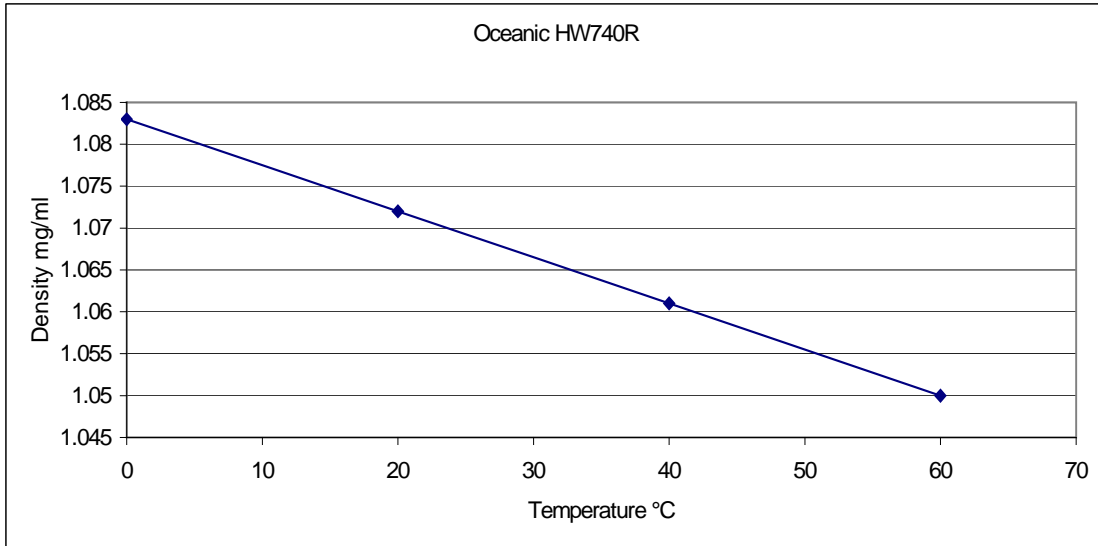
Filter Elements Some impregnated paper types lose structural strength in contact with aqueous fluids. Recommended filter media are woven polypropylene or glass fibre.

Our companies has long term experience with Pall Ultipor filter medium, and recommend its use in conjunction with Oceanic HW subsea production control fluids.

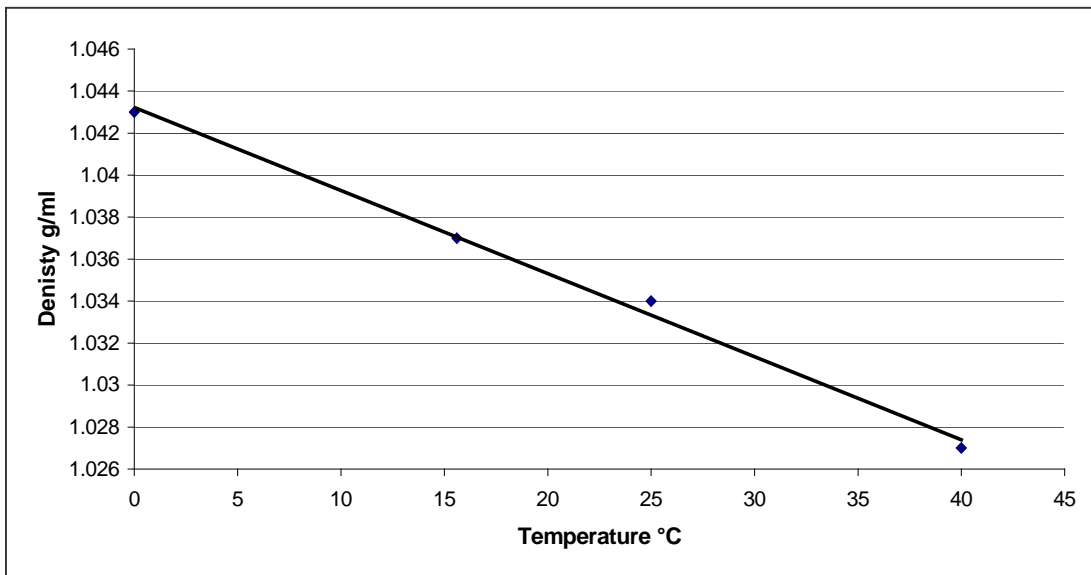
Paints Most paints used in the offshore industry are compatible with Oceanic HW Fluids. The most satisfactory results may be obtained with Nylon, Phenolic or 2-Part Epoxy based coatings.



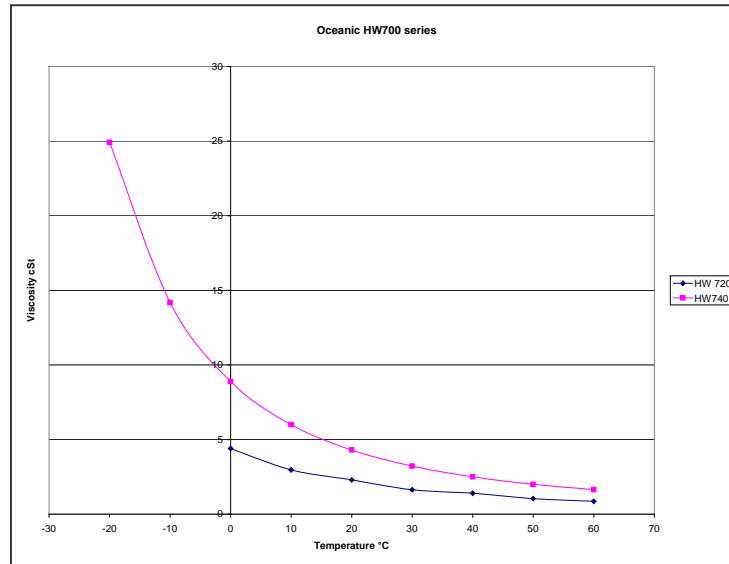
Density Temperature Oceanic HW740R



Density Temperature Oceanic HW720R



Viscosity Temperature Oceanic HW720R and Oceanic HW740R



Pressure, psig	HW 720R Isothermal Secant Bulk Modulus, psi	HW 720R Isothermal Tangent Bulk Modulus, psi	HW 740R Isothermal Secant Bulk Modulus, psi	HW 740R Isothermal Tangent Bulk Modulus, psi
1000	380455	383964	408633	412443
2000	384924	392026	413398	421108
3000	389393	400171	418164	429861
4000	393861	408397	422930	438704
5000	398330	416705	427696	447636
6000	402798	425097	432462	456656
7000	407268	433571	437227	465765
8000	411737	442127	441993	474963
9000	416206	450765	446759	484250
10000	420675	459487	451525	493626
11000	425143	468289	456290	503091
12000	429612	477176	461056	512645
13000	434081	486145	465822	522287
14000	438550	495194	470588	532019
15000	443019	504328	475354	541839

An independent laboratory has determined bulk Modulus results for MacDermid Offshore Solutions. Bulk Modulus results for Oceanic HW540, Oceanic HW443 and Oceanic HW443 ND are very similar.

Information given in this publication is based upon technical data gained in our own and other Laboratories and is believed to be true. However the material is used in conditions beyond our control thus we can assume no liability for results obtained or damages incurred through the application of the data presented herein.



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