Product Data

Castrol Transaqua™ SP

Water-based subsea production control fluid

Description

Castrol Transaqua™ SP is a water-based hydraulic control fluid specifically formulated for use as the control medium in subsea production control systems. The fluid delivers excellent all-round subsea production system protection.

Castrol Transaqua™ SP has been developed and qualified under a Quality Management System with ISO 9001:2015 Certification and an Environmental Management System with ISO 14001:2004 Certification for Research and Development. Qualification testing carried out in accordance with API 17F Annex C (3rd edition, May 2014) requirements.

Application

- Designed for use in Electro-Hydraulic Multiplex (EH-Mux) and direct hydraulic control systems.
- Designed for use throughout the entire production and work over control systems, covering Topsides and Subsea applications: both open water and well bore; and Downhole from control of a single SSSV through to complex intelligent well completions.
- Can operate over a temperature range of -45ºC (-49F) to 150ºC (302F).

Advantages

- Castrol Transaqua™ SP provides protection against corrosion proven through rigorous testing and excellent performance in OEM qualification (approved by major Subsea OEMs).
- Excellent materials compatibility performance across a wide range of subsea production system materials (see Tables 3 & 4).
- Excellent stability with expected system contaminants proven through enhanced fluid stability when contaminated with seawater (up to 30%) and common completion brines
- Fully miscible with other products in the Castrol Transaqua™ range and other water-based subsea control fluids.
- Rigorous environmental testing has been completed in many geographies worldwide. Tested according to OSPAR requirements and is registered for use offshore Norway (yellow).
- Contains a leak tracer to allow rapid detection of subsea leaks either visually or using a dedicated ROV mountable leak detection sensor.

Typical Physical Characteristics

Table 1							
Fluid – Castrol Transaqua™ SP							
Rheology at Ambient Pressure							
Property	@ units	-25°C	0°C	25°C	40°C	100°C	140°C
Density	g/ml	1.1019	1.0887	1.0741	1.0647	1.0220	0.9890
	lb/ft^3	68.79	67.97	67.05	66.47	63.80	61.74
Kinematic Viscosity	mm^2/s	56.87	12.75	4.70	2.99	0.90	0.56
Bulk Modulus	N/m^2 (x 10^9)	-	3.35	-	3.02	2.46	2.06
	psi (x 10^5)	-	4.86	-	4.38	3.57	2.99

General Properties			
Property	Code	Units	Typical Value
Appearance	-	-	Clear mobile fluid
Colour	-	-	Amber to pale brown
Pour Point	ASTM D97	°C (°F)	-50°C (-58°F)
Flash Point – closed cup method	ISO 2719 / ASTM D93	°C (°F)	N/A as water based
pH @ 20ºC (68ºF)	-	-	9.0
Acid Number	ISO 6619 / ASTM D664	mg KOH/g	2.7
Coefficient of Thermal Expansion	ASTM D1903	$ºC^{-1}$	0.000628
Thermal Conductivity	ASTM D5930	W/m°C	-
Specific Heat	ASTM D2766	kJ/Kg°C	-
Foam Test Sequence 1 –tendency/ stability	ISO 6247 / ASTM D892	ml / ml	400/0
Particulate Cleanliness	SAE AS4059F	-	Class 6

The above figures are typical of those obtained with normal production tolerance and do not constitute a specification. Detailed Pressure/ Viscosity/Temperature (PVT) data is available on request.

Table 2			
Fluid – Castrol Transaqua™ SP			
Typical Performance Characteristics			
Property		Specification	Performance
Seawater Stability		API 17F Annex C	Stable with up to 30% seawater contamination at seabed temperatures. Provides anti-corrosion performance on carbon steel with up to 10% seawater.
Lubrication Shell 4 Ball – Mean Wear Scar Diameter (1hr, 30 kg, 1460 rpm)		IP239	0.898 mm
Environmental Performance		OSPAR Requirements	Tested according to OSPAR requirements - all components tested for toxicity (4 species), biodegradation and bioaccumulation.
Compatibility	Metals	API 17F Annex C	Compatible with a wide range of metals. For a core set of commonly used metals see Table 3.
	Elastomers / Plastics	API 17F Annex C	Compatible with a range of elastomers/plastics. For a core set of commonly used compounds see Table 4.
	Umbilical Testing	API 17E	3 month compatibility testing completed successfully.
Valve Testing	DCV	OEM specific	Qualified by a number of leading DCV manufacturers.
	SSSV	OEM specific	Qualified by a leading SSSV manufacturer for temperatures up to 145°C.
Equipment Testing	Pumps	OEM specific	Qualified by a number of leading pump manufacturers.

For a more extensive list of tested materials and detailed information on testing contact Castrol.

Table 3		
Fluid – Castrol Transaqua™ SP		
Metal Compatibility - carried out in accordance with API 17F Annex C (3rd edition, May 2014)		
Material	Compatibility	Comments
Carbon Steel EN 10025 Grade S235	Compatible	
Al-bronze grade UNS C63000	Compatible	
Tungsten Carbide with 10% Ni binder	Compatible	
Beryllium Copper UNS C17200	Compatible	
AISI 316 Stainless Steel	Compatible	
17-4PH Stainless Steel	Compatible	
Electroless Nickel Plating on magnetic steel DIN50960	Compatible	Ensure even plating thickness.
High Strength Steel 8620	Compatible	
High Strength Steel 5160	Compatible	
Tungsten Carbide - 10% Cobalt Bonded	Compatible	
Stainless Steel Super Duplex	Compatible	
Beryllium Copper Alloy 3	Compatible	Some tarnishing expected in the presence of seawater but corrosion rates remain acceptably low.
Silicon Nitride	Compatible	
Aluminium	Limited compatibility	Components may be protected by hard anodizing. Avoid rubbing contact.
Zinc and Cadmium Plating	Not compatible	Commonly used on standard industrial hydraulic components. Will be removed over time by water based control fluids.

Castrol Transaqua™ SP has excellent compatiblity with many materials commonly used in the construction of modern production subsea control systems. As with any fluid, a complete materials review should always be carried out before using Castrol Transaqua™ SP.

Table 4		
Fluid – Castrol Transaqua™ SP		
Elastomer & Plastic Compatibility carried out in accordance with API 17F Annex C (3rd edition, May 2014)		
Material	Compatibility	Comments
Nitrile (NBR)	Compatible	Widely used as a standard seal material. Performance can vary according to grade.
Hydrogenated Nitrile (HNBR)	Compatible	Better high temperature performance than Nitrile.
Fluorocarbon (FKM - Viton)	Compatible	Performance can very according to grade.
PTFE	Compatible	Very inert, and suitable for high temperature and pressure applications.
PEEK	Compatible	Very inert, and suitable for high temperature and pressure applications.
Perfluoroelastomer (FFKM - Chemraz)	Compatible	Suitable for extreme temperature applications, but can suffer from creep.
Polyamide	Compatible	
Nylon 11	Compatible	Umbilical testing to API 17E.
Ducoflex	Compatible	Umbilical testing to API 17E.

The data reported in Table 4 refer to "standard" compounds recognised by industry. However, performance can vary depending on manufacturer, grade or operational conditions, e.g. manufacturing process, filler materials used in compounds, application, extreme temperatures, etc. We therefore recommend clarification or further testing is sought regarding project specific material compatibility, from either the seal vendor or Castrol.

Seal Materials to be avoided

Rubber Impregnated Fabric Composites are not compatible with Castrol Transaqua™ SP. These materials must be changed out from equipment to be used with Castrol Transaqua™ SP.

Painted and other Surface Coatings
It is recommended that in accordance with good working practice the internal surface of the hydraulic system should not be coated. However, external surfaces may require coating and as with all control fluids conventional paint systems will tend to soften or strip. It is therefore recommended that these be replaced by cured epoxy, nylon, or Phenolic types as commonly used subsea. Surface preparation prior to paint application is critical.

Where it is necessary to use internal surface coatings such as PTFE these should be assessed for suitability of use. Manufacturers guidelines should be observed with regards cure times and temperatures and as with paints systems surface preparation specifications should be adhered to.

Care and Handling

This product has been manufactured to a tightly controlled cleanliness specification. Any container that has been opened for use must be re-sealed to avoid contamination ingress from the environment (e.g. particulates or water). Any contaminants entering the product can affect its performance. The integrity of the product once the container is opened is the responsibility of the end user. It is good practice to use tarpaulins or drum lids to cover all containers to prevent ingress of contamination.

As with all glycol based control fluids, Castrol Transaqua™ SP must never be mixed with control fluids of different base types such as synthetic fluids (e.g. Castrol Brayco Micronic™ SV/3) or mineral oils (such as the Castrol Hyspin range). Contamination of Castrol Transaqua™ SP by either of these types of products can seriously affect the product performance.

If you need advice on any of the above, please contact your local Castrol Technical Service Engineer for more specific details.

Storage

All containers should be stored under cover and protected from exposure to direct sunlight. Do not store containers in temperatures below minus 5ºC or above 45°C. 208L plastic drums can be stored a maximum of 2 high, providing a pallet is used to distribute the upper load evenly. In addition, the fill level of the upper drums should be less than or equal to the fill level of the lower drums. It is not recommended to store 208L plastic drums horizontally.

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