

# PRODUCT AND TECHNICAL DATA



## Castrol Transaqua HT

### Water-based subsea production control fluid

#### Description

Castrol Transaqua HT is a water-based hydraulic control fluid specifically formulated for use as the control medium in surface and subsea production control systems. The fluid incorporates all the features required for operation in a wide range of equipment, and can therefore be used as the operating medium throughout the control system including subsurface safety valve and well control areas.

Castrol Transaqua HT has been developed and qualified under a Quality Management System with BS5750:1987 Certification for Research and Development.

Qualification testing carried out in accordance with ISO13628-6 requirements.

#### Application

- Castrol Transaqua HT is designed specifically for use in all conventional and high pressure, high temperature applications.
- Castrol Transaqua HT is rated for operation over a temperature range of -30°C (-22°F) to 180°C (356°F).
- Castrol Transaqua HT is tolerant of the high well temperatures encountered by those parts of the control system located at the well bore.
- The low pour point also allows use in areas where low ambient temperatures prevail.
- Designed for use within Electro-Hydraulic Multiplex (EH-Mux) or direct hydraulic control systems.
- Designed for reliable use throughout the entire production and workover 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.





## Features

- Castrol Transaqua HT has undergone rigorous environmental testing worldwide, including testing that meets the requirements of OSPAR 2007 legislation.
- Castrol Transaqua HT has an operating capability up to 180°C (356°F). See Table 1 & Table 2 for detailed physical and performance characteristics.
- Castrol Transaqua HT contains a yellow metal passivator.
- Castrol Transaqua HT contains leak tracer to aid low-level Subsea leak detection.
- Castrol Transaqua HT is fully compatible and miscible in all proportions with the Castrol Transaqua range and most other water-based subsea control fluids.
- As with all glycol based control fluids, Castrol Transaqua HT 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 HT by either of these types of products can seriously affect the product performance.
- Castrol Transaqua HT resistant to bacterial and fungal growth.
- Castrol Transaqua HT is stable with seawater contamination.
- Castrol Transaqua HT is compatible with a wide range of materials commonly used in subsea control systems, for basic lists see Table 3 & Table 4.

## Benefits

- Proven track record in the field.
- Extensive environmental testing provides a large global operational footprint.
- Allows reliable operation of subsea equipment exposed to conventional or HP/HT conditions.
- Allows rapid detection of leaks either visually or using a dedicated ROV mountable leak detection tool.
- Compatibility and miscibility properties of Castrol Transaqua HT with other water based control fluids allow for easily managed direct top up and upgrade option programs. For further details contact Castrol Offshore.
- The chemistry of the fluid allows operation in low ambient temperature environments and inhibits hydrate formation.
- Viscosity profile of fluid permits optimum hydraulic response through very long control umbilicals.

Table 1

Fluid - Castrol Transaqua HT Rheology @ ambient pressure							
Property	Units @	-25°C (-13°F)	0°C (32°F)	20°C (68°F)	40°C (104°F)	100°C (212°F)	175°C (347°F)
Density	g/ml	1.0880	1.0741	1.0630	1.0519	1.0186	0.9770
	lb/ft <sup>3</sup>	67.92	67.05	66.36	65.67	63.59	60.99
Viscosity	cSt	29.1	8.2	4.4	2.4	0.8	0.3
Bulk Modulus	N/m <sup>2</sup> (x 10 <sup>9</sup> )	2.75	2.74	2.7	2.64	2.29	1.52
	Psi (x 10 <sup>6</sup> )	3.99	3.98	3.92	3.83	3.33	2.20
General Properties							
Property	Code	Units	Typical Value				
Appearance	-	-	Clear mobile liquid				
Colour	-	-	Pale straw				
Pour Point	IP15 / ASTM D97	°C (°F)	-39 (-38.2)				
Flash Point	ASTM D92	°C (°F)	N/A as water based				
pH @ 20°C (68°F)	-	-	8.9				
TAN	IP177 / ASTM D664	mg KOH/g	2.6				
TBN	IP276 / ASTM D2896	mg KOH/g	15.2				
Coefficient of Thermal Expansion	-	m <sup>3</sup> /m <sup>3</sup> /°C	0.00052				
Thermal Conductivity	ASTM D2717	W/m/°C	0.42				
Specific Heat	ASTM D2766	KJ/Kg/K	3.257				
Foam Test Sequence 1 Tendency	IP146 / ASTM D892	ml	300 maximum				
Foam Test Sequence 1 Stability	IP146 / ASTM D892	ml	0				
Viscosity Index (VI)	ASTM D2270	-	N/A as water based				
Moisture Content Volumetric- Karl Fisher	IP386	p.p.m.	N/A as water based				
Relative Humidity	CWS01	%	N/A as water based				
Particulate Cleanliness	SAE AS4059E	-	Class 6 B to F or better				
	ISO 4406	-	Code 14/11 or better				

Castrol Offshore Ltd has comprehensive PVT data available, which covers a range of pressures and temperatures upon request.

Table 2

Fluid - Castrol Transaqua HT Typical Performance Characteristics			
Property	Code	Performance	
Sea Water Stability	ISO 13628-6 Annex C (2006 E)	Stable to 10% sea water contamination. Provides anti corrosion performance on carbon steel with 10% sea water.	
Microbiological Growth – 28 Day Challenge Test Fungi Bacteria	ISO 13628-6 Annex C (2006 E)	Sterile during and after test	
Lubrication Shell 4 Ball – Mean Wear Scar Diameter (1hr, 30 kg, 1460 rpm)	IP239	0.958 mm	
Environmental Performance	2007 OSPAR Requirements	Meets 2007 OSPAR requirements - all components tested for toxicity (4 species), biodegradation and bioaccumulation	
Compatibility	Metals	ISO 13628-6 Annex C (2006 E)	Compatible with a wide range of metals for a core set of commonly used metals see Table 3
	Elastomers / Plastics	ISO 13628-6 Annex C (2006 E)	Compatible with a wide 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 manufactures.
	SSSV	OEM specific & OTO99001	Qualified by a number of leading SSSV manufactures.

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

Table 3

Fluid - Castrol Transaqua HT Metal Compatibility		
Material	Compatibility	Comments
<i>Mild Steel A105</i>	Compatible	Unprotected carbon steel above the fluid surface may be subject to corrosion from condensed moisture.
<i>Alloy Steel 4140</i>	Compatible	
<i>Alloy Steel 440C</i>	Compatible	
<i>Stainless Steel 316</i>	Compatible	
<i>Stainless Steel 17-4PH</i>	Compatible	
<i>Nitronic 60</i>	Compatible	
<i>Monel 400</i>	Compatible	
<i>Nickel 200</i>	Compatible	
<i>Inconel 825</i>	Compatible	
<i>Super Duplex 2507</i>	Compatible	
<i>Aluminium Bronze (CDA945)</i>	Compatible	
<i>Tungsten Carbide - 10% Cobalt Bonded</i>	Compatible	
<i>Tungsten Carbide - 9% Nickel Bonded</i>	Compatible	
<i>Aluminium</i>	Limited compatibility	Components may be protected by hard anodizing. Avoid rubbing contact.
<i>Electroless Nickel Plating</i>	Compatible	Ensure even plating thickness.
<i>Zinc and Cadmium Plating</i>	Not compatible	Commonly used on standard industrial hydraulic components. Will be removed over time by water based control fluids.

Castrol Transaqua HT is compatible 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 HT.

### Metals to be avoided

The following metals are best avoided with all glycol water-based fluids: Aluminium, Cadmium, Magnesium and Zinc. For coating compatibility data please contact Castrol Offshore.

Table 4

Fluid - Castrol Transaqua HT Elastomer & Plastic Compatibility		
Material	Compatibility	Comments
<i>Nitrile (NBR)</i>	Compatible	Widely used as standard seal material. Performance can vary according to grade.
<i>Hydrogenated Nitrile (HNBR)</i>	Compatible	Better high temperature performance than Nitrile. Not recommended for temperatures above 120°C.
<i>Low permeability Nitrile</i>	Compatible	
<i>Fluorocarbon (FKM - Viton)</i>	Compatible	Performance can vary according to grade. Not recommended for temperatures above 90°C.
<i>PTFE</i>	Compatible	Very inert, and suitable for high temperature and pressure applications.
<i>PEEK</i>	Compatible	Very inert, and suitable for high temperature and pressure applications.
<i>Perfluoroelastomer (FFKM - Chemraz)</i>	Compatible	Suitable for extreme temperature applications. But can suffer from creep.
<i>Polyurethane</i>	Compatible	Good resistance to abrasion. Performance can vary with grade.
<i>Ethylene Propylene (EPDM)</i>	Compatible	Good compatibility with water based fluids, and at elevated temperatures. <b>Important</b> - EPR is not suitable for use with any hydrocarbon based fluids or greases.
<i>Nylon 11</i>	Compatible	Tested to API 17 E.
<i>Silicone</i>	Compatible	Poor mechanical properties, but wide temperature range.

As with all elastomer compatibility testing, performance of materials can vary between manufacturers. The data reported above refer to "standard" compounds recognised by industry. In critical applications it is advisable to carry out additional testing on specific materials obtained from the component manufacturer.



### **Seal Materials to be avoided**

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

### **Paint 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.

### **Environmental Compliance**

Castrol Transaqua HT has undergone extensive environmental testing and registration ensuring a wide global operational footprint.

For more detailed information on environmental compliance with legislation, please refer to the Castrol Transaqua HT environmental information sheet.

### **Product Supply**

Our products are available world-wide through our global sales and logistics network, with stocks held in all strategic offshore supply locations. All our Subsea products are supplied in 208 litre (55 US gallon) plastic drums as well as bulk containers and small packs; for details of specific packaging availability in your location contact your local Castrol Offshore sales office.

### **Storage**

All packages should be stored under cover. Where outside storage is unavoidable, drums should be laid horizontally to avoid ingress of water and the possible obliteration of drum markings. Product should not be stored above 60 °C, exposed to direct hot sun or freezing conditions.



## Health and Safety

The wearing of impervious PVC (or other suitable material) apron and gloves, together with eye protection is recommended. Contaminated clothing should be changed immediately and thoroughly cleansed before re-use. This applies especially to under garments.

Material safety data sheets are available for all Castrol subsea products from [www.subseadownloads.castrol.com](http://www.subseadownloads.castrol.com)

Or by contacting the addresses or website below.

## Disclaimer

Data reported in this datasheet are the result of work carried out in Castrol and other laboratories, and is believed to be accurate. Specific values are typical for the product, but must not be considered as constituting a specification.

Data included may be subject to revision, and additional data may be periodically added. Before using data in critical application, recipients are advised to consult Castrol Offshore at addresses below.

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## SYSTEM RELIABILITY

It must work: designing out all foreseeable early life and through life failures.

## ENVIRONMENTAL LEADERSHIP

Minimise environmental impact: preventing, reducing or eliminating pollution from subsea operations.

## GLOBAL SERVICE AND SUPPORT

Service excellence: we develop proactive, responsive and open relationships.

Authorised distributor of Castrol Offshore

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