Product Data

Brayco Micronic™ LV/3

Synthetic subsea production control fluid

Description

Castrol Brayco Micronic™ LV/3 is a synthetic hydrocarbon control fluid specifically formulated for use as the control medium in closed loop surface and very long offset subsea production control systems. The fluid incorporates all the features required for operation throughout the control system including Sub Surface Safety Valves (SSSV) and intelligent well completions.

Brayco Micronic LV/3 has been developed and qualified under a Quality Management System with ISO 9001:2000 Certification and an Environmental Management System with ISO 14001:2004 Certification for Research and Development.

Application

- Designed for use in all conventional and high pressure, high temperature applications (according to API 17 TR8) and very long offsets.
- Can operate over a temperature range of -40ºC (-40ºF) to 200ºC (392ºF).
- Suitable for use within Electro-Hydraulic Multiplex (EH-Mux) or direct hydraulic control systems.
- Designed for 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.

Advantages

- Fully compliant with OSPAR environmental legislation and does not contain any "substitutable" components. Environmental testing has been completed for compliance in other geographies.
- Has field proven performance, with an operating capability up to 200ºC (392ºF).
- Maintains corrosion performance with sea water contamination.
- Tolerant of the high well temperatures encountered by those parts of the control system located at the well bore.
- Fully compatible and miscible in all proportions with other products in the Castrol Brayco Micronic Subsea range.
- Compatible with a wide range of materials commonly used in subsea control systems (see Tables 3 & 4). More detailed compatibility information is available on request.

Typical Physical Characteristics

Table 1

Fluid - Castrol Brayco Micronic LV/3
Rheology at Ambient Pressure

Property	@ units	-25ºC (-13ºF)	0ºC (32ºF)	20ºC (68ºF)	40ºC (104ºF)	100ºC (212ºF)	175ºC (347ºF)
Density	g/ml	0.8355	0.8184	0.8047	0.7910	0.7499	0.6986
	lb/ft^3	52.16	51.09	50.23	49.38	46.82	42.61
Viscosity	mm^2/s	72.24	19.94	9.61	5.50	1.85	0.89
Bulk Modulus	N/m^2 (x 10^9)	1.69	1.48	1.33	1.18	0.81	0.48
	psi (x 10^5)	2.46	2.15	1.93	1.72	1.18	0.70

General Properties

Property	Code	Units	Typical Value
Appearance	-	-	Clear mobile liquid
Colour	-	-	Amber
Pour Point	ISO 3016 / ASTM D97	ºC (ºF)	< -50 (<-58)
Flash Point - closed cup method	ISO 2719 / ASTM D93	ºC (ºF)	140 (284)
pH @ 20ºC (68ºF)	-	-	N/A as oil based fluid
Acid Number	ISO 6619 / ASTM D664	mg KOH/g	0.2
Base Number	ISO 3771 / ASTM D2896	mg KOH/g	1.4
Coefficient of Thermal Expansion	ASTM D1903	$ºC^{-1}$	-
Thermal Conductivity	ASTM D2717	W/mºC	-
Specific Heat	ASTM D2766	kJ/Kg°C	-
Foam Sequence 1 - tendency / stability	ISO 6247 / ASTM D892	ml / ml	100 / 0
Viscosity Index	ISO 2909 / ASTM D2270	-	Cannot be determined (viscosity @ 100ºC < $2mm^2/s$)
Water Content - Karl Fischer test (coulometric)	ISO 6296 / ASTM D1744	ppm	< 300
Relative Humidity	CWS01	%	< 37.5
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 available on request.

Table 2			
Fluid - Castrol Brayco Micronic LV/3 Typical Performance Characteristics			
Property		Code	Performance
Sea Water Stability		ISO 13628-6 Annex C (2006 E)	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	0.5 mm typical
Environmental Performance		OSPAR Requirements	Meets OSPAR requirements - all components tested for toxicity, biodegradation and bioaccumulation.
Compatibility	Metals	ISO 13628-6 Annex C (2006 E)	Compatible with a 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 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	Approved by a number of leading DCV manufacturers.
	SSSV	OEM specific & OTO99001	N/A

For a more details of tested materials and information on testing contact Castrol.

Table 3		
Fluid - Castrol Brayco Micronic LV/3 Metal Compatibility*		
Material	Compatibility	Comments
Mild Steel A105	Compatible	Unprotected carbon steel above the fluid surface may be subject to corrosion from condensed moisture if fluid contains excessive water.
Alloy Steel 4140 and 440C	Compatible	
Stainless Steel 316	Compatible	
Stainless Steel 17-4PH	Compatible	
Nitronic 60	Compatible	
Monel 400	Compatible	
Nickel 200	Compatible	
Inconel 825	Compatible	
Super Duplex 2507	Compatible	
Aluminium Bronze (CDA945)	Compatible	
Tungsten Carbide - 10% Cobalt Bonded	Compatible	
Tungsten Carbide - 9% Nickel Bonded	Compatible	
Aluminium	Compatible	
Electroless Nickel Plating	Compatible	
Zinc and Cadmium Plating	Compatible	

*based on typical performance of the Brayco Micronic range.

Castrol Brayco Micronic LV/3 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 Brayco Micronic LV/3.

For coating compatibility data contact Castrol.

Table 4		
Fluid - Castrol Brayco Micronic LV/3 Elastomer and Plastic Compatibility*		
Material	Compatibility	Comments
Nitrile (NBR)	Compatible	Widely used as standard material, but care should be taken to select grades that provide the best performance. Higher acrylo nitrile contents generally give improved compatibility.
Hydrogenated Nitrile (HNBR)	Compatible	
Low permeability Nitrile	Compatible	
Fluorocarbon (FKM - Viton)	Compatible	Performance can vary according to grade. Superior to Nitrile if higher temperatures involved (90ºC or above).
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.
Polyurethane	Compatible	
Ethylene Propylene (EPDM)	Not compatible	**Important** EPDM is not suitable for use with any hydrocarbon based fluids or greases.
Nylon 11	Compatible	Tested to API 17 E
Silicone	Not compatible	

*based on typical performance of the Brayco Micronic range.

The data reported in Table 4 above 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

Ethylene Propylene rubbers (EPR, EPDM) are not compatible with Castrol Brayco Micronic LV/3. These materials must be changed out from equipment to be used with Castrol Brayco Micronic LV/3.

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 preparations specifications should be adherred 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 (eg 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 synthetic oil based control fluids, Castrol Brayco Micronic LV/3 must never be mixed with control fluids of different base types such as water glycol (e.g. Castrol Transaqua HT2). It can be used to replace mineral oils (such as the Castrol Hyspin range), but this requires clarification with Castrol. Contamination of Castrol Brayco Micronic LV/3 with other fluid types 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 30ºC 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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