

**ROYAL**   
 **PURPLE**

# **BARRIER FLUIDS**

**Buffer / Barrier Fluid For Mechanical Seals**

# BARRIER FLUID FDA®

Barrier Fluid FDA is a pure, nonreactive, synthetic fluid that provides superior lubrication and cooling for double and tandem mechanical seals.

Barrier Fluid FDA provides extremely stable seal performance over a wide temperature range, satisfying most seal service requirements. It also is extremely clean and has excellent low temperature fluidity and heat transfer properties.

Barrier Fluid FDA is sanctioned under FDA CFR Title 21 Sections 178.3620(a)(b); 172.878; 175.105; 176.200; 176.210; 177.2260, 2600 and 2800; 178.3570 and 3910. It is approved by the USDA for both H-1 and H-2 service, and Barrier Fluid FDA is a NSF registered H1 Food Grade product.

## BEATS THE COMPETITION

Barrier Fluid FDA outperformed eighteen leading competitive fluids in extensive seal performance tests, which were performed by a major seal manufacturer. In these tests, Barrier Fluid FDA excelled with:

- A very low seal face  $\Delta T$ , which is an accurate measure of seal performance.
- An extremely low STD (Standard Temperature Deviation), which indicates maximum seal stability during operation.
- A minimal  $R_a$  value, resulting in smoother seal faces with less wear.

## SUPERIOR COOLING

In tests performed by another leading seal manufacturer, Barrier Fluid FDA 22 had 400 percent greater flow rates and removed 2 1/2 times more heat than a competitive fluid.

Barrier Fluid is chemically inert, allowing it to be used with most non-oxidizing gases and liquids.

## EXTREMELY CLEAN

Tandem and double mechanical seals utilize opposing seal faces (one stationary and one rotating) to seal the pump from the outside environment. The seal is cooled and lubricated by a barrier fluid circulating between the seal pot and the seal. Part of this fluid is trapped between the opposing seal faces, forming an extremely thin fluid film that both seals and lubricates.

Most fluids are relatively dirty, having an ISO cleanliness level of 20/18/14 or greater. Royal Purple's Barrier fluids are extremely clean, having a typical ISO cleanliness level of 14/13/11 (64 times cleaner).

Dirt trapped between opposing seal faces causes abrasive wear. This pitting and etching of the seal faces can disrupt the fluid seal between the faces, causing lubricant starvation, hot spots and premature seal failures.

### TYPICAL FLUID CLEANLINESS DIRTY ABRASIVE FLUID FILM



### BARRIER FLUID CLEANLINESS CLEAN FLUID FILM



**NOTE:** To avoid contamination and retain fluid cleanliness, Royal Purple Barrier fluids should be used only from their original container, and pumps and seal pots should be flushed with Royal Purple Barrier Fluid immediately prior to filling.



# BARRIER FLUID GT®

Barrier Fluid GT is available in the same grades and meets the same physical specifications as Barrier Fluid FDA. It is recommended for use at elevated temperatures where a nitrogen purge is not an option, when FDA purity is not required and

greater oxidation stability is desired. Royal Purple can develop custom Barrier fluids for customers who have special needs regarding solubility, reactivity, etc.

## EXCLUSIVE PERFORMANCE ADVANTAGES

- **Environmentally Safe**  
Royal Purple Barrier Fluids are not listed on the EPA's VHAP (volatile hazardous air pollutants) or VOC (volatile organic compounds) lists.
- **Minimal Disposal Problems**  
Royal Purple Barrier fluids can be recycled, burned or disposed the same as mineral oil.
- **Very Low Moisture Content**  
Royal Purple Barrier fluids have a low moisture content to prevent seal problems or catalyst poisoning where applicable.
- **Compatible with Most Fluids**  
Royal Purple Barrier Fluids can be mixed with mineral oils, PAOs and diester fluids but should not be mixed with glycol or silicone synthetics.
- **Extremely Clean**  
Barrier Fluid FDA has a typical ISO Cleanliness Level of 14/13/11, which minimizes abrasive wear to seal faces and extends seal life.
- **Excellent Heat Transfer Properties**  
Royal Purple Barrier Fluids are 25 to 30 percent better than mineral oils at keeping seals cool.
- **High Flash Point**  
Royal Purple Barrier Fluids have a high flash point for maximum safety.
- **Excellent Low Temperature Fluidity**  
Royal Purple Barrier Fluids have excellent low temperature fluidity for cryogenic and cold weather service.
- **Uniform Molecular Size**  
The excellent thermal stability of Royal Purple Barrier Fluids provides maximum protection against blistering of carbon seal faces caused by fluid volatility.
- **Wide Seal Compatibility Range**  
Royal Purple Barrier Fluids are compatible with Viton®, neoprene, Buna N (except high ACN), Teflon®, silicone, polyurethane ester, epichlorohydrin, polysulfide, ethylene / acrylic, polycrylate, fluoro-silicone, propylene oxide, chlorosulfonated polyethylene, chlorinated polyethylene, Kalrez®, Nordel®, fluoroelastomer, nitrile and others. It is not for use with EPDM or EPR elastomers. Viton, Teflon, Kalrez and Nordel are registered trademarks of E.I. DuPont.
- **Highest Purity**  
Barrier Fluid FDA contains no impurities such as sulfur, vanadium, amines, etc., that can be harmful or reactive to process fluids or poison the catalyst if it enters a process stream.

## USAGE GUIDELINES

### Viscosity

The appropriate viscosity grades of Royal Purple Barrier Fluid are determined by the maximum and minimum operating temperatures at the mechanical seal face. The minimum recommended fluid viscosity across the seal face (at maximum fluid temperature) is 1 cSt. The maximum recommended fluid viscosity (at minimum fluid temperature) is 100 cSt. To ensure adequate flow at cold start, the Barrier Fluid should not have a cold viscosity of more than 500 cSt. The Viscosity table and Temperature chart, to the right, show the viscosity vs. temperature of Barrier Fluids.

### Safety

For fire safety, it is recommended that the Barrier Fluid Flash Point be 20°F above maximum process temperature and Boiling Point be 50°F above maximum process temperature. In a pressurized system with a nitrogen purge on the seal pot, boiling point is the more important consideration. A table and graph showing Barrier Fluid viscosity vs. temperature is provided.

# TYPICAL PROPERTIES

## TYPICAL PROPERTIES\*

	BARRIER FLUID GRADE				
	22	34	56	78	910
<b>Vapor Pressure</b>					
mmHG @ 100°F	0.0060	0.0001	0.0005	0.0003	0.0001
<b>Pour Point °F</b>	-70	-85	-39	-31	-65
<b>Flash Point °F</b>	330	445	465	505	530
<b>Fire Point °F</b>	350	485	510	542	555
<b>Boiling Point °F</b>	567	637	720	847	810
<b>Autoignition °F</b>	428	689	744	750	779

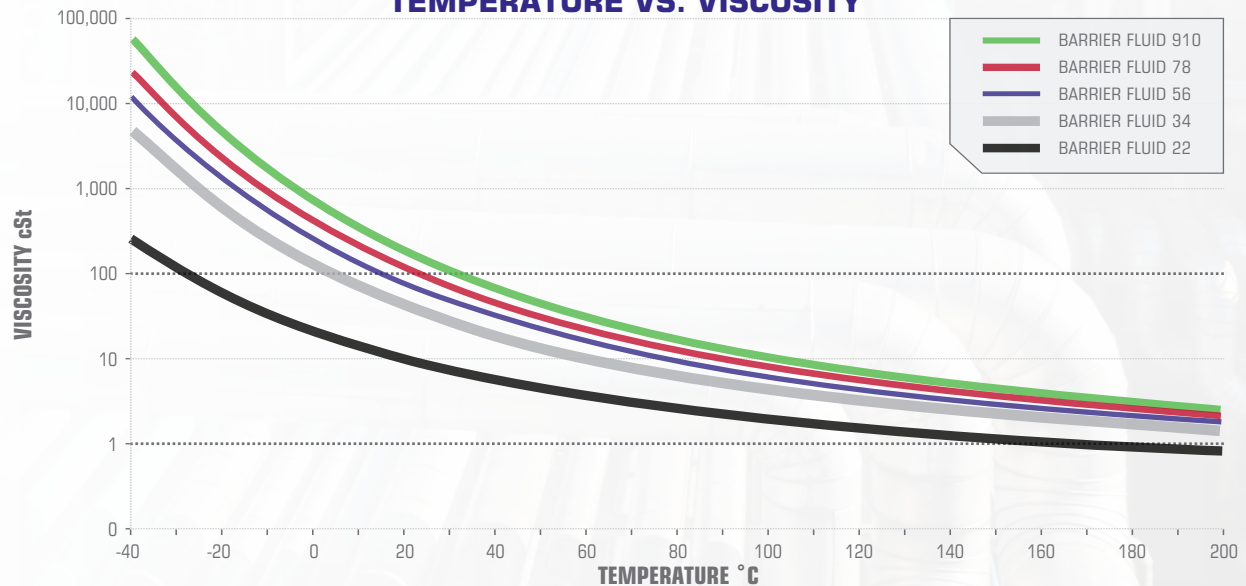
\* Properties are typical and may vary.

\*\*Barrier Fluid 22 is 80 percent biodegradable within 28 days per industry standard CEC L33-A-94.

## VISCOSITY DATA

TEMPERATURE		BARRIER FLUID GRADE									
		22		34		56		78		910	
°C	°F	cSt	Sp. G	cSt	Sp. G	cSt	Sp. G	cSt	Sp. G	cSt	Sp. G
-40	-40	251.9	0.8406	5034.4	0.8615	11832.4	0.8682	23476.8	0.8739	58533.8	0.8768
-20	-4	56.1	0.8261	557.0	0.8475	1206.3	0.8542	2138.3	0.8601	4371.2	0.8630
0	32	19.8	0.8115	120.7	0.8332	240.1	0.8401	388.8	0.8460	687.7	0.8490
20	68	9.3	0.7967	40.3	0.8188	74.2	0.8258	111.8	0.8318	177.7	0.8348
40	104	5.3	0.7817	17.9	0.8042	30.8	0.8114	43.9	0.8175	64.4	0.8206
60	140	3.4	0.7666	9.6	0.7895	15.7	0.7968	21.4	0.8030	29.5	0.8061
80	176	2.4	0.7514	5.9	0.7747	9.2	0.7821	12.1	0.7884	16.0	0.7916
100	212	1.8	0.7360	4.0	0.7598	6.0	0.7673	7.7	0.7738	9.8	0.7770
120	248	1.4	0.7206	2.9	0.7448	4.2	0.7524	5.3	0.7590	6.6	0.7623
140	284	1.2	0.7051	2.2	0.7297	3.2	0.7375	3.9	0.7442	4.7	0.7475
160	320	1.0	0.6895	1.8	0.7146	2.5	0.7225	3.0	0.7293	3.5	0.7327
180	356	0.8	0.6740	1.4	0.6995	2.0	0.7075	2.4	0.7144	2.8	0.7179
200	392	0.7	0.6584	1.2	0.6843	1.6	0.6925	1.9	0.6995	2.2	0.7030

## TEMPERATURE VS. VISCOSITY



# THERMAL PROPERTIES

## SPECIFIC HEAT AS BTU/lb. °F

TEMPERATURE °F	BARRIER FLUID GRADE				
	22	34	56	78	910
0	0.474	0.474	0.474	0.474	0.474
50	0.499	0.498	0.498	0.498	0.498
100	0.524	0.523	0.523	0.523	0.522
150	0.549	0.548	0.547	0.547	0.546
200	0.574	0.573	0.572	0.571	0.571
250	0.599	0.597	0.597	0.596	0.595
300	0.624	0.622	0.621	0.620	0.619
350	0.649	0.647	0.646	0.644	0.643
400	0.674	0.672	0.670	0.669	0.667

## THERMAL CONDUCTIVITY



### TECHNICAL QUESTIONS

For further questions, please contact Royal Purple's Industrial Technical Support Department at 888-382-6300.

**NOTE:** All physical properties contained in this brochure pertain to both Barrier Fluid FDA and Barrier Fluid GT. All values are typical and may vary.



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