ADVANCED SEALING TECHNOLOGY

BARRIER/BUFFER FLUID SELECTION

Dual seals may be operated with either a pressurized barrier fluid or an unpressurized buffer fluid between the two seals. A pressurized barrier fluid (Plan 53, or double seal operation) is used when the pumped fluid must be isolated from the environment to prevent flashing, crystallization, or polymerization; or when the pumped fluid is toxic or hazardous. The barrier fluid is typically pressurized 15-30 psi over seal chamber pressure.

An unpressurized buffer fluid (Plan 52, or tandem seal operation), is used to provide cooling or lubrication to sealed fluids with poor lubricating characteristics, such as light hydrocarbons. A buffer fluid which has a lower vapor pressure than the sealed fluid, and which is immiscible with it, allows the process fluid leakage to bubble through the buffer fluid to be vented to flare or other control device.

Neither barrier nor buffer fluids should be confused with a seal flush (Plan 11 and others), which is injected directly into the pumpage through the seal gland or the pump's seal chamber.

A barrier or buffer fluid should be
--compatible with the process,
--compatible with the seal materials,
--a good lubricant and heat transfer medium for the seal faces,
--benign to the environment and the workers in the plant.

Some good choices for barrier and buffer fluids:

Water: Cheap, safe, available, excellent heat transfer characteristics (high specific heat, low viscosity, high thermal conductivity). Don't use in freezing conditions.

Water/ethylene glycol mixture: Almost as good as water for heat transfer; doesn't freeze in outdoor applications. 50/50 mix by volume is easiest to mix, and gives good freeze protection. Use corrosion-inhibited industrial grade.

Water/propylene glycol mixture: Like water/ethylene glycol, but usable in food applications.

Light mineral and synthetic oils: Generally good. Within synthetics, polyalphaolefin (PAO) based fluids are usually better than ester-based. Synthetic oils specifically formulated for use as mechanical seal barrier fluids are available, including grades accepted by FDA and USDA.

Kerosene or Diesel fuel: Good where an oil is required. Low enough viscosity to flow well and transfer heat, and a good lubricant. Vapor pressure low enough that emissions aren't a problem.

Some common, but bad, choices:

Automotive antifreeze: Contains additives to prevent corrosion of automotive engine components and to stop small radiator leaks. These additives cause excessive seal face wear.

Uninhibited ethylene glycol: Without corrosion inhibitors, can attack seal parts, notably the nickel binder in tungsten carbide.

Automatic transmission fluid (ATF): Contains additives to increase friction in the bands and clutches in automatic transmissions. These also increase wear and friction in seal faces.

Silicone oils: Inert, but often form glassy particles that abrade and clog seals.

Turbine oils: Additives can plate out on seal faces. 6/2007

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	Heat Transfer	Temperature Range		Food Use	Cost	Notes
		°F	°C			
Water	Best	40/180	4/80	OK	Low	Can freeze Rusts steel
Water/ Ethylene Glycol	Very good	-50/220	-46/104	No	Moderate	May be classed as hazardous Use inhibited grade Don't use automotive antifreeze
Water/ Propylene Glycol	Very good	-20/220	-32/104	OK	Moderate	
Kerosene	Good	0/300	-18/150	No	Moderate	Attacks EP
Diesel Fuel	Good	10/300	-12/150	No	Moderate	Attacks EP
Methanol	Good	-93/30	-70/0	No	Moderate	Attacks Viton Classed as VHAP
Propyl Alcohol	Good	-127/157	-88/69	No	Moderate	
Mineral Oil	Good	-13/400	-25/204	OK	Moderate	Attacks EP
Synthetic Oils	Good	-60/450	-51/232	Some	High	Grades vary widely Attacks EP

Temperature range depends on
- mixture strength (water/glycol mixes)
- local formulation (diesel fuel, kerosene)
- grade (synthetic and mineral oils). 0798

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