

OSBORN®

Born for lubrication solutions

TC-704

Diffusion Pump Fluid

DESCRIPTION

OSBORN® TC-704 Diffusion Pump Fluid is a single-component fluid for high vacuums of 10^{-6} to 10^{-8} torr (untrapped) and 10^{-10} to 10^{-11} torr (trapped). It performs well in tough, rugged applications and offers quick pumpdown, even after exposure to air at operating temperatures.

BENEFITS

- Shorter conditioning runs: Single-component silicone fluids reach maximum potential in far less time than that required for multi-component organic fluids.
- Faster pumping: Diffusion pumps using silicone fluids can operate against 20 to 300 percent higher forepressures than those using organic fluids. For higher gas through-put at the high-pressure end of the pump's operating range, heater input can be increased 20 to 30 percent.
- Minimal backstreaming: The vapor pressure of single-component silicone fluids from OSBORN is so low that the use of traps – or refrigeration of existing traps – is unnecessary for many applications.
- Longer service life: Thermal and chemical stability of silicone fluids allows exceptionally long runs without deterioration or contamination.
- Cleaner systems, less maintenance required: Low vapor pressure of silicone fluids at baffle temperatures results in low migration rates. Jets and boiler surfaces stay clean; silicone fluids exhibit virtually no breakdown or decomposition under operational conditions.
- Faster cycling, reduced downtime, less frequent fluid replacement: The recovery rate of silicone fluids after exposure to air at operating temperatures is many times faster than that of organic fluids. Time is saved between cycles because the outstanding resistance of silicone fluids from OSBORN to oxidation and hydrolysis allows release of the vacuum without cooling the pump.

USES

OSBORN® TC-704 Diffusion Pump Fluids can be used in a variety of applications including:

Electronics

- Evacuating television and cathode-ray tubes
- Evacuating power and microwave tubes
- Vapor deposition of thin films by sputtering or evaporation in devices and microcircuits

Metallurgy

- Electron-beam operations; high-vacuum furnaces
- Melting, degassing and sintering refractory metals; thick-film deposition

TYPICAL PROPERTIES

These values are not intended for use in preparing specifications.

OSBORN TC- 704 Diffusion Pump Fluid

Ultimate Vacuum, torr, untrapped	10-7 to 10-8
trapped	to 10-11
Extrapolated Vapor Pressure, torr, 25°C (77°F)	2 x 10-8
Specific Gravity at 25°C (77°F)	1.07
Viscosity at 25°C (77°F), cSt	38 to 40
Flash Point, open cup, °C (°F)	221 (430)
Boiling Point, at 0.5 torr, °C (°F)	215 (419)
Typical Boiler Temperature, °C (°F)	220 (428)
Surface Tension, dynes/cm	37.3
Heat of Vaporization, kcal/g mole	25.5/200°C (392°F)
Molecular Description	Tetramethyltetra- phenyltrisiloxane
Molecular Weight	484
Vapor Pressure Equation,	A = 11.025
log ₁₀ P = A - B/T	B = 5570
(P = vapor pressure, torr; T = absolute temperature, °K)	

Specification Writers: Please obtain copies of the OSBORN Sales Specification for these products and use them as a basis for your specifications. They may be obtained from any OSBORN Sales Office.

Vacuum Coatings

- Aluminizing television tubes
- Optical coatings
- Decorative coatings for novelties and automobile parts
- Coating architectural glass, plastic and metal sheet

Research

- Ultrahigh vacuum and ultraclean vacuum for thin-film, surface- emissivity, lubrication and metal-fatigue studies

PERFORMANCE DATA

Oxidation Resistance

Silicone fluids are not oxidized by air at operating temperatures and are not subject to hydrolysis by water vapor.

Their chemical resistance gives them long life and eliminates frequent replacement. Also, the silicone fluids, being inert, do not react with metal parts, elastomer seals and gasses such as hydrogen and carbon monoxide.

Rapid Cycling

The results of cycling tests show that the capability of silicone fluids was practically unchanged after 1000 cycles. In comparison, the vacuum obtainable with an organic ester deteriorated by a factor of about 100 after 400 cycles. In the test, a single-stage glass diffusion pump and a Knudsen vacuum gauge were used.

During each cycle, the pump was operated for 12 minutes and then exposed to atmosphere for three minutes. The heater was off during exposure, but the fluid remained close to the operating temperature. Test results were:

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Number of Cycles	Pressure, torr
0	2.3 x 10 ⁻⁶
994	3.0 x 10 ⁻⁶
2072	3.3 x 10 ⁻⁶

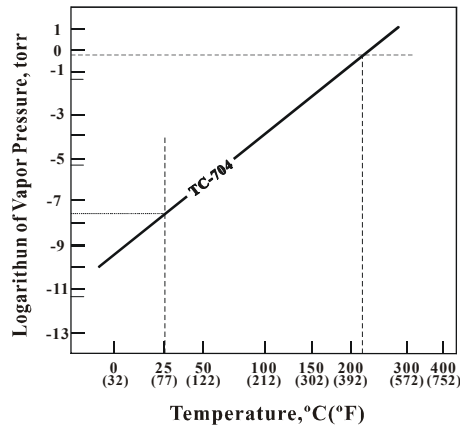
Tests under the same conditions with the organic ester fluid, di (2-ethylexyl) phthalate, gave the following results:

Number of Cycles	Pressure, torr
0	2.0 x 10 ⁻⁶
107	3.5 x 10 ⁻⁵
220	6.0 x 10 ⁻⁵
412	1.6 x 10 ⁻⁴

Vapor Pressure

As Figure 1 shows, OSBORN® TC-704 Diffusion Pump Fluid has extremely low vapor pressure. The broken line at 25°C (77°F) marks the vapor pressures with a baffle at that temperature. Broken lines at right indicate operating temperatures in modern commercial pumps producing 0.8 torr boiler pressure.

Figure 1: Vapor Pressure



SHIPPING LIMITATIONS

None.

STORAGE AND SHELF LIFE

When stored in the original, sealed container, at or below 25°C (77°F), OSBORN TC-704 Diffusion Pump Fluids have a shelf life of 60 months from date of manufacture , although no inherent limitations on the useful life of this product are known to exist.

PACKAGING

OSBORN® TC-704 Diffusion Pump Fluid are available in 3.8-kg / pails and 25-kg / pails . All weights net.

