Ultra High and High Vacuum Greases

Introduction

Apiezon L, M and N greases have been specifically developed for vacuum use, but are also extensively used for non-vacuum purposes in a variety of industrial and scientific applications.

A cross section of the key features of these products are shown in the table opposite.

High vacuum

Apiezon L grease has the best vapour pressure properties of all the hydrocarbon products and can be used in ultra high vacuum applications. M and N greases can be used in high vacuum conditions. Vapour pressures for each grease over its working temperature range are shown in the graph below.

Ambient temperatures

Apiezon L, M and N grease are generally used at ambient temperatures, however Apiezon N grease is also widely recognised and recommended as the cryogenic vacuum grease of choice.

A full data sheet on the cryogenic vacuum uses of Apiezon N grease is available.

Added cushioning

Apiezon N grease has a special additive which gives it a tenacious, rubbery consistency. This provides an extra cushioning effect, which absorbs vibrations in equipment. N grease is thus invaluable for use in fragile glass to glass joints, like burette taps, which continually run the risk of fracture.

Apiezon Vacuum Greases

- Very high vacuum range
- Ambient temperatures
- Cryogenic uses
- Radiation resistant
- Added cushioning
- Excellent lubricants
- Silicone & halogen free
- Easily removed

Long lasting lubrication

Apiezon L and M greases have been especially formulated to provide excellent lubrication while maintaining an efficient seal and are widely used in the manufacture and servicing of high performance vacuum pumps.

N grease, although a good lubricant at ambient temperatures should not be used as a lubricant at cryogenic temperatures.

Silicone free

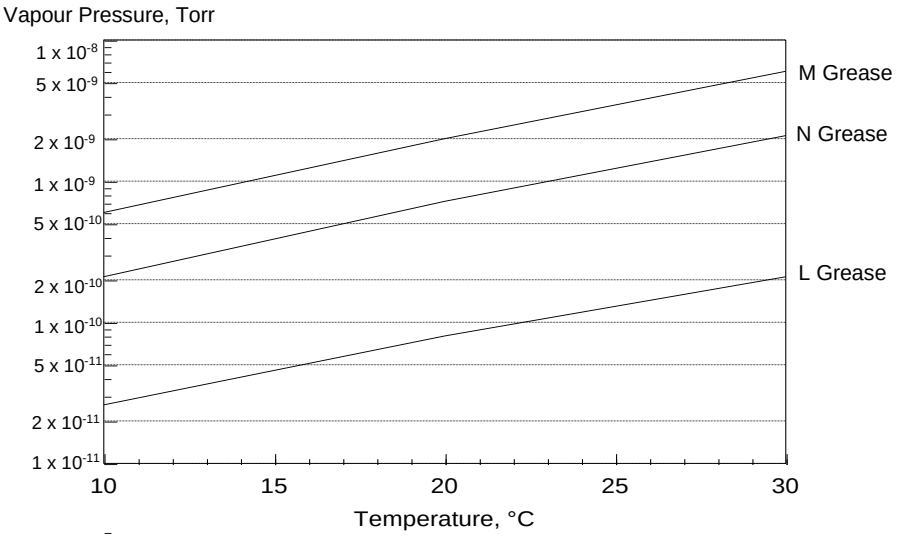
As hydrocarbon-based greases, Apiezon L, M and N are highly resistant to "creep" or “carry over”, a phenomenon associated with silicone-based products. Silicone has a tendency to travel away from the area of application and contaminate adjacent surfaces.

The creep resistance of Apiezon hydrocarbon greases benefits scientific users as it reduces sample contamination and the risk of interference in analytical techniques such as infra-red and mass spectrometry.

Silicone contamination is of particular concern in surface coating applications such as industrial paint or metal deposition processes, as trace amounts of silicone on surfaces prevent the adherence of paint and poor or incomplete coverage results. In semiconductor manufacture, yields can be severely affected by silicone contamination.

When using Apiezon hydrocarbon greases, the problems associated with silicone creep and contamination are avoided.

Vapour pressure over working temperature range



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Radiation resistant

Apiezon L and M grease are halogen free and as such show a degree of radiation resistance with only a small increase in viscosity when irradiated with 4 MeV electrons to approximately 1 MGy.

They are markedly better lubricants at higher irradiation levels than other high vacuum greases, such as silicones, esters or halogenated products, which decompose at radiation levels of 0.1 MGy or less.

"Gettering" action

Apiezon hydrocarbon greases are manufactured from a unique feedstock containing a high proportion of branched and unsaturated structures. These give the greases a very high molecular weight and consequently strong powers of absorption, particularly for other hydrocarbon molecules.

Strong absorption properties ensure that Apiezon hydrocarbon greases have a powerful "gettering" action, i.e. the power to absorb greasy or chemical impurities on metal and glass surfaces. This is of value in the electronics industry where scrupulous cleanliness is required.

Apiezon hydrocarbon greases have no contaminating effect on electrical equipment and are easily removed by hydrocarbon solvents. This process takes with it many trace impurities which are not removed by solvents alone.

Apiezon L and M greases are frequently used as the stationary phase in gas chromatography for their strong powers of absorption.

Typical Properties

		L	M	N
Dropping point - ASTM.D 566	*°C*	42 to 52	40 to 60	42 to 52
	°F	107 to 126	104 to 140	108 to 126
Typical working temperature range	*°C*	10 to 30	10 to 30	-269 to 30
	°F	50 to 86	50 to 86	-452 to 86
Vapour pressure @ 20°C / 68°F, Torr		7×10^{-11}	1.7×10^{-9}	6×10^{-10}
Relative density @ 20°C / 68°F		0.896	0.894	0.911
Resistant to radiation		Yes	Yes	Not recommended
Outgassing characteristics - ASTM .E 595				
TML		<1%	-	<1%
CVCM		<0.1%	-	<0.1%
Lubricity 4 Ball Test - ASTM.D 2596, kg		150	140	150
Viscosity of molten grease, cSt				
@ 50°C / 122°F		766	413	-
@ 100°C / 212°F		62.3	29.8	-
Coefficient of expansion per °C over 20°C - 30°C		0.00076	0.00075	0.00072
Thermal conductivity @ 20°C, W/m°C		0.194	0.194	0.194
Volume resistivity, Ω cm		1.2×10^{16}	2.6×10^{16}	2.0×10^{16}
Permittivity		2.3	2.1	2.3
Loss tangent		<0.0001	<0.0001	<0.0001
Surface breakdown at flash over, kV		24	28	27
Electrical strength, V/mil(0.001")		730	850	820

Easily removed

Apiezon hydrocarbon greases are easily removed by wiping with a soft clean lint free cloth. Any residues of grease can be washed away with warm soapy water or by using any aromatic hydrocarbon solvent (toluene, xylene). For a more environmentally friendly solvent, we recommend Limonene.

Apiezon hydrocarbon greases are not soluble in alcohols (ethanol, IPA) or ketones (acetone, MEK) so these cannot be used for cleaning.

Apiezon hydrocarbon greases work when you want them to, but are easily removed when you don't.

Compatibility

Apiezon L, M and N greases are compatible with a wide range of o-ring materials including:-

- Viton
- Silicone
- Nitrile (>30% nitrile content)
- Nylon
- Polyurethane
- Polyethylene
- Polypropylene

Due to their hydrocarbon base L, M & N greases are not compatible with:-

- EPDM (ethylene propylene diene M-class rubber)
- EPR (ethylene propylene rubber)
- Butyl rubber
- PVC seals

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Shelf life

The shelf life of L, M & N greases is ten years from date of manufacture, providing the product is in the original unopened packaging and has been stored at ambient (10 to 30°C) temperature.

Industry approvals

Apiezon vacuum greases have gained many prestigious approvals.

Examples include:
Apiezon L grease
- The European Space Agency
- NASA
- NATO

Apiezon M grease
- NATO

Apiezon N grease
- NASA
- US Navy

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