

Grease compatibility and conversion guidance

Key insight

Compatibility testing enables users to make informed decisions when converting from one grease to another.

Introduction

This tech topic explains what grease compatibility is, and how compatibility affects performance. Grease compatibility is a measure of the interaction of two different greases when mixed in grease-lubricated equipment.

Grease performance and interactions

Grease performance can be affected by interactions between:

- **Thickener:** Loss of structural stability. Greases with same thickener type (e.g., clay, Li-complex) are not necessarily compatible.
- **Additive chemistry:** Additives may act in synergy, compete or act antagonistically.
- **Base oil types:** Change in additive solvency, mineral and some synthetic oils do not mix well.

Truths

Greases of the same thickener type can be incompatible

Greases of different thickener types can be compatible

One should never generalize about grease compatibility based on thickener type

Grease compatibility can only be assured through proper testing

Myths

Mixing different types of greases is OK, as long as they are the same thickener type

ALL greases are compatible with one another

Greases with different thickeners are NEVER compatible with one another

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What happens if you mix incompatible greases?



Mixtures of incompatible greases can have a negative effect on lubrication properties and the ability of the grease to perform as designed in application. Mixing incompatible greases can have unexpected effects such as change in consistency, shear stability, oil separation and/or oxidation stability issues. The most common effects include:

- Softening, which can lead to grease leakage followed by lubrication starvation
- Stiffening, which can result in reduced grease flow or prevention of oil release
- Frictional drag, which increases operating temperature
- Separation of the thickener and oil phases, which can lead to a premature lubrication failure or distribution system plugging
- Reduction in dropping point, which can cause leakage and eventually lubrication starvation at peak operating temperatures

How is grease compatibility determined?

To validate compatibility, greases are tested to measure the interaction between the two different greases. A grease may be deemed compatible if it shows no impact on consistency or performance features. A compatible rating only indicates that there may be a low risk of incompatibility issues. Any mixing of greases should be closely monitored.

ExxonMobil Research and Engineering (EMRE) conducts various compatibility tests using industry approved tests and standards.

- ASTM D6185 relies on penetration, penetration 100K and dropping point
- ExxonMobil LTS (Lubricants Technical Support) Method uses penetration, extended penetration, roll stability and dropping point

The measure of change in structural stability when mixing two greases is a key indicator of grease compatibility. This testing involves mixing two greases at different ratios under mild shear before testing for changes in structural stability. ExxonMobil prefers the LTS method because it provides more rigorous evaluation under different shear regimes and has many years of proven experience.

Compatibility testing enables users to make informed decisions when converting from one grease to another – assessing the risks that grease mixture could soften, harden or excessively release oil in the application.

Penetration test (ASTM D6185)



100% Mobil Aviation Grease SHC™ 100



75/25 grease mixture (Mobil Aviation Grease SHC 100 and Unirex S2)
Penetration after rolling

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Conversion considerations

What factors should be considered when converting from one grease to another?

- Validate compatibility of new grease with the old grease
 - If the existing and new grease are fully compatible, normal regreasing is an acceptable conversion process (e.g., Mobilgrease™ 33 grease)
 - If, however, compatibility is borderline, one extra regreasing at half the normal interval is desirable
 - If compatibility of existing and new grease is poor, regreasing at half the normal regrease interval for several cycles is recommended
- To mitigate risk, we recommend thoroughly cleaning components prior to conversion
 - Presents the lowest risk
 - Allows operators to immediately capture performance benefits associated with the new grease
- When cleaning is not an option, or if the aircraft manufacturer's recommendation is to purge and fill:
 - Purge out existing grease until old grease is no longer visible on exit port
 - Minimize the duration of potential grease mixture in application by increasing the relubrication interval for a period of time
- Document issues or concerns with old grease to compare results of new grease
- Always refer to the aircraft manufacturers manual (AMM) instructions to ensure compliance



For more information

Please contact your ExxonMobil aviation sales representative, or download the Material Safety Data Sheet (MSDS).