White Paper

KLÜBER LUBRICATION

Keep oven chains protected, even at extreme temperatures

- **Bakery ovens used in the production of tortillas, pita bread, pizza dough and other baked goods can expose conveyor chains to extreme temperatures upward of 1000°F (537°C), which can significantly challenge typical food-grade lubricants.**
- **Klüberfood NH1 CH 6-120 SUPREME is a major development for bakeries looking to provide optimum protection for chains at extreme temperatures, while continuing on the path toward food safety.**

At high temperatures, common food-grade chain oils can evaporate and break down, leaving behind high levels of residue and/or requiring constant relubrication. A common alternative is to use a chain lubricant containing suspended industrial solids that will provide emergency lubrication even when the carrying fluid evaporates. Although these formulations can provide high-temperature lubrication, it is often accomplished at the sacrifice of the lubricant no longer being registered by the National Sanitation Foundation (NSF) as food-grade H1.

New Klüberfood NH1 CH 6-120 SUPREME provides optimum protection of chains at extreme temperatures. The formulation utilizes a solid white lubricant and is NSF H1 registered for incidental contact, providing a long-lasting solution to the challenge of using food-grade lubricants at extreme temperatures.

Meeting the demands of extreme temperature applications in food processing

In all industries, but particularly in the food industry, it is valuable to understand the makeup of the lubricant that is applied to equipment operating at elevated temperatures.

Conveyor chains in bakery ovens are exposed to extreme temperatures upward of 1000°F (537°C), which can significantly challenge typical food-grade lubricants, such as synthetic esters that can evaporate at temperatures above 500-600°F (260-315°C).

In addition to other areas, the various base oils used in lubricants are affected by extreme temperatures in the levels of evaporation loss and in the formation of residues—factors that influence chain life.

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Each type of base oil has a different temperature limit—and even going slightly past this limit can have a dramatic effect. For instance, at temperatures above 500-600°F (260-315°C), even synthetic esters, which are excellent performers in many bread ovens, can evaporate. As a result, frequent relubrication is needed to keep the chain lubricated and protected. However, even with constant relubrication, the continuous break down of certain types of base oils can thin the lubrication barrier, which reduces component protection. Also, residue levels become higher, which impairs fresh lubricant from reaching the intended surface(s).

A common method used to lubricate chains operating at extreme temperatures is to use a solid lubricant. The solid lubricant is in suspension within a fluid carrier when the lubricant is applied. As the fluid carries the complete formulation into the components and begins to evaporate, the solid stays behind inside the friction points as a type of emergency protectant to decrease wear of the surfaces.

Understanding the importance of the types of carrier fluid and solid being used is critical. As with any formulation, they should be selected based on the complete tribological environment. Other important factors include how the lubricant will be stored, the method in which it will be applied to the chain and when it will be applied.

A lubricating formulation using solids held in suspension is likely to require mixing either when being stored or prior to application. Stirring can be done with various methods, such as using an agitator pump inside the lube reservoir. Agitation maintains the proper ratio of the fluid carrier and the solid lubricant(s) during application, which can then be done using an automatic lubrication system.

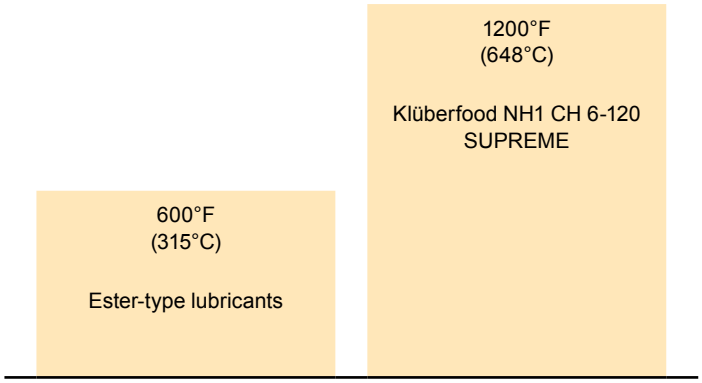
Because the carrier will eventually evaporate, the application should be performed at a temperature allowing the carrier to first deliver the additives into the friction points. Otherwise, if applied while the oven is at full or too high a temperature, heavy smoking and flashing off of the oil will occur when it contacts the chain. It is best to apply the lubricant at a lower temperature within the operating range of the carrier to allow penetration of the solid additives.

Advanced protection for oven chains at extreme temperatures

Klüberfood NH1 CH 6-120 SUPREME uses a carefully selected synthetic base oil as a carrier with a white solid lubricant held in suspension. The base oil evaporates off cleanly with very little residue, which provides the best protection possible from the solid lubricant. This formulation has excellent wetting and penetration properties on application, and can be used at operating temperatures even up to 1200°F (650°C).

At the same time, it provides excellent long-term performance while maintaining high industry standards for food safety. Klüberfood NH1 CH 6-120 SUPREME is registered as food grade H1 by the NSF.

Temperature limits of synthetic food-grade lubricants suitable for chains



Save time and money while supporting food safety

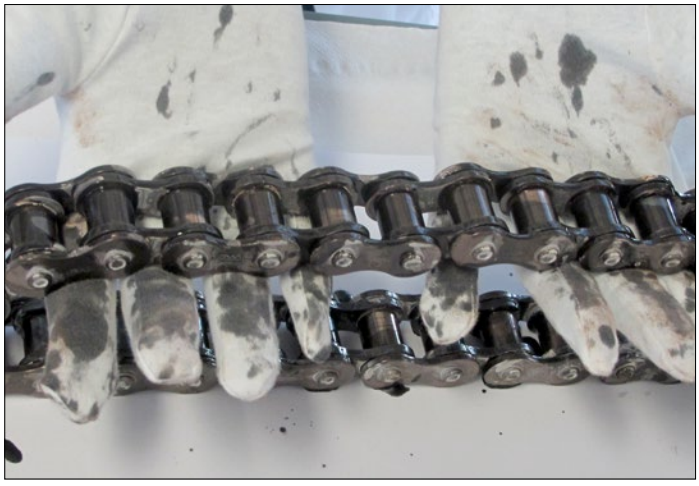
Along with performance and food safety advantages, Klüberfood NH1 CH 6-120 SUPREME protects components to extend chain life, reducing maintenance issues. Additionally, relubrication periods are extended—upward of one or two weeks—as the solid lubricants become impregnated into the metal surfaces. The synthetic oil provides good corrosion protection and, along with the solids, exhibits excellent wear behavior, which also enhances chain life.

To ensure optimum lubrication and performance, Klüberfood NH1 CH 6-120 SUPREME must be properly applied. If a solid lubricant solution has already been used, the same application procedure can be followed. Typically, a solid lubricant in fluid suspension is applied at lower temperatures to reduce smoking and to ensure that the carrier penetrates into the chain components. Application at chain temperatures below 302°F (150°C) is recommended during planned maintenance or periodic downtimes.

Comparing Klüberfood NH1 CH 6-120 SUPREME synthetic oil with an ester lubricant when used above 600°F

Klüberfood NH1 CH 6-120 SUPREME	High-Temperature Ester Lubricant
1200°F (650°C) upper operational limit	600°F (315°C) upper operational limit
Example: 1- to 2-week application intervals in established practice	Requires continuous and costly reapplication
Cleaner burn off with low residue	Burn off leaves higher levels of residue

The reservoir holding the lubricant, if automated lubrication is used, should employ an agitation or stirring method. Agitation ensures that the solid lubricant stays in suspension. Application frequency should be reviewed with the lubricant manufacturer, particularly when switching from alternatives or working with a newer chain.



The solid white lubricant formulation (left) of Klüberfood NH1 CH 6-120 SUPREME is NSF H1 registered for incidental contact, providing a food-grade solution for chain lubrication at extreme temperatures without the residue of typical lubricants (right).

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In addition to high-temperature performance and NSF H1 registration, Klüberfood NH1 CH 6-120 SUPREME is ISO 21469 certified. ISO 21469 certifies that the lubricant has been produced and packaged following hygiene requirements established by the standard.

Solving the dilemma of extreme-temperature performance and food-grade certification

In the past, bakery operators and manufacturers faced a likely dilemma: either provide the best protection possible for the equipment without using a food-grade lubricant, or switch to an NSF H1 lubricant with the expenses of higher lubricant consumption and shorter equipment life.

For bakeries in either situation, Klüberfood NH1 CH 6-120 SUPREME provides a single solution. Proven in baking applications, this advanced formulation provides excellent high-temperature performance as well as food-grade NSF H1 registration and ISO 21469 certification to meet demanding hygiene requirements.

For more information, please contact Klüber Lubrication at marketing@us.kluber.com.

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