

THE USE OF FOOD GRADE LUBRICANTS IN FOOD PRODUCTION

Piet Steenaard^{1*}

¹Dr Catzlaan 19- 1261 CE, The Netherlands

*e-mail: Steenaard@kpnmail.nl

Abstract

Many food incidents are caused by contamination of toxic materials. Lubricants are a potential hazard and contamination must be avoided. Production and use of food grade lubricants is the title of EHEDG document 23.

H-1 lubricants for incidental food contact are the safest solution for critical lubrication points. Some production companies use H-1 lubricants only for critical lubricating points. Most food grade producers have decided to switch over completely to H-1 lubricants to avoid human errors and be more efficient. Leakage of greases from bearings is a frequent problem. Lubricants also often drip and splash from open lubricating points such as chains and open gears. Leakage from oil circulation systems, especially when the oil is under pressure from an oil pump. This can also cause small leaks to occur, which are difficult to detect. Hydraulic systems and hydraulically operated valves are other examples of potential sources of oil leaks.

In this paper will be shown on a practical way how to control lubricants. The importance of Best Manufacturing Practice in regards to lubrication will be discussed. Storage and handling, cleanliness of lubricants, lubricants hazards in the food industry, switching to food grade lubricants and reasons for failures are subjects in this paper.

It is very important to train maintenance people how to use food grade lubricants and how to control lubrication points.

Key words: H-1 lubricants, BMP, control of critical lubrication points.

1. Introduction

H-1 lubricants for incidental food contact are the safest solution for critical lubrication points and the registration of these lubricants can be checked on www.nsf/usda.org [3] and [4] or www.Insservices.eu. It goes without saying that these lubricants are not specifically intended to come into contact with food, but if they do the producer and consumer can be certain that the

lubricant is composed of FDA-approved components. Consumers do not have this certainty with regard to the production of H-1 lubricants and how they are handled in practice.

2. Hygienic production of H-1 lubricants

There are many risks associated with the production of H-1 lubricants. There is no information about how these lubricants should be produced. There is no assurance that a lubricant producer employs hygienically responsible processes. Nor is possible to overcome this by insisting on a HACCP system, as this system is only applicable to the food industry. Lubricant suppliers with a responsible risk management policy would have to incorporate a HACCP-oriented section in their ISO 9000 system.

The EHEDG guideline for the production and use of lubricants is available and includes a number of critical points, together with suggestions for their management.

Lubricant hygiene is described in the guideline as follows:

All measures necessary to ensure the safety and wholesomeness of food-grade lubricants. These measures shall cover all stages during preparation, processing, manufacturing, packaging, storing, transportation, distribution, handling and offering for sale or supply to the customer.

2.1 Raw materials

First of all the producer must be sure that all raw materials satisfy the FDA requirements.

Incorporated supplier quality assurance is recommended. A program of measures that guarantees the safety and quality of basic materials.

Analyses can be used to check the purity of the raw materials. Stored raw materials must be systematically checked to ensure that they are not outdated.

A batch registration system and a raw materials identification system are recommended. EHEDG advises lubricant producers to set up a system to prevent the wrong raw materials from being used in the production of H-1 lubricants.

2.2 Contamination

Risks can also be identified during production. H-1 lubricants can cause contamination during production and packaging if risks are not properly managed. Production staff must be informed in work instructions, procedures and training programs.

2.3 How to approve the use of H-1 lubricants

Critical limits must be defined, so that measures can be taken, risks can be minimized and the process can be brought under control again.

Non-conforming lubricants must be blocked.

A system must ensure that no errors are made during packaging and labeling of the containers.

Adequate control, testing and registration must ensure that only approved lubricants are released for sale.

2.4 Distribution

During the transportation of H-1 lubricants the packaging must be properly sealed, so that they cannot cause any contamination. Stored lubricants must not be exposed to extreme temperatures, as this may cause them to degrade. H-1 lubricants must be stored separately from toxic substances and dangerous materials. The storage of H-1 lubricants in an area where conventional lubricants are also stored can lead to human errors.

2.5 Use of H-1 lubricants a must?

Opinions vary about the use of H-1 lubricants. Some production companies use H-1 lubricants only for critical lubricating points. Conventional lubricants are used for the other lubricating points. Such a system has to be efficiently managed to prevent human errors from occurring. For this reason most food producers have decided to switch over completely to H-1 lubricants. This considerably simplifies the management of critical lubricating points, as errors do not lead to the use of toxic lubricants at these points. Moreover the number of lubricants can be considerably reduced. Ultimately the food industry itself is responsible for the choice of system. EHEDG recommends using only H-1 lubricants.

2.6 Practical examples

Critical lubricating points are described in the guideline. Leakage of greases from bearings is a frequent problem. Lubricants also often drip and splash from open lubricating points such as chains and open gears. Leakage from oil circulation systems, especially when the oil is under pressure from an oil pump. This can also cause small leaks to occur, which are difficult to detect. Hydraulic systems and hydraulically operated valves are other examples of potential sources of oil leaks.

Leaks from oil-filled heat transfer systems are also difficult to detect. Leaks can also cause materials to corrode or to suffer electrochemical attack over a long period of time.

Oil-coated machine surfaces such as chutes used to transport food are a source of risk that has to be managed.

During machine maintenance, spilled lubricants may easily come into contact with the product. Lubricants that enter a production area as fine droplets entrained in air cannot be controlled. Compressed air is one example. The use of H-1 compressor oils reduces the associated risk. If filters are used in the air systems in combination with H-1 compressor oil, the risk is reduced even further. If oil-free compressors are used, it is advisable to fill the gear drive with H-1 oil, as any oil that leaks from the gearbox system is immediately caught up in the air circuit.

The use of lubricants to clean machine parts and protect them against corrosion is a risk that can be avoided by using safe products. Lubricants that are improperly used as solvents may also pose a risk.

2.7 Degradation of lubricants and microbiological effects

Lubricants may undergo changes during use. These changes may occur due to contamination with non-foodgrade lubricants or because water finds its way into the lubricant. The presence of water in lubricants, in combination with a temperature conducive to the formation of bacteria and moulds, is a source of risk. In such circumstances, lubricants may serve as a culture medium in which bacteria can multiply. Promotion of the use of FDA-approved substances [1] to manage this risk will no longer be permitted in future in Europe. The substances will not be banned, but it will not be possible to communicate the information that they are used in H-1 lubricants. Some suppliers are well known suppliers of H-1 lubricants that incorporate bacterial-growth inhibitors. Incidentally, these substances must be exclusively effective against selected bacteria, so that fermentation processes are not impaired. It is advisable to carry out regular checks on lubricants to

determine whether they contain bacteria. The basic materials of the lubricants do not play a role here, as under certain circumstances bacteria can multiply in white oils as well as synthetic PAOs. Lubrication points where H-1 lubricants may become contaminated with beverages are also critical, as such contamination may encourage bacterial growth.

2.8 The use of dedicated equipment

The use of equipment constitutes a major risk. Grease guns, oil cans and funnels may only be used for H-1 lubricants for the purpose of ensuring that non-H-1 oils and greases do not contaminate the equipment.

Lots of risk situations occur during maintenance and the use of lubricants. Lubricants may degrade as they become older. Adding too much oil to reservoirs and bearings may cause leaks to occur, thus contaminating the product. If a lubricant does not function properly, this may result in wear and tear, with the associated risk of product contamination by abraded particles.

2.9 Labeling

The use of the wrong lubricant is a frequent problem. Critical lubricating points must be labeled to reduce the risk of using the wrong lubricant. Text stickers or color codes can be used for this purpose.

2.10 Training of the staff

The proper training of technical maintenance staff is an important aspect of risk management. The system depends on adequately trained and motivated maintenance personnel. Staffs are to be trained in the relevant procedures. These procedures to be written and used by staff, as part both regular production procedures and as part of the quality system are subject to regular audits.

2.11 Suppliers agreement

The EHEDG guideline recommends entering into a supplier's agreement with the lubricant supplier. This agreement can regulate matters such as:

- All food-grade lubricants must correspond to the former USDA H-1 classification.

Definitions of food-grade lubricants can be found in the following documents:

- H-1 of the USDA;
- ISO norm 24969 [2].
- No change in composition of the product or grade substitution is permitted without prior evaluation and authorization;
- All shipments should be delivered in clean containers suitable for the transportation and pro-

tection of their contents with respect to integrity and quality and in keeping with good commercial practices and be labeled properly;

- All packs should be sealed with tamper evident seals fitted at the point of filling;
- Deliveries arriving without their seals intact will be rejected;
- In case of non-compliance with these provisions the lot will be rejected and returned at the supplier's expense.

2.12 Machine failures and procedure

The EHEDG guideline describes in detail the various failures that can occur in machines or procedures. It refers to the permissible amounts of lubricants in food, and to traceability.

2.13 Replace conventional lubricants by H-1 lubricants following flow diagrams

A flow diagram is a schematic representation of the production process. In the EHEDG guideline flow diagrams sequential steps are described by means of which the maintenance department effectively can replace the conventional lubricants by H-1 lubricants for critical equipment of which the lubricants used may come into contact with food.

3. Conclusions

- It has to be underlined that the food manufacturer is responsible for the standards applied to his production process. Hydraulic systems, gearboxes, compressors and greased bearings are mentioned.
- Heat transfer systems and cooling systems often contain large volumes of oil or coolants.
- The replacement of heat transfer oils and coolants is also described in detail in the guideline.

4. References

- [1] FDA Code of Federal Regulations 21 par. 178.3570. <URL: <http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=178.3570>. Accessed 4 March 2011.
- [2] ISO Norm 24969. <URL: http://www.iso.org/iso/iso_catalogue.htm. Accessed 4 March 2011.
- [3] NSF Nonfood compounds listings directory. <URL: www.nsf/usda.org. Accessed 4 March 2011.
- [4] NSF List of Proprietary Substances. <URL: www.nsf/usda.org. Accessed 4 March 2011.

Additional information

You can find more information on the EHEDG website www.ehedg.org.