

# Biolubricants

## Application of concrete release agents in civil engineering and utility construction

Every year, over five million litres of concrete release agent are used in the Dutch construction and precast concrete industry combined. Concrete release agents or stripping agents are total loss lubricants that ease the release of the moulds or formwork into which concrete is poured after the concrete has set. Release agents containing volatile organic solvents can have detrimental effect on health and the environment. In 1998, the Dutch concrete release agent manufacturers organization (SBLF), the Dutch construction industry's Health and Safety organisation (Stichting Arbow), and the Dutch Ministry for Housing, Spatial Planning and the Environment (VROM) agreed on a classification system for release agents consisting of five categories (see table 1). Products from category 1 are the least harmful to health and the environment; products from category 5 are the most harmful. [More information on classification in relation to basic requirements and allotment criteria.](#) [More information on sustainability requirements for the purchase of biolubricants.](#)

category	Criteria	Practical
1	<ul style="list-style-type: none"><li>- ready biodegradable according to OECD 301 B, C, D or F</li><li>- no R-phrases according to the Dangerous Substances Directive</li><li>- at least 75% (w/w) renewable raw materials</li><li>- Flash point greater than 100°C</li></ul>	Primarily based on renewable raw materials; fully biodegradable; free of solvents
2	<ul style="list-style-type: none"><li>at least 70% biodegradable according to OECD 301 B, C, D or F, (excluding the '10-day window')</li><li>- no R-phrases according to the Dangerous Substances Directive except for R-65</li><li>- Flash point greater than 100°C</li></ul>	Based on mixtures of mineral and renewable oils; inherent biodegradable; free of solvents
3	<ul style="list-style-type: none"><li>- over 80% biodegradable according to the CEC-L-33-A-93 test</li><li>- no R-phrases according to the Dangerous Substances Directive except for R-65</li><li>- Flash point greater than 61°C</li></ul>	Moderate biodegradability; may contain solvents
4	<ul style="list-style-type: none"><li>- no R-phrases according to the Dangerous Substances Directive except for R-65</li><li>- Flash point greater than 61°C</li></ul>	May contain solvents; no biodegradability data available and/or insufficiently biodegradable
5	<ul style="list-style-type: none"><li>- other products</li></ul>	Contains solvents; is labeled with R-phrases and is badly biodegradable.

### Raw materials use of SBLF members and market shifts:

The SBLF has made an inventory of the raw materials use in the production of release agents between 1998 and 2003; 1998 represents the situation before the introduction of the classification system. The figures indicate the shifts which have occurred on the market, partly as a consequence of the classification system. The SBLF members have an estimated market share of at least 95%, thereby making the inventory representative for the Netherlands.

Figure 1: division of raw materials use in release agents by SBLF members in kilos 1998-2003

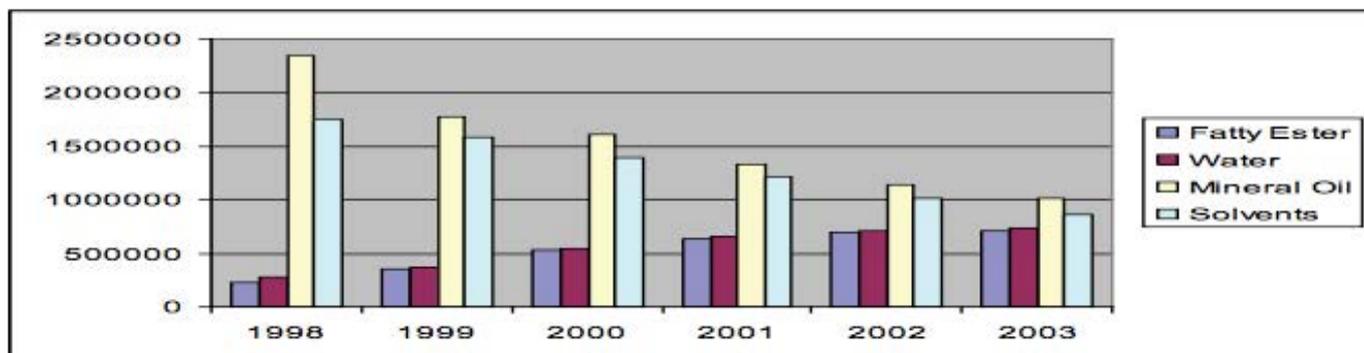


Figure 1 illustrates the consumption of the main raw materials used in the production of release agents: fatty esters, water, mineral oil and solvents. Based on these components five product types may be distinguished:

Products based on mineral oil; mineral oil and solvents; mixtures of mineral and vegetable oil; vegetable oil and/or fatty esters; and waterborne emulsions of vegetable oil or fatty esters. The consumption of vegetable oil and water in the production of release agents has risen sharply. At the same time, the use of mineral oil and solvents decreases. 'Autonomous' developments, such as the classification system, stimulation via the [Sumovera project](#) (among other things) and proposed legislation on exposure to solvents are likely to have played a part in these developments. It is not known how the distribution of the consumption has been divided over the five categories of the classification system and whether the use of products from categories 1 and 2 has increased. Assessment and review of the classification system: a large part of the products has been classified (table 2) more favourably by the distributors than by the researchers.

Class	Number of products according to the distributors	Number of products according to the researchers
1	19	6
2	17	3
3	20	8
4	2	46
5	-	-

The main reason for this is the demand that test data on the biodegradability of the entire product be available. Many of the products for which insufficient product information was provided (approx. 73%) have now, as a direct consequence, been placed in class 4 by the researchers.

Tests on biodegradability are costly. Supplying biodegradability data has often been the problem, while differentiation can be made with regard to flash point (e.g. volatile substances and health risks). Products with high flash points are now classified in category 4 by researchers because of the lack of test data on their biodegradability. The SBLF has, based on this assessment proposed a cheaper,

adjusted classification method consisting of 4 categories to judge the biodegradability of a product (Table 3).

Table 3: revised classification of concrete release agents by environmental safety and, health and safety		
Class	Criteria	Properties
1	- (excluding water) minimum 85% renewable materials. - no mineral oil - No R-phrase labelling necessary	Based on renewable materials. No risks for consumer
2	- No volatile organic compounds (VOCs) - Flash point greater than 100°C - No R-phrase labelling necessary, labelling of R65 is admitted	Not or partly based on renewable materials. No risks for consumer
3	- Flash point greater than °C 65'C - No R-phrase labelling necessary, labelling of R65 is admitted	Limited risks for consumer
4	- No criteria	Other

N.B. By now, the classification of classes 1 and 2 in table 1 correspond reasonably well with criteria class II. (the remaining are too low). A number of products from class 1 and 2 could bear the German Blue Angel ecolabel. (At this moment ca. 28 products have that class II ecolabel.) In 2009, 3 or 4 release agents received the European Ecolabel (class I). This appears to tie in with the development of sustainable procurement on a European scale. With regards to the newly proposed SBLF criteria of table 3, not one class is equal to class I or II, because the biodegradability and aquatic toxicity are not mentioned. Closer study might provide insight as to whether joining the system, with a two-class classification, based on existing Eco labels could be feasible. N.B. tables 1 and 3 a product tables, while the European Ecolabel (EEL) provides a substances list.