

European Code to good practice for the industrial manufacture of safe feed materials

# Sector reference document on the manufacturing of safe feed materials from biodiesel processing

**Version 1.0**  
**Effective from June 2013**



## Sectors covered by the European Code

The following sector specific sector documents have been developed by the respective European sector organisations in cooperation with EFISC:

<a href="#">AAF</a>	Sector reference document on the manufacturing of safe feed materials from starch processing
<a href="#">FEDIOL</a>	Sector reference document on the manufacturing of safe feed materials from oilseed crushing and vegetable oil refining
<a href="#">EBB</a>	<b>Sector reference document on the manufacturing of safe feed materials from Biodiesel processing</b>

This European Code is open to other manufacturers producing feed materials by the development of a sector specific document.

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Within this Biodiesel Sector document animal fats/waste oils production processes and its' derived feed materials are not considered, therefore exempted from this sector document and excluded from EFISC certification

This risk assessment builds on the Fediol sector reference document (Appendix 4 of the European Code to good practice for the industrial manufacture of safe feed materials) for the manufacturing of the vegetable oils. Therefore it has as a starting point the transport of the incoming material

## 1. Introduction

The members of the European Biodiesel Board (hereinafter referred to as EBB) produce besides biodiesel, a number of co-products for animal feeding and for technical purposes. The EBB counts nearly 80 member companies and associations located in 21 EU Member States.

EBB members are committed to manufacture safe feed materials and to demonstrate their compliance to European health and safety requirements. In particular in the frame of the Feed Hygiene Regulation 183/2005 as well as within the Catalogue of Feed Material (Regulation 68/2013).

Biodiesel is a renewable fuel, providing a sustainable alternative to fossil fuels. In addition to reducing greenhouse gas emissions in European transportation, biodiesel provides extensive amounts of glycerine used for animal feed and other by-products, used for technical purposes.

The following document intends to support biodiesel facilities in delivering safe feed materials. The EBB has conducted risk assessments of the chain of feed materials from the main incoming materials processed by its industry. These assessments offer a tool to the biodiesel manufacturer for the evaluation of their own feed safety management system. They also support these manufacturers in their dialogue on chain control with their customers, suppliers and other stakeholders. The risk assessments mentioning control measures is further detailing of the concept of HACCP and the supporting Prerequisite Programmes as mentioned in chapter 5 and 6 of the accompanying Community Code.

EBB would like to emphasize that companies remain primarily responsible for supplying safe feed and that this risk assessment cannot replace any responsibility.

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## 2. Listing of feed materials

The main raw materials processed by the EU Biodiesel industry are rapeseed oil, soybean oil, sunflower seed oil and palm oil in combination with methanol.

The Catalogue of the European Union for Feed Materials provides a common system in the EU for the description and labeling of feed materials. The Catalogue includes, for each feed material listed, the name of the product, an identification number, a description of the feed material including - if appropriate - information on the manufacturing process, and the particulars replacing the compulsory declaration for the purpose of article 16 (1) (b) of Regulation (EC) No 767/2009.

Hereby listed the biodiesel related feed materials within Reg. 68/2013 (adapted for vegetable origin):

Glycerine, crude	13.8.1	<p>By-product obtained from:</p> <ul style="list-style-type: none"> <li>– the oleochemical process of oil/fat splitting to obtain fatty acids and sweet water, followed by concentration of the sweet water to get crude glycerol or by transesterification (may contain up to 0,5 % methanol) of natural oils/fats to obtain fatty acid methyl esters and sweet water, followed by concentration of the sweet water to get crude glycerol;</li> <li>– the production of biodiesel (methyl or ethyl esters of fatty acids) by transesterification of oils and fats of unspecified vegetable origin. Mineral and organic salts might remain in the glycerine (up to 7,5 %).</li> </ul> <p>May contain up to 0,5 % Methanol and up to 4 % of Matter Organic Non Glycerol (MONG) comprising of Fatty Acid Methyl Esters, Fatty Acid Ethyl Esters, Free Fatty Acids and Glycerides;</p> <ul style="list-style-type: none"> <li>– saponifications of oils/fats of vegetable origin, normally with alkali/alkaline earths, to obtain soaps.</li> </ul> <p>May contain up to 50 ppm Nickel from hydrogenation.</p>
Glycerine	13.8.2	<p>Product obtained from:</p> <ul style="list-style-type: none"> <li>– the oleochemical process of (a) oil/fat splitting followed by concentration of sweet waters and refining by distillation (see part B, glossary of processes, entry 20) or ion-exchange process; (b) transesterification of natural oils/fats to obtain fatty acid methyl esters and crude sweet water, followed by concentration of the sweet water to get crude glycerol and refining by distillation or ion-exchange process;</li> <li>– the production of biodiesel (methyl or ethyl esters of fatty acids) by transesterification of oils and fats of unspecified vegetable origin with subsequent refining of the glycerine. Minimum Glycerol content: 99 % of dry matter;</li> <li>– saponifications of oils/fats of vegetable origin, normally with alkali/alkaline earths, to obtain soaps, followed by refining of crude Glycerol and distillation.</li> </ul> <p>May contain up to 50 ppm Nickel from hydrogenation.</p>

## **2.1 Processing aids possibly used during treatment and processing**

Water

Aluminium Sulphate

Citric acid

Ferric Chloride

Hydrochloric acid

Potassium hydroxide

Sodium Hydroxide

Sodium Methoxide

Sulphuric acid

Phosphoric acid

Toluene Sulphonic acid

This list is non-exhaustive

### 3. Process Description of Biodiesel

Biodiesel consists of Fatty Acid Methyl Esters and is produced by the chemical reaction of Oils and Fats with monoalcohols, typically methanol. A catalyst, usually sodium or potassium hydroxide and/or methylate, is utilized to accelerate the formation of alkyl esters. This production process is generally known as transesterification.



This section will describe the process of biodiesel production from vegetable oils where the triglyceride oil is broken into alkyl (biodiesel) and glycerine by reaction with a mono alcohol. The biodiesel and glycerine phases are then separated and purified. Production processes contain the same stages, irrespective of the production scale, although the differences in equipment may be significant.

#### 3.1. Reception of Vegetable Oil

Vegetable oils delivered to biodiesel plants are partially refined vegetable oils. Pre-delivery (as per FEDIOL sector reference document)<sup>1</sup> vegetable oils undergo a number of refining steps to remove various impurities, such as phosphatides, free fatty acids, waxes, tocopherols or colorants, which could impede the biodiesel process reaction.

Most if not all feedstocks undergo some form of pre-treatment for impurities or free fatty acid (FFA) reduction prior to being utilised as a raw material in the manufacture of biodiesel.

On delivery, the partially refined vegetable oils are segregated to pre-processing storage tanks. The safety and quality of the incoming material is assessed.

The content of free fatty acids, water and non-saponifiable substances are key parameters in achieving high conversion efficiency in the transesterification reaction. The results of the oils parameters will influence the quantity of raw material, alcohol and catalyst ratio in the transesterification process.

#### 3.2. Reaction Stage/ Transesterification:

The objective of the reaction stage is to convert the free fatty acid (FFA) fraction of the feedstock into biodiesel. When the FFA content is high the reaction stage is usually conducted in two steps: esterification and transesterification.

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<sup>1</sup> Fediol Sector Reference Document: appendix 4 to the European Code to good practice for the manufacture of safe feed materials:  
[http://www.efisc.eu/data/1342020514Sector%20document%20oilseed%20and%20proteinmeal%20industry\\_version-2-2-1\\_16-02-11%20update%20hyperlinks%209\\_7.pdf](http://www.efisc.eu/data/1342020514Sector%20document%20oilseed%20and%20proteinmeal%20industry_version-2-2-1_16-02-11%20update%20hyperlinks%209_7.pdf)  
*Sector reference document on the manufacturing of safe feed materials from biodiesel processing*

Following the pre-processing analysis of the incoming vegetable oil, the alcohol and catalyst is mixed and sent to the reaction vessel where upon the vegetable oil is added (Figure 1 Flow Chart). This stage is known as esterification and is a pretreatment step to the transesterification which reduces the FFA content of the oil.

The complete transesterification process is closed to the atmosphere to prevent any loss of alcohol. Excess alcohol is normally used to ensure total conversion of the oil to its esters.

### **3.3. Separation Stage**

Once the reaction is complete, two major products exist: glycerine and biodiesel. Each has a substantial amount of the excess methanol that was used in the reaction. The reacted mixture is sometimes neutralized at this step if needed. The glycerine phase is much more dense than biodiesel phase and the two can be gravity separated with glycerine simply drawn off the bottom of the settling vessel. In some cases, a centrifuge is used to separate the two materials faster.

### **3.4. Acidulation and FFA separation**

Typically, the glycerine after the separator is usually 50% glycerine, 40% methanol and 10% soap and catalyst. The catalyst is neutralized and soaps are split to fatty acids and salts. Free fatty acids and methanol are removed and recovered.

### **3.5. Glycerin Neutralization**

The glycerine by-product contains unused catalyst and soaps that are neutralized with an acid and sent to storage as crude glycerine. In some cases the salt formed during this phase is recovered for use as fertilizer. In most cases the salt is left in the glycerine. Water and alcohol are removed to produce approx. 80% pure glycerine that is ready to be sold as crude neutralised glycerine.

Refined Glycerine: Crude glycerine in some cases maybe further refined to pharmaceutical or technical grades or feed grades by removing water and salts by distillation.

### **3.6. Methyl Ester Wash**

Once separated from the glycerine, the biodiesel is sometimes purified by washing gently with warm water to remove residual catalyst or soaps, dried, and sent to storage. In some processes this step is unnecessary. In some systems the biodiesel is distilled. This step is optional and increases biodiesel purity.

### **3.7. Storage**

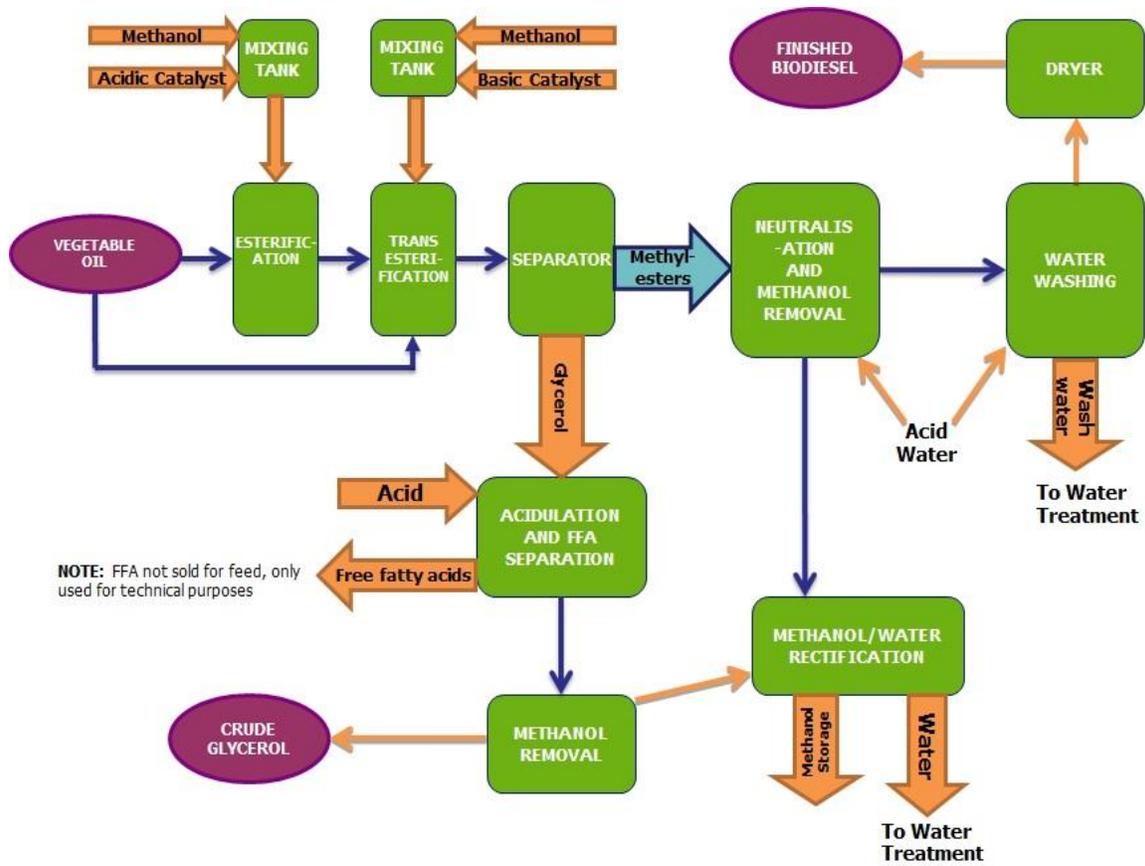
Glycerine is stored in suitable storage tanks.

### **3.8. Transport**

Transportation is required for the processed co-product glycerine. The transportation of the co-product has to be in line with EU and National legislations, existing transportation codes, customer requirement and the requirements in this code 'Sector reference document on the manufacturing of safe feed materials from biodiesel processing'.

## 6. Biodiesel Production Process Flow Chart

This chart describes a very general biodiesel process



## **7. Risk Assessment**

### **7.1. EBB made the following incoming materials subject to feed safety chain risk assessment**

Raw Material: Vegetable Oils

In all cases, biodiesel sites are expected to comply with the requirements concerning risk assessments. A table of hazards is included in Appendix 1 but individuals should note that this list is not exhaustive and the operator should carry out their own risk assessments. Further information on specific hazards and control measures can be found in relevant HSE publications and EC Regulations in the Risk Assessment tables.

### **7.2. Summary of the risk-based approach for the biodiesel sector**

In establishing the list of potential hazards, an operator should take due consideration of:

- The Directive of undesirable substances in feed (2002/32/EC).
- The Regulation on genetically modified food and feed (1829/2003/EC).
- The Placing on the market Regulation (767/2009/EC)
- The Regulation on maximum residues levels of pesticides in or on food and feed of plant and animal origin (396/2005/EC).
- The Regulation Catalogue of Feed Materials (68/2013/EC).
- The Regulation regards the approval of establishments placing on the market, for feed use, products derived from vegetable oils and blended fates as regards the specific requirements for production, storage, transport and dioxin testing of oils, fats and products derived thereof (225/2012/EC).

The following list of examples is non-exhaustive and should be adapted according to the circumstances.

#### **Biological hazards**

- Relevant Vegetative Pathogens according to the GMP feed regulation and associated microbiological criteria.

#### **Potential Chemical hazards**

- Process chemicals, processing aids e.g. and antioxidants,
- Mycotoxin
- Heavy metals
- Pesticides residues
- PCB, Dioxins
- Polycyclic aromatic hydrocarbons (PAH)
- Lubricants (non- food grade)
- Pest control chemicals

The use of processing aids is included in the hazards analysis developed by the operator according to the requirements of the section 6 of the Code.

#### **Physical contamination hazards**

- Physical contamination of undesirable substances, i.e. metal, glass
- Any other relevant physical contamination.

#### **Radioactivity hazard**

- Radionuclides (after a nuclear accident)

### **7.3. Risk-based approach for the characterisation of hazards applicable to feed materials coming from biodiesel production**

The following tables present the characterisation of hazards applicable to products, coming from biodiesel production, sold as feed materials. For more understanding of the following risk assessment tables please see EFISC main text, chapter 6 HACCP system.

Those risks cannot be considered as complete and may differ amongst biodiesel producers based on individual and specific manufacturer's processing conditions.

Biodiesel manufacturers have refined the risks to a level appropriate to their specific operating conditions.

Moreover, in these tables, no CCP is listed due to the fact that the decision leading to the establishment of such CCP should be consistent with the reality of each plant or processing line.

Three categories of hazards were considered:

- Biological hazards;
- Chemical hazards; and,
- Physical hazards.

## 7.4. Procedure of carrying out risk assessment

7.4.1. Biodiesel Process: EBB constructed a flow chart covering all stages of biodiesel production: from transport and reception of raw materials, storage, application of processing aids, separation of materials following transesterification, washing, further refining of glycerine to end product of biodiesel and crude glycerine feed material, storage and transport

7.4.2. For processing steps: utilities-related hazards were commonly described. A safety hazard is a biological (B), chemical (C) or physical agents (P) in, or condition of, a product that makes it injurious to human or animal health.

7.4.3. In the elements of the chain that directly relate to the professional activity of the EBB members within the production process, per hazard, EBB sets the risk as follows:

On the basis of expert's experience assessed the likelihood of the hazard occurring or "chance" as very low, low, medium or high. These chance classes can be quantified as follows:

- very low: the hazard has never occurred, but may occur
- low: the hazard may occur once in 5 years
- medium: the hazard may occur once a year
- high: the hazard may occur more often than once a year

Seriousness should relate to the risk of the molecule/substance for the animal or human health. It subdivides as follows:

- little: small injuries, little illness
- medium: substantial injuries or illness, immediate or on longer run
- high: fatal effects, serious injuries or illness, immediate or on longer run

7.4.4. Classified the risks according to following table

<b>Seriousness</b>	Little	Medium	High
<b>Chance</b>			
Very Low	1	1	2
Low	1	2	3
Medium	2	3	4
High	3	4	4

7.4.5. Justified the risk assessment

7.4.6. Checked whether EU legislation or trade standards limits for respective standards for the respective hazard, and if so, listed them

7.4.7. Formulated control measures based on the following table:

<b>Risk class</b>	<b>Action</b>
1	No control measures needed
2	No control measures needed, but periodically evaluate if control measures are necessary
3	Risk to be controlled by generally verifiable measures such as good operation practices (Prerequisite Programmes or OPRP)
4	Risk to be controlled by a measure that is specifically designed to control the risk (CCP or OPRP)

8. Risk based approach for glycerine				1. General risk: Biodiesel Processing				
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS	CONTROL MEASURE	REMARKS
<b>Quality of water</b>	C/B/P	Low	High	3	Water is used in the production of biodiesel.	According to Regulation 1831/2003/EC water used during the manufacture of feed shall be of suitable quality.	Apply suitable water of drinking quality.  Dedicate water circuits	
<b>Cleaning agents</b>	C	Low	Medium	2	Cleaning come into contact with the product.		Cleaning agents used in the production system should be flushed. Cleaning agents used must be evaluated and appropriate measures taken to bring risk to acceptable levels.	Not a common risk as most productions facilities are continuous process
<b>Flying in birds</b>	B	Low	Medium	2				Closed building can prohibit this hazard
<b>Toxins from pest control materials</b>	C	Very low	High	2	Poison bait from open boxes could cause cross contamination		A pest control programme must be applied. Appropriate measures should be taken to minimise risk	
<b>Lubricants</b>	C	Low	High	3			Use of lubricant should be evaluated before use and appropriate measures be taken to bring risk to acceptable levels	Purchasing specifications. Risk is low as oils are checked before use
<b>Insects and rodents</b>	B	Medium	Low	2			Building proofing, cleaning programs and pest control system as part of the pre requisite programme	

8. Risk based approach for glycerine				2. Reception of feedstock vegetable oil				
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS	CONTROL MEASURE	REMARKS
<b>Contamination by the previous cargo during the transport by truck or barge or ocean going vessel</b>	C	Low	High	3	Transport of vegetable oils usually takes place in dedicated transport vehicles		Risk must be evaluated and appropriate measures must be taken to bring this risk to acceptable levels. Dedicated transport, control of the three previous cargos.	Visual checks
<b>Foreign materials</b>	P	Low	Low	1	Foreign materials may be present.		Dedicated buildings and circuits filters, staff hygiene, glass procedure, good maintenance practices	
<b>Contamination with undesirable substances</b>	C	Low	High	3	In general, most contaminants do not concentrate in the glycerine		Monitoring plan	Contamination with undesirable substance normal cases CHANCE is LOW – if manufacturer purchases a raw material of lower quality the risk elevates to medium
<b>- Dioxins</b>	C	Very Low	High	2		EU Regulation of 225/2012 on Dioxins	Monitoring plan	
<b>- Nickel</b>	C	Low	High	3		EU Regulation 68/2013 Catalogue of Feed Materials	Monitoring plan	Nickel in most cases not used in biodiesel production
<b>- PCB, dIPCB</b>	C	Very Low	High	2		EU Regulation 32/2002 on undesirable substances on feed materials	Monitoring plan	

- PAH	C	Low	High	3			Monitoring plan	
<b>Pesticide residues above the minimal risk levels (MRL), i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.</b>	C	Low	Medium	2	Regular monitoring of pesticide residues on crude oil shows that residue levels remain within legal limits.	Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured.	Monitoring plan	Most pesticides are not water soluble and will not move to the glycerine water phase
<b>Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff</b>	C	Very low	High	2	Some of the banned pesticides may be present in the environment. The chance of finding them in crude soybean oil, however, is very low. The use of endosulfan is allowed on soybeans. Monitoring data show that its residue in crude oil remains within the legal limit.	Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff.	Monitoring plan	Most pesticides are not water soluble and will not move to the glycerine water phase
<b>Microbiological contamination</b>		Low	Medium	2			Monitoring plan	

8. Risk based approach for glycerine				3. Storage of the incoming material				
HAZARD	CAT.	CHANCE	SERIOUSNES	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS	CONTROL MEASURE	REMARKS
<b>Contamination by cleaning agents</b>	C	Low	Medium	3	This risk classification applies to terminals that store both chemicals and vegetable oils. They may abstain from using cleaning agents that are suitable for use in the food industry. For tank terminals in the EU that apply HACCP and that keep the storage of vegetable oils and chemicals separated, the chance of using the wrong cleaning agents is very low.		Cleaning agents used must be evaluated and appropriate measures taken to bring risk to acceptable levels.	
<b>Thermal heating fluids from failing equipment</b>	C	Low	High	3	Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during storage, the chance of leakage of thermal heating fluids into the product is low.		Documentation on nett losses and analyse accordingly, if necessary.	The use of water and steam heating is recommended. Thermal heating fluids are not commonly used
<b>Cross contamination</b>	C	Low	Medium	2	Sources of risk include equipment malfunction and operator accident. Extremely low frequency of occurrence. Preventative measures to reduce impact include automated safety mechanisms, spill containment, site security, restricted site access.		Storage procedure in place	

8. Risk based approach for glycerine				4. Stage 1 of 3 – Trans esterification (Reaction stage)				
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS	CONTROL MEASURE	REMARKS
<b>Processing aids (alkali solution, acids)</b>	C	Low	Medium	2	Processing aids come into contact with the product.		<p>Processing aids that directly come into contact with the oil must be evaluated and appropriate measures taken to bring risk to acceptable levels.</p> <p>Online process monitoring, correct labelling of the chemical containers</p>	
<b>Contamination caused during addition of Catalyst (Methanol)</b>		Low	Medium	2	Undesirable substances in the Methanol		<p>Apply methanol of suitable quality</p> <p>Described in the contract specification</p> <p>Online process monitoring, correct labelling of the chemical containers</p>	In very small scale operations, the handling of dangerous chemicals may pose a greater risk to the operator if these chemicals are manually transferred and employed in a batch process versus an automated system.

8. Risk based approach for glycerine				5. Stage 2 of 3 – Trans esterification (Separation stage)				
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
<b>Methyl ester remaining in glycerine</b>	C	Low	High	3	Separation of biodiesel from coproducts - stage 1	Legislation 68/2003 mentions: May contain up to 4% of Matter Organic Non Glycerol (MONG° comprising of Fatty ACID Methyl Esters, Fatty Acid Ethyl Esters, Free Fatty Acids and Glycerides	Monitoring plan and process follow up	
<b>Methanol in glycerine</b>	C	Medium	High	4		Legislation 68/2013 mentions: May contain up to 0,5 % methanol	CCP: analysis methanol or control by process parameters	

8. Risk based approach for glycerine				6. Stage 3 of 3 - Acidulation and FFA separation				
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS	CONTROL MEASURE	REMARKS
<b>Processing aids (alkali solution, acids)</b>	C	Low	High	3	Processing aids come into contact with the product.  Risk of overdoses	Regulation 68/2013 set limits for maximum contents of chemical impurities resulting from manufacturing process or from processing aids	Processing aids that directly come into contact with the oil must be must be evaluated and appropriate measures taken to bring risk to acceptable levels.  Online process monitoring (consumption rates)	
<b>Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.</b>	C	Low	Low	1	Regular monitoring of pesticide residues shows that residue levels remain within legal limits. Pesticides do not concentrate in the glycerine	Regulation 396/2005 sets limits for residues of pesticides.		
<b>Delivery of Fatty Matter</b>		Medium	High	4			If fatty matter is delivered as a by product, label fatty matter as "nonfeed/nonfood" in order to assure this is not used in feed sector	Fatty acids with methyl esters (also called fatty matter) collected after methanol recovery at a biodiesel production, are prohibited for feed purposes, since liphophile additives, used in biodiesel production, concentrate in fatty acids.

8. Risk based approach for glycerine				7. Storage				
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
<b>Contamination due to lack of segregation</b>	C	Low	High	3			Storage procedures in place to reduce the risk of cross contamination Dedicated tanks	
<b>Contamination by cleaning agents</b>	C	Low	Medium	2	This risk classification applies to terminals that store both chemicals and vegetable oils. They may abstain from using cleaning agents that are suitable for use in the food industry. For tank terminals in the EU that apply HACCP and that keep the storage of vegetable oils and chemicals separated, the chance of using the wrong cleaning agents is very low.		Cleaning agents used must be evaluated and appropriate measures taken to bring risk to acceptable levels	
<b>Thermal heating fluids from failing equipment</b>	C	Low	High	3	Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during storage, the chance of leakage of thermal heating fluids into the product is low.		If thermal heating fluids have been used, the storage company must provide for documentation on nett losses and analyse accordingly, if necessary.	The use of water and steam heating is recommended. Thermal heating fluids are not commonly used
<b>Cross contamination</b>	C	Medium	Medium	3			Dedicated circuits and storage tanks. Storage procedure in place	

8. Risk based approach for glycerine				8. Transport of glycerine				
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Contamination by previous cargo	P/C/B	Low	Medium	2			Control of the three previous cargoes	
- Tank cars, rail tanks and barges	C	Low	High	3	Transport of glycerine based on customer requirements	EC Regulation No. 183/2005 setting rules in the transport of feed materials	Check previous cargoes via <a href="#">IDTF database</a> Transport suitable for feed materials as described in the European Code for the industrial manufacturing for safe feed materials	
Contamination by cleaning agents	C	Low	High	3				
Tank cars	C	Low	Little	1	Stainless steel tanks are used which are heated with cooling water from the motor through a system of double walls (and not coils).			
Foreign bodies	P	Low	High	3			A quality plan should require the loading of tank cars with glycerine under a roof.	
Pest	B	Medium	Medium	3			PRP program for pest control	Check on pest activity

## 9. Minimum Monitoring

EFISC system participants shall implement a monitoring plan as described in the EFISC Code §4.4.3

In case insufficient data is available for a risk assessment the following minimum monitoring requirements shall apply. The minimum number of analysis will depend on the volume of feed materials in tons manufactured in one location as shown in the table below.

### **Minimum Monitoring plan Glycerine as by-product of the processing of vegetable oil**

**Table A Glycerine and Crude Glycerine.**

<b>Annual production in t Parameter</b>	<b>&lt;10,000 t</b>	<b>&gt; 10,000t - &lt;20,000t</b>	<b>&gt; 20,000 t</b>
<b>Dioxin</b>	2	4	4
<b>Dioxinlike PCB</b>	2	4	4
<b>Non- dioxine like PCB</b>	2	4	4
<b>Salmonella</b>	2	3	4
<b>Heavy metals (Pb, Cd, As, Hg</b>	2	3	4
<b>Pesticides</b>	2	2	2
<b>Methanol*</b>	2	3	4

\*Examinations of methanol only for crude glycerine

