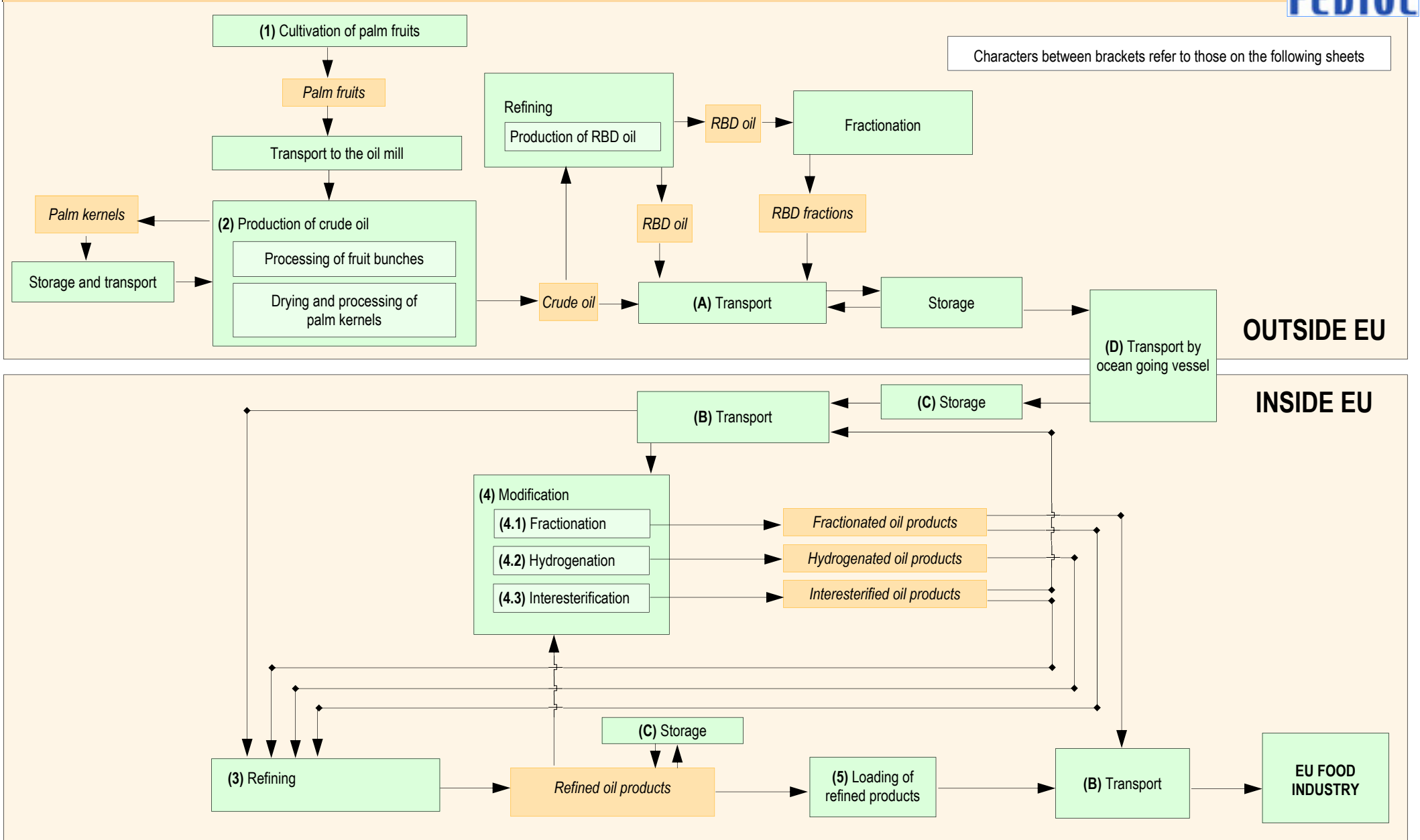


Flow chart of the production chain of palm oil and palm kernel oil products for food application in the EU



Risk assessment of the chain of palm and palm kernel oil products

			1. Cultivation of palm fruits*						
HAZARD	CAT.	CHANCE	SERIOUSNESS*	RISK CLASS.		JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Pesticide residues above the EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU MRL.	C					The countries of export of palm oil (Indonesia, Malaysia and others such as South America and Africa) work with positive lists for the use of pesticides during cultivation which, for some substances, may conflict with European pesticide residue legislation.	EC Regulation No. 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annexes. EC Regulation No. 178/2006 establishes Annex I that lists the food and feed products for which pesticide residue limits apply. Regulation 149/2008 establishes Annexes II, III and IV that sets the MRLs for the products listed in Annex I.		
3-MCPD esters						3-MCPD esters are substances formed during the refining process. Studies have demonstrated that the presence of naturally occurring substances (=precursors) is linked to higher occurrence of 3-MCPD esters in the refined oil. Preventive steps should therefore be taken to address the presence precursors in the palm fruits.	JECFA risk assessment 2016 Codex Alimentarius CoP is under construction.		Consider <ul style="list-style-type: none"> • Selecting oil plant varieties with low lipase activity to reduce formation of FFA and acylglycerol precursors. • Minimising use of substances such as fertilizers, pesticides, and irrigation water containing chlorine compounds during cultivation. • Harvesting oil palm fruit when they are at optimal ripeness. Minimize handling of the fresh fruit bunches, avoid using damaged or overripe fruits. • Transporting oil palm fruits to oil mills as soon as possible after their harvest.
Contaminants caused by environmental deposition - dioxin - PAH	C					Wood fires and volcano eruptions may lead to deposition of traces of dioxin and PAH on the oilseed. Use of clay pigeons may lead to deposition of traces of PAH on the oilseed.			

* Assessment of risks outside the EU is out of the scope of this document. For more information, see Methodology of the FEDIOL food and feed chain risk assessments as available on the FEDIOL website.

Risk assessment of the chain of palm and palm kernel oil products

			2. Production of crude palm oil and crude palm kernel oil*						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.		JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Boiler chemicals	C					Increased risk at plants without good manufacturing practices.			Steam (using boiler chemicals) that directly comes into contact with the product must be suitable for use in the food industry.
Recycling of contaminated fat from fat traps in effluent water.	C					Effluent water may be chemically contaminated.			Fat from fat traps in effluent water must not be recycled for food or feed application.
Hydraulic oil or lubricants from equipment	C					Hydraulic oils and lubricants may contain toxic compounds.			<p>Critical lubrication/fluid points in the plants are identified and clear procedures for the correct management of the lubrication/fluid systems are in place to prevent/minimize leakages/contact.</p> <p>In all critical lubrication points, only food grade lubricants are used (i.e. lubricants suitable for incidental contact with food or lubricants for direct food contact).</p> <p>Equipment in the production chain requires proper lubrication to operate at optimum performance and reliability. In specific cases where no food grade lubricant with high quality could meet the particular lubrication requirements of an equipment, a technical solution should be found to avoid leakage/contact.</p> <p>FEDIOL code of practice for the management of mineral oil hydrocarbons presence in vegetable oils and fats intended for food uses (ref 14COD 341).</p>
Foreign bodies	P					Foreign bodies may be present.			A system should be in place that removes any foreign material.
PAHs (only for palm kernels)	C					BaP may be found in crude palm kernel oil due to bad drying practices.			JECFA (Joint FAO/WHO Expert Committee on Food Additives) recommends replacing direct drying by indirect drying. In case of direct heating, Good Manufacturing Practices recommend

Risk assessment of the chain of palm and palm kernel oil products

									<p>not to use waste products as a fuel for direct drying. Temperature and time should be controlled to avoid PAH formation. The equipment has to be kept clean and well maintained.</p> <p>EC Regulation No. 1881/2006 sets a maximum limit at 2.0 µg/kg limit for BaP and at 10 µg/kg for the sum of four PAH in oils and fats intended for direct human consumption or use as an ingredient in foods (excluding cocoa butter and coconut oil).</p>
3-MCPD esters						<p>3-MCPD esters are substances formed during the refining process. Studies have demonstrated that the presence of naturally occurring substances (=precursors) is linked to higher occurrence of 3-MCPD esters afterwards in the oil. Preventive steps should therefore be taken to address presence of precursors in crude palm oil.</p>	<p>EFSA opinion 2017 JECFA opinion 2016 Codex Alimentarius CoP FEDIOL Review of mitigation measures on MCPD esters and glycidyl esters (Ref 15SAF108)</p>		<p>Recommend washing of crude oil with water.</p>

* Assessment of risks outside the EU is out of the scope of this document. For more information, see also the footnote for sheet 1 on Cultivation of palm fruits

Risk assessment of the chain of palm and palm kernel oil products

			Utilities: palm and palm kernel oil refining and processing						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.		JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Hydraulic oils or lubricants from equipment and or thermal heating fluids	C	low	high	3		Hydraulic oils, lubricants and thermal heating fluids may contain toxic compounds.	FEDIOL code of practice for the management of mineral oil hydrocarbons presence in vegetable oils and fats intended for food uses (ref 14COD 341).	<p>Critical lubrication/fluid points in the plants are identified and clear procedures for the correct management of the lubrication/fluid systems are in place to prevent/minimize leakages/contact.</p> <p>In all critical lubrication points, only food grade lubricants are used (i.e. lubricants suitable for incidental contact with food or lubricants for direct food contact).</p> <p>Equipment in the production chain requires proper lubrication to operate at optimum performance and reliability. In specific cases where no food grade lubricant with high quality could meet the particular lubrication requirements of an equipment, a technical solution should be found to avoid leakage/contact.</p> <p>Use steam heating.</p>	
Contaminants in water such as perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA)	C	low	medium	2		Water is used in the crushing and refining process.	Regulation 852/2004/EC is addressing water use.		
Cleaning agents and boiler chemicals	C	medium	medium	3		Cleaning agents and steam (using boiler chemicals) come into contact with the product.		Cleaning agents used in the production system should be flushed. Cleaning agents and boiler chemicals must be suitable for use in the food industry.	

Risk assessment of the chain of palm and palm kernel oil products

			3. Refining						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.		JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Contaminants in processing aids (such as mercury in caustic soda)	C	low	high	3		Processing aids come into contact with the product.		Processing aids that directly come into contact with the oil must be of food grade quality or for food use.	
Dioxin from bleaching earth	C	low	high	3		A potential source of dioxin contamination during refining is bleaching earth	<p>EC Regulation No. 1881/2006 and its amendment Commission Regulation (EU) No 1259/2011, for vegetable fats and oils sets a dioxin limit of 0.75 ng/kg (WHO-PCDD/F-TEQ) and one for the sum of dioxin and dioxin-like PCBs of 1.25 ng/kg (WHO-PCDD/F-PCB-TEQ). The non-dioxin like PCBs are specified as well.</p> <p>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1.5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value (16COD137).</p>	Source fresh bleaching earth from suppliers that fulfil the FEDIOL specifications on fresh bleaching earth (16COD137).	Dioxin partly evaporates during distillation.
Pesticide residues above the EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU MRL.	C	very low	medium	1		The level of a pesticide residue exceeding the legal limit doesn't necessarily mean a food safety issue.	EC Regulation No. 396/2005 sets limits for residues of pesticides. This regulation allows to use a processing/concentration factor for authorised pesticides into processed products, providing food safety is assured.		<p>Refining of the crude oil is a control measure for regulatory compliance.</p> <p>Regulation (EC) 882/2004 allows for the processing of non-compliant agricultural commodities into compliant food or feed products under the control of the authorities.</p>

Risk assessment of the chain of palm and palm kernel oil products

Microbiological growth	B	low	medium	2		Moisture content (i.e. water activity) in refined oils is too low for bacteria to grow.			
Adventitious presence of allergens from for example soybeans, peanuts, and products thereof.	C	low	high	3		Potential cross contamination. Allergic reactions may occur at very low levels.	Regulation (EU) No 1169/2011 requires the mandatory labelling of ingredients known to trigger allergies or intolerances. FEDIOL Code of Practice on the production and labelling of certain oils in connection with allergy.	Prerequisite programme to prevent cross contamination.	This risk is only relevant when different types of oils are processed.
PAHs (only for palm kernel oil)	C	medium	high	4		BaP levels may be found in crude palm kernel oil due to bad drying practices. BaP is an indicator for PAHs.	EC Regulation No. 1881/2006 sets a limit of 2.0 µg/kg for BaP and a limit of 10 µg/kg for four PAH in oils and fats intended for direct human consumption or use as an ingredient in foods.	Use of active carbon to verify compliance with EU legislation.	
Glycidyl esters (GE)	C	medium	high	4		Glycidyl esters are substances that can arise in oils and fats during the refining process.	FEDIOL Review of mitigation measures on MCPD esters and glycidyl esters (Ref 15SAF108) Codex Alimentarius CoP. Commission Reg (EU) 2018/290 amending Regulation (EC) 1881/2006. A Codex Alimentarius Code of Practice is under construction.	Implementation of mitigation measures tailor-made to the refinery and commodity at stake throughout the refining process. FEDIOL members committed to a max level of GE of 1 mg/kg in the oils and fats that they put on the market for food as of September 2017.	See the dedicated FEDIOL webpage on 2, 3 MCPD- and GE.
3-MCPD esters		high	high	4		3-MCPD esters are substances formed during the refining process. Presence of naturally occurring substances (precursors) lead to higher occurrence during refining. Prevention of the presence of such precursors before refining is therefore one of the key steps for mitigation. Use of aluminium chloride to flock particles in recycled process water is a source of chlorine for 3-MCPDE	FEDIOL Review of mitigation measures on MCPD esters and glycidyl esters (Ref 15SAF108). A Codex Alimentarius Code of Practice is under construction.	Implementation of mitigation measures tailor-made to the refinery and commodity at stake throughout the refining process.	See the dedicated FEDIOL webpage on 2, 3 MCPD- and GE.

Risk assessment of the chain of palm and palm kernel oil products

						formation in the oil.			
Lead	C	Very low	High	2		Lead has poor oil solubility.	EC Regulation 1881/2006 limits lead in fats and oil to 0.1 mg/kg wet weight.		

Risk assessment of the chain of palm and palm kernel oil products

			4. Modification (general)						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.		JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Foreign materials such as glass, metal, etc.	P	medium	medium	3		Foreign materials may be present.		Filter before loading.	
Contaminants in processing aids such as heavy metals.	C	medium	medium	3		Processing aids come into contact with the product.		Processing aids that directly come into contact with the oil must be for food use or of food grade quality.	

Risk assessment of the chain of palm and palm kernel oil products

			4.1 Fractionation (dry or wet)						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.		JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Contaminant of the stearin	P/C/B	low	high	3		Open stearin collection tank.		High-care zone and filtering.	
Toxic compounds from solvent	C	low	high	3		Solvents are used for wet fractionation. Probable use of solvents that are not of food-grade quality.	Directive (EC) 2009/32 sets purity criteria for the use of solvents for food production.	Use of solvents suitable for use in the food industry	

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			4.2 Hydrogenation						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.		JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Traces of nickel remaining in the hydrogenated product after filtration.	C	medium	medium	3		Nickel is used as a catalyst. Traces may remain in the oil after filtration.		Proper post-refining or post-bleaching.	France has a legal limit of nickel in oil for food of 0.2 ppm..

Risk assessment of the chain of palm and palm kernel oil products

			5. Loading of refined products						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.		JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Foreign matter such as glass, wood, metals, etc.	P	low	high	3		Foreign bodies may be present.	FEDIOL Code of working practice for bulk road and tank container transport of fats and oils for direct food use.	Filter before loading. A quality plan should require the loading of tank cars with refined oils under a roof.	
Microbiological growth	B	low	medium	2		Moisture content (i.e. water activity) in refined oils is too low for bacteria to grow.			
Misuse of additives	C	low	medium	2		Misuse or overdosing of additives may occur.	Regulation (EC) 1333/2008		
Adventitious presence of allergens (from lecithin, peanuts, nuts, sesame seeds and products thereof)	C	low	high	3		Potential cross contamination. Allergic reactions may occur at very low levels.	Regulation EU No 1169/2011 requires the mandatory labelling of ingredients known to trigger allergies or intolerances. FEDIOL Code of Practice on the Production and Labelling of certain oils in connection with allergy.	Prerequisite programme to prevent cross contamination.	This risk is only applicable when different types of oils are processed and / or additives are used.

Risk assessment of the chain of palm and palm kernel oil products

A. Transport of palm oil and derived products for food application by tank car, rail tank, barge or coaster (excluding ocean going vessel).								
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Microbiological growth	B	Low	High	3	Residual water in a tank can make pathogens grow.		Control drying after cleaning.	
Contamination by previous cargo								
- Tank cars, rail tanks and barges outside of the EU	C				Tank cars and barges may have been used for non food compatible products such as petrochemicals.			Tank cars and barges that are not dedicated to the transport of foodstuff should have undergone a validated cleaning procedure.
- Tank cars, tank containers, rail tanks and barges following EU standards for the transport of food stuffs	C	low	high	3	Transport of vegetable oils for food application is by means of transport that are dedicated to food stuffs.	The Food Hygiene Regulation EC No. 852/2004 requires the transport of liquid food stuffs by tank cars, rail tanks and barges to be dedicated to that of food stuffs. Oils for processing: FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref 14COD152 chapter A). Oils for direct food use: FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use (Ref 07COD138).	Make sure a means of transport is marked "for foodstuffs only".	
- Tank coasters following EU standards for the transport of food stuffs	C	low	high	3	Oil to be processed Coasters carrying oils and fats that are still to be processed and that have stainless steel tanks must have as immediate previous cargo one that appears on the EU list of Acceptable Previous Cargoes. Oil for direct use Tank coasters carrying refined oils and	Regulation EU No 579/2014 on bulk transport of oils and fats by sea. FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref 14COD152 chapter B) (including FOSFA operational procedures).	Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining (Ref 14COD153) , FOSFA certificate of compliance, cleanliness and suitability of Ship's tanks issued by a FOSFA Member Superintendent. FOSFA	

Risk assessment of the chain of palm and palm kernel oil products

					fats for direct food use during short sea voyages in the EU must have as three previous cargoes a product that is foodstuff and the tanks must be of stainless steel or epoxy coated (mild steel not allowed)		combined Masters certificate signed by the Captain/First Officer or an equivalent statement signed by the ship's owner or authorised agent, applicable before any loading or cargo transfer.	
Contamination by cleaning agents								
- Residues of detergents used to clean tank cars, rail tanks and barges used for the transport of chemicals	C	medium	medium	3	Increased risk at cleaning stations that clean both food and chemical tanks on one site.	<p>Oils for processing: FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref 14COD152 chapter A).</p> <p>Oils for direct use: FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use (Ref 07COD138).</p>	Apply good practices for cleaning of tanks	
- Residues of detergents used to clean tank coasters used for the transport of chemicals	C	medium	medium	3	Increased risk in case coaster is not dedicated to foodstuff. This can be the case with the transport of crude vegetable oils and fats by coaster (previous cargo to be on EU list of Acceptable Previous Cargoes in case of stainless steel tank). Coasters that are carrying refined vegetable oils and fats are dedicated to the transport of food stuffs and are cleaned with water. In these cases the risk of contamination with residues of detergents is low.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref 014COD152 chapter B) (including FOSFA operational procedures).	FOSFA certificate of compliance, cleanliness and suitability of Ship's tanks issued by a FOSFA Member Superintendent. FOSFA combined Masters certificate signed by the Captain/First Officer or an equivalent statement signed by the ship's owner or authorised agent, applicable before any loading or cargo transfer.	
Heating or cooling fluids from equipment								
- Tank cars	C	low	medium	2	Stainless steel tanks are used which are heated with cooling water from the motor through a system of double walls (and not coils).	<p>Oils for processing: FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (14COD152 chapter A).</p>	Use of thermal heating fluids in direct heating systems is forbidden.	

Risk assessment of the chain of palm and palm kernel oil products

						Oils for direct use: FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use (Ref 07COD138).		
- Rail tanks, tank barges	C	low	high	3	Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (14COD152 chapter A).	Heating coils of rail tanks must be of stainless steel. Thermal heating fluids in direct heating systems is forbidden. The transporter of the oil must provide for documentation on possible net losses of thermal heating fluids and analyse accordingly if necessary.	The use of hot water or steam heating is recommended.
- Tank coasters	C	low	high	3	Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (14COD152 chapter B) (including FOSFA operational procedures).	If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary.	
Foreign material such as glass, wood, metals, etc.	P	medium	medium	3		Oils for direct use: FEDIOL Code of working practice for bulk road and tank container transport of fats and oils for direct food use (Ref 07COD138).	A quality plan should require the loading of tank cars with refined oils under a roof.	

Risk assessment of the chain of palm and palm kernel oil products

			B. Storage of crude or refined oil						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.		JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Contamination due to lack of segregation (contamination from previous cargoes, use of incorrect joining, shared equipment)	C	low	high	3		This risk classification applies to terminals that store both chemicals and vegetable oils. Less risk is involved when the tank terminal applies the EU list of acceptable previous cargoes during sea transport to the storage of vegetable oils. Least risk is involved when the vegetable oils are stored in tanks that are dedicated to the storage of foodstuffs.	Terminals in the EU that store oils and fats for food application are obliged to apply HACCP (EC Regulation No. 852/2004).	Food or feed dedication of storage tanks. Otherwise, storage tanks must at least adhere to the EU rules on previous cargoes that have been set up for sea transport in Regulation EU No 579/2014..	
Contamination by cleaning agents	C	low	high	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 must be suitable for use in the food industry.	
Solvent from coating	C	low	high	3		Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining		Do proper analyses on maiden oil storage before accepting and monitor refining.	
Misuse of additives	C	low	medium	2		Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they may not have been approved.			

Risk assessment of the chain of palm and palm kernel oil products

			C. Transport of palm oil by ocean going vessel					
HAZARD	CAT.	CHANCE	SERIOUSNES S	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Transport contamination								
- Contamination by previous cargoes present in tanks or pipes	C	medium	medium	3	Bulk vegetable oils and fats imported into the EU undergo refining before they are delivered for food application. Ocean going vessels carrying these oils and fats into the EU must have as the immediate previous cargo a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC.	Regulation 579/2014 (Derogation to EC Regulation No. 852/2004) requires that previous loads have to be checked. FOSFA contracts oblige the seller to inform the buyer what the three preceding cargoes have been during the sea transport of oils and fats. FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref 014COD152 chapter B) (including FOSFA operational procedures). The EU has not regulated the sea transport of oils and fats for feed application.	FOSFA certificate of compliance, cleanliness and suitability of Ship's tanks issued by a FOSFA Member Superintendent. FOSFA combined Masters certificate signed by the Captain/First Officer or an equivalent statement signed by the ship's owner or authorised agent, applicable before any loading or cargo transfer. The use of dedicated pipe lines at loading and unloading.	
- Contamination by cleaning agents	C	low	low	1	Tanks of ocean going vessels are cleaned with sea water.			
Solvent from coating	C	low	high	3	Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining		Do proper analyses on maiden oil voyages before accepting and monitor refining	
Thermal heating fluids (THF) from equipment	C	low	high	3	Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (including FOSFA operational procedures) (14COD152 chapter B).	If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary.	The use of water and steam heating is recommended.
Hydraulic oils from portable pumps	C	low	high	3	Hydraulic oils from portable pumps may be toxic.		The use of portable pumps with clear separation of hydraulic motor from pump. If not, hydraulic oils of food grade quality must be used.	Hydraulic motors that are directly linked to the pump allow for unwanted leakages of hydraulic oil into the vegetable oil in case of seal failure.