FS Section	Content field	Explanation of content	CSR	eSDS
1. Title	1.1 Title of SPERC	Use in rubber production and processing (industrial): solvent-borne	Y	Y
	1.2 SPERC code	ESVOC SPERC 4.19a.v3	Y	Y
2. Scope	2.1 Substance/Product Domain			
	Substance types / functions / properties included or excluded	Applicable to petroleum substances and petrochemicals.	Y	N
	Additional specification of product types covered:	Includes a variety of aliphatic and aromatic hydrocarbons, ketones, alcohols, acetates, glycols, glycol ethers, and glycol ether acetates.	Y	N
	Inclusion of sub-SPERCs	Yes	N	N
	2.2 Process domain			
	Description of activities/processes:	Manufacture of tires and general rubber articles, including processing of raw (uncured) rubber, handling and mixing of rubber additives, vulcanising, cooling and finishing.	Y	Y
	2.3 List of applicable Use Descriptors			
	LCS	IS – Use at industrial sites	Y	Y
	SU	SU11 - Manufacture rubber products	Y	Y
	PC	PC0 - Other	Y	Y
3. Operational conditions	3.1 Conditions of use			
	Location of use	Indoor	Y	Y
	Water contact during use	Yes	Y	Y
	Connected to a standard municipal biological STP	No, site specifc biological STP with assumed discharge rate of municipal biological STP of >= 2000 m^3/day	Y	Y
	Rigorously contained system with minimisation of release to the environment	No	Y	N
	Further operational conditions impacting on releases to the environment	Volatile compounds subject to air emission controls. Wastewater emissions generated from equipment cleaning with water.	Y	Y
	3.2 Waste Handling and Disposal			
	Waste Handling and Disposal:	Residual raw materials and are in some cases recycled and fed back into the process reactor to improve efficiencies. In other cases, residues and by-products are used as raw materials for other downstream applications (EU, 2016). Wastewater generated during cleaning and maintenance operations is directed to a wastewater treatment plant for biological degradation. Atmospheric release of waste vapuor may be ameliorated using wet scrubbers, thermal oxidizers, solid adsorbents, membrane separators, biofilters, and/or cold oxidizers for trapping residual vapours. Solvent-containing liquid cleaning wastes are handled as hazardous waste and disposed of via thermal or catalytic incineration capable of efficiently converting volatile organic compounds to carbon dioxide and water. Hazardous waste handling conforms with the requirements of the Waste Framework Directive and includes procedures that minimize release during production, collection, storage, transportation, and treatment. These measures include a ban on the mixing of waste types, suitable	Y	N

FS Section	Content field	Explanation of content	CSR	eSDS
		packaging and labelling, and detailed documentation on the sources, quantities, and characteristics of the waste. EU (2016). Best Available Techniques (BAT) Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector. Report EUR 28112 EN. European IPPC Bureau. Seville, Spain. http://eippcb.jrc.ec.europa.eu/reference/BREF/CWW_Bref_2016_published.pdf EU (2008). Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Official Journal of the European Union 22.11.2008. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0098&from=EN		
4. Obligatory RMMs onsite	**RMM limiting release to air:**	No obligatory RMMs.	Y	Y
	RMM Efficiency (air):	Optional RMMs have been assigned a nominal removal efficiency value that is not accounted for in the air release factor. See the background document for more information.	Y	Y
	Reference for RMM Efficiency (air):	EU (2016). Best Available Techniques (BAT) Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector. Report EUR 28112 EN. European IPPC Bureau. Seville, Spain. http://eippcb.jrc.ec.europa.eu/reference/BREF/CWW_Bref_2016_published.pdf	Y	N
	RMM limiting release to water:	Oil-water separation (e.g. *via* oil water separators, oil skimmers, or dissolved air flotation) is required.	Y	Y
	RMM Efficiency (water):	The efficiency of this RMM varies dependent on the treatment technology and the properties of the substance.	Y	Y
	Reference for RMM Efficiency (water):	EU (2016). Best Available Techniques (BAT) Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector. Report EUR 28112 EN. European IPPC Bureau. Seville, Spain. http://eippcb.jrc.ec.europa.eu/reference/BREF/CWW_Bref_2016_published.pdf	Y	N
	RMM limiting release to soil:	The sludge generated from wastewater treatment is not applied to agricultural soil.	Y	Y
	RMM Efficiency (soil):	Not applicable	Y	Y
	Reference for RMM Efficiency (soil):	ECHA (2016). Guidance on Information Requirements and Chemical Safety Assessment. Chapter R.16: Environmental Exposure Assessment Version 3.0. European Chemicals Agency. Helsinki, Finland. https://echa.europa.eu/documents/10162/13632/information_requirements_r16_en.pdf	Y	N
5. Exposure Assessment Input	**5.1 Substance use rate**			
	Amount of substance use per day:	100,000 kg/day	Y	Y
	Fraction of EU tonnage used in region:	100%	Y	N
	Fraction of Regional tonnage used locally:	100%	Y	N
	Justification / information source:	ECHA, 2016. Guidance on Information Requirements and Chemical Safety Assessment. Chapter R.16: Environmental Exposure Assessment Version 3.0. European Chemicals Agency. Helsinki, Finland. https://echa.europa.eu/documents/10162/13632/information_requirements_r16_en.pdf	Y	N
	5.2 Days emitting			
	Number of emission days per year:	300 (default value)	Y	Y

FS Section	Content field	Explanation of content	CSR	eSDS
	Justification / information source:	ECHA, 2016. Guidance on Information Requirements and Chemical Safety Assessment. Chapter R.16: Environmental Exposure Assessment Version 3.0. European Chemicals Agency. Helsinki, Finland. https://echa.europa.eu/documents/10162/13632/information_requirements_r16_en.pdf	Y	N
	5.3 Release factors			
	sub-SPERC identifier:	ESVOC 4.19a.a.v3 WS <1 mg/l	Y	N
	ERC	ERC 4		
	sub-SPERC applicability:	Water solubility <1 mg/l	Y	N
	5.3.1 Release Factor – air			
	Numeric value / percent of input amount (Air)	1.0%	Y	Y
	Justification of RFs (Air):	The value has been adopted from an authoritative literature source that documents the air release factors for processing aids with a vapour pressure greater than 100 Pa and a boiling point less than 300 °C. OECD (2004). Emission Scenario Documents on Additives in Rubber Industry, No. 6. Organisation for Economic Co-operation and Development. Paris, France. http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2004)11&doclanguage=en	Y	N
	5.3.2 Release Factor – water			
	Numeric value / percent of input amount (Water):	0.001%	Y	Y
	Justification of RFs (Water):	The value has been adopted from life cycle assessments for the production of a natural rubber. Solvent and water usages were used to calculate the volume of wastewater generated per ton of solvent, which then yielded a water release factor that was adjusted for water solubilbity. Azarabadi, H., Eranki, P.L., Landis, A.E., 2017. Life cycle impacts of commercial guayule rubber production estimated from batch-scale operation data. *International Journal of Environmental Sustainability* **13**, 15-30. Eranki, P.L., Landis, A.E., 2019. Pathway to domestic natural rubber production: a cradle-to-grave life cycle assessment of the first guayule automobile tire manufactured in the United States. *The International Journal of Life Cycle Assessment* **24**, 1348-1135.	Y	N
	5.3.3 Release Factor – soil			
	Numeric value / percent of input amount (Soil):	0.01%	Y	Y
	Justification of RFs (Soil):	The value has been adopted from an authoritative literature source that documents the release factors for each environmental release category (ERC). The preceding value corresponds to to the default release factor for use of a non-reactive processing aid at an industrial site (ERC 1). ECHA (2016). Guidance on Information Requirements and Chemical Safety Assessment Chapter R.16: Environmental exposure assessment Version 3.0. Appendix A.16-1. Helsinki, Finland.. https://echa.europa.eu/documents/10162/13632/information_requirements_r16_en.pdf	Y	N
	5.3.4 Release Factor – waste			
	Percent of input amount disposed as waste:	4.0%	Y	N
	Justification of RFs:	The quoted value was derived from a life cyle assessment for plastic parts manufacturing using injection moulding machines (Oncel et al. 2017). This operation provides a reasonable surrogate for the manufacture of rubber	Y	N

FS Section	Content field	Explanation of content	CSR	eSDS
		products such as seals and gaskets and automotive tires. An uncertainty factor of 10 has been applied to this value based on the anticipated variability of this factor across different industry sectors. Oncel, M.S. et al. (2017). Hazardous wastes and waste generation factors for plastic products manufacturing industries in Turkey. Sustainable Environ. Res. 27,188-194.		
	sub-SPERC identifier:	ESVOC 4.19a.b.v3 WS 1-10 mg/l	Y	N
	ERC:	ERC 4		
	sub-SPERC applicability:	Water solubility 1-10 mg/l	Y	N
	5.3.1 Release Factor – air			
	Numeric value / percent of input amount (Air):	1.0%	Y	Y
	Justification of RFs (Air):	The value has been adopted from an authoritative literature source that documents the air release factors for processing aids with a vapour pressure greater than 100 Pa and a boiling point less than 300 °C. OECD (2004). Emission Scenario Documents on Additives in Rubber Industry, No. 6. Organisation for Economic Co-operation and Development. Paris, France. http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2004)11&doclanguage=en	Y	N
	5.3.2 Release Factor – water			
	Numeric value / percent of input amount (Water):	0.003%	Y	Y
	Justification of RFs (Water):	The value has been adopted from life cycle assessments for the production of a natural rubber. Solvent and water usages were used to calculate the volume of wastewater generated per ton of solvent, which then yielded a water release factor that was adjusted for water solubilbity. Azarabadi, H., Eranki, P.L., Landis, A.E., 2017. Life cycle impacts of commercial guayule rubber production estimated from batch-scale operation data. *International Journal of Environmental Sustainability* **13**, 15-30. Eranki, P.L., Landis, A.E., 2019. Pathway to domestic natural rubber production: a cradle-to-grave life cycle assessment of the first guayule automobile tire manufactured in the United States. *The International Journal of Life Cycle Assessment* **24**, 1348-1135.	Y	N
	5.3.3 Release Factor – soil			
	Numeric value / percent of input amount (Soil):	0.01%	Y	Y
	Justification of RFs (Soil):	The value has been adopted from an authoritative literature source that documents the release factors for each environmental release category (ERC). The preceding value corresponds to to the default release factor for use of a non-reactive processing aid at an industrial site (ERC 1). ECHA (2016). Guidance on Information Requirements and Chemical Safety Assessment Chapter R.16: Environmental exposure assessment Version 3.0. Appendix A.16-1. Helsinki, Finland. https://echa.europa.eu/documents/10162/13632/information_requirements_r16_en.pdf	Y	N
	5.3.4 Release Factor – waste			
	Percent of input amount disposed as waste:	4.0%	Y	N
	Justification of RFs:	The quoted value was derived from a life cycle assessment for plastic parts manufacturing using injection moulding machines (Oncel et al. 2017). This operation provides a reasonable surrogate for the manufacture of rubber products such as seals and gaskets and	Y	N

FS Section	Content field	Explanation of content	CSR	eSDS
		automotive tires. An uncertainty factor of 10 has been applied to this value based on the anticipated variability of this factor across different industry sectors. Oncel, M.S. et al. (2017). Hazardous wastes and waste generation factors for plastic products manufacturing industries in Turkey. Sustainable Environ. Res. 27,188-194.		
	sub-SPERC identifier:	ESVOC 4.19a.c.v3 WS 10-100 mg/l	Y	N
	ERC	ERC 4		
	sub-SPERC applicability:	Water Solubility 10-100 mg/l	Y	N
	5.3.1 Release Factor – air			
	Numeric value / percent of input amount (Air):	1.0%	Y	Y
	Justification of RFs (Air):	The value has been adopted from an authoritative literature source that documents the air release factors for processing aids with a vapour pressure greater than 100 Pa and a boiling point less than 300 °C. OECD (2004). Emission Scenario Documents on Additives in Rubber Industry, No. 6. Organisation for Economic Co-operation and Development. Paris, France. http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2004)11&doclanguage=en	Y	N
	5.3.2 Release Factor – water			
	Numeric value / percent of input amount (Water):	0.03%	Y	Y
	Justification of RFs (Water):	The value has been adopted from life cycle assessments for the production of a natural rubber. Solvent and water usages were used to calculate the volume of wastewater generated per ton of solvent, which then yielded a water release factor that was adjusted for water solubilbity. Azarabadi, H., Eranki, P.L., Landis, A.E., 2017. Life cycle impacts of commercial guayule rubber production estimated from batch-scale operation data. *International Journal of Environmental Sustainability* **13**, 15-30. Eranki, P.L., Landis, A.E., 2019. Pathway to domestic natural rubber production: a cradle-to-grave life cycle assessment of the first guayule automobile tire manufactured in the United States. *The International Journal of Life Cycle Assessment* **24**, 1348-1135.	Y	N
	5.3.3 Release Factor – soil			
	Numeric value / percent of input amount (Soil):	0.01%	Y	Y
	Justification of RFs (Soil):	The value has been adopted from an authoritative literature source that documents the release factors for each environmental release category (ERC). The preceding value corresponds to to the default release factor for use of a non-reactive processing aid at an industrial site (ERC 1). ECHA (2016). Guidance on Information Requirements and Chemical Safety Assessment Chapter R.16: Environmental exposure assessment Version 3.0. Appendix A.16-1. Helsinki, Finland. https://echa.europa.eu/documents/10162/13632/information_requirements_r16_en.pdf	Y	N
	5.3.4 Release Factor – waste			
	Percent of input amount disposed as waste:	4.0%	Y	N
	Justification of RFs:	The quoted value was derived from a life cycle assessment for plastic parts manufacturing using injection moulding machines (Oncel et al. 2017). This operation provides a reasonable surrogate for the manufacture of rubber products such as seals and gaskets and	Y	N

FS Section	Content field	Explanation of content	CSR	eSDS
		automotive tires. An uncertainty factor of 10 has been applied to this value based on the anticipated variability of this factor across different industry sectors. Oncel, M.S. et al. (2017). Hazardous wastes and waste generation factors for plastic products manufacturing industries in Turkey. Sustainable Environ. Res. 27,188-194.		
	sub-SPERC identifier:	ESVOC 4.19a.d.v3 WS 100-1000 mg/l	Y	N
	ERC	ERC 4		
	sub-SPERC applicability:	Water Solubility 100-1000 mg/l	Y	N
	5.3.1 Release Factor – air			
	Numeric value / percent of input amount (Air):	1.0%	Y	Y
	Justification of RFs (Air):	The value has been adopted from an authoritative literature source that documents the air release factors for processing aids with a vapour pressure greater than 100 Pa and a boiling point less than 300 °C. OECD (2004). Emission Scenario Documents on Additives in Rubber Industry, No. 6. Organisation for Economic Co-operation and Development. Paris, France. http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2004)11&doclanguage=en	Y	N
	5.3.2 Release Factor – water			
	Numeric value / percent of input amount (Water):	0.3%	Y	Y
	Justification of RFs (Water):	The value has been adopted from life cycle assessments for the production of a natural rubber. Solvent and water usages were used to calculate the volume of wastewater generated per ton of solvent, which then yielded a water release factor that was adjusted for water solubilbity. Azarabadi, H., Eranki, P.L., Landis, A.E., 2017. Life cycle impacts of commercial guayule rubber production estimated from batch-scale operation data. *International Journal of Environmental Sustainability* **13**, 15-30. Eranki, P.L., Landis, A.E., 2019. Pathway to domestic natural rubber production: a cradle-to-grave life cycle assessment of the first guayule automobile tire manufactured in the United States. *The International Journal of Life Cycle Assessment* **24**, 1348-1135.	Y	N
	5.3.3 Release Factor – soil			
	Numeric value / percent of input amount (Soil):	0.01%	Y	Y
	Justification of RFs (Soil):	The value has been adopted from an authoritative literature source that documents the release factors for each environmental release category (ERC). The preceding value corresponds to to the default release factor for use of a non-reactive processing aid at an industrial site (ERC 1). ECHA (2016). Guidance on Information Requirements and Chemical Safety Assessment Chapter R.16: Environmental exposure assessment Version 3.0. Appendix A.16-1. Helsinki, Finland. https://echa.europa.eu/documents/10162/13632/information_requirements_r16_en.pdf	Y	N
	5.3.4 Release Factor – waste			
	Percent of input amount disposed as waste	4.0%	Y	N
	Justification of RFs:	The quoted value was derived from a life cycle assessment for plastic parts manufacturing using injection moulding machines (Oncel et al. 2017). This operation provides a reasonable surrogate for the manufacture of rubber products such as seals and gaskets and	Y	N

FS Section	Content field	Explanation of content	CSR	eSDS
		automotive tires. An uncertainty factor of 10 has been applied to this value based on the anticipated variability of this factor across different industry sectors. Oncel, M.S. et al. (2017). Hazardous wastes and waste generation factors for plastic products manufacturing industries in Turkey. Sustainable Environ. Res. 27,188-194.		
	sub-SPERC identifier:	ESVOC 4.19a.e.v3 WS >1000 mg/l	Y	N
	ERC	ERC 4		
	sub-SPERC applicability:	Water Solubility >1000 mg/l	Y	N
	5.3.1 Release Factor – air			
	Numeric value / percent of input amount (Air):	1.0%	Y	Y
	Justification of RFs (Air):	The value has been adopted from an authoritative literature source that documents the air release factors for processing aids with a vapour pressure greater than 100 Pa and a boiling point less than 300 °C. OECD (2004). Emission Scenario Documents on Additives in Rubber Industry, No. 6. Organisation for Economic Co-operation and Development. Paris, France. http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2004)11&doclanguage=en	Y	N
	5.3.2 Release Factor – water			
	Numeric value / percent of input amount (Water):	1.0%	Y	Y
	Justification of RFs (Water):	The value has been adopted from life cycle assessments for the production of a natural rubber. Solvent and water usages were used to calculate the volume of wastewater generated per ton of solvent, which then yielded a water release factor that was adjusted for water solubilbity. Azarabadi, H., Eranki, P.L., Landis, A.E., 2017. Life cycle impacts of commercial guayule rubber production estimated from batch-scale operation data. *International Journal of Environmental Sustainability* **13**, 15-30. Eranki, P.L., Landis, A.E., 2019. Pathway to domestic natural rubber production: a cradle-to-grave life cycle assessment of the first guayule automobile tire manufactured in the United States. *The International Journal of Life Cycle Assessment* **24**, 1348-1135.	Y	N
	5.3.3 Release Factor – soil			
	Numeric value / percent of input amount (Soil):	0.01%	Y	Y
	Justification of RFs (Soil):	The value has been adopted from an authoritative literature source that documents the release factors for each environmental release category (ERC). The preceding value corresponds to to the default release factor for use of a non-reactive processing aid at an industrial site (ERC 1). ECHA (2016). Guidance on Information Requirements and Chemical Safety Assessment Chapter R.16: Environmental exposure assessment Version 3.0. Appendix A.16-1. Helsinki, Finland. https://echa.europa.eu/documents/10162/13632/information_requirements_r16_en.pdf	Y	N
	5.3.4 Release Factor – waste			
	Percent of input amount disposed as waste:	4.0%	Y	N
	Justification of RFs:	The quoted value was derived from a life cycle assessment for plastic parts manufacturing using injection moulding machines (Oncel et al. 2017). This operation provides a reasonable surrogate for the manufacture of rubber products such as seals and gaskets and	Y	N

FS Section	Content field	Explanation of content	CSR	eSDS
		automotive tires. An uncertainty factor of 10 has been applied to this value based on the anticipated variability of this factor across different industry sectors. Oncel, M.S. et al. (2017). Hazardous wastes and waste generation factors for plastic products manufacturing industries in Turkey. Sustainable Environ. Res. 27,188-194.		
References to SPERC Background Document				
	Reference to Background Document	ESIG/ESVOC (2019). SpERC Background Document. Specific Environmental Release Categories (SpERCs) for the use of solvents and solvent borne substances in the industrial production and/or use of explosives, synthetic rubbers, and blowing agents. European Solvents Industry Group. Brussels, Belgium	Y	N