

Nynas Enduratherm Z4



SAFETY DATA SHEET

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name	Nynas Enduratherm Z4
Product description	Bitumen for warm-mix applications
Product type	Liquid.
MARPOL Annex 1	Asphalt solution

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	
<input checked="" type="checkbox"/> Formulation: Injection of the additive in warm Bitumen - Industrial Use in road and construction products - Professional	
Uses advised against	Reason
This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.	-

1.3 Details of the supplier of the safety data sheet

Supplier/Manufacturer	Head office: Nynas AB P.O. Box 10700 SE-121 29 Stockholm SWEDEN +46 8 602 12 00 (Office hours 8 am - 4.30 pm (CET)) www.nynas.com
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e-mail address of person responsible for this SDS: ProductHSE@nynas.com

<u>National contact</u>	Nynas UK AB North Road Ellesmere Port CH65 1AJ UNITED KINGDOM +44-151 327 31 71	Nynas UK AB East Camperdown Street Dundee DD1 3LG UNITED KINGDOM +44-1-382 462 211
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1.4 Emergency telephone number

Telephone number	+44 (0) 1235 239 670
Hours of operation	24 hour service

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Product definition	Mixture
<u>Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]</u>	
Skin Sens. 1, H317	
Aquatic Chronic 3, H412	

The product is classified as hazardous according to Regulation (EC) 1272/2008 as amended.

SECTION 2: Hazards identification

See Section 16 for the full text of the H statements declared above.

See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements

Hazard pictograms



Signal word

Warning

Hazard statements

H317 - May cause an allergic skin reaction.
H412 - Harmful to aquatic life with long lasting effects.

Precautionary statements

Prevention

P280 - Wear protective gloves.
P273 - Avoid release to the environment.
P261 - Avoid breathing vapour.

Response

P302 + P352 + P362+P364 - IF ON SKIN: Wash with plenty of soap and water.
Take off contaminated clothing and wash it before reuse.
P333 + P313 - If skin irritation or rash occurs: Get medical attention.

Storage

Not applicable.

Disposal

P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements

Not applicable.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Not applicable.

2.3 Other hazards

Substance meets the criteria for PBT according to Regulation (EC) No. 1907/2006, Annex XIII

Not applicable.

Substance meets the criteria for vPvB according to Regulation (EC) No. 1907/2006, Annex XIII

Not applicable.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Mixture

Product/ingredient name	Identifiers	%	Classification	
			Regulation (EC) No. 1272/2008 [CLP]	Type
Asphalt *	REACH #: 01-2119480172-44 EC: 232-490-9 CAS: 8052-42-4	>90	Not classified.	[2]
Polymer	-	<10	Not classified.	[6]
Paraffin waxes and Hydrocarbon waxes	REACH #: 01-2119488076-30 EC: 232-315-6 CAS: 8002-74-2 Index: ID720	<5	Not classified.	[2]
Fatty acids C18 unsat,	REACH #:	0.1 - 1	Skin Corr. 1C, H314	[1]

SECTION 3: Composition/information on ingredients

reaction products with Pentaethylenehexamine	01-2119492546-27 CAS: 1224966-13-5		Eye Dam. 1, H318 Skin Sens. 1A, H317 Aquatic Chronic 1, H410 (M=1) See Section 16 for the full text of the H statements declared above.
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* SAFETY DATA SHEET SECTION 16: Other information

Hydrogen sulphide can accumulate in tanks and confined spaces and reach potentially hazardous concentrations. There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment, are PBTs or vPvBs or have been assigned a workplace exposure limit and hence require reporting in this section.

Type

- [1] Substance classified with a health or environmental hazard
- [2] Substance with a workplace exposure limit
- [3] Substance meets the criteria for PBT according to Regulation (EC) No. 1907/2006, Annex XIII
- [4] Substance meets the criteria for vPvB according to Regulation (EC) No. 1907/2006, Annex XIII
- [5] Substance of equivalent concern
- [6] Additional disclosure due to company policy

Occupational exposure limits, if available, are listed in Section 8.

SECTION 4: First aid measures

4.1 Description of first aid measures

Eye contact	<p>HOT PRODUCT: If hot product is splashed into the eye, it should be cooled down immediately to dissipate heat, under cold running water. Immediately obtain specialist medical assessment and treatment for the casualty.</p> <p>COLD PRODUCT: In the event of eye contact with cold product, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If irritation, blurred vision or swelling occurs and persists, obtain medical advice from a specialist.</p>
Inhalation	<p>If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Get medical attention if adverse health effects persist or are severe. Maintain an open airway. In case of symptoms arising from inhalation of bitumen fumes, mists or vapour: remove casualty to a quiet and well ventilated place if safe to do so.</p> <p>Exposure to Hydrogen sulphide ; If there is any suspicion of inhalation of H₂S (hydrogen sulphide); Rescuers must wear breathing apparatus, belt and safety rope, and follow rescue procedures. Remove casualty to fresh air as quickly as possible. Immediately begin artificial respiration if breathing has ceased. Provision of oxygen may help. Obtain medical advice for further treatment. Vapor from hot product may contain Hydrogen Sulfide which can be harmful or fatal if inhaled.</p>
Skin contact	<p>HOT PRODUCT: In the event of accidental skin contact with hot product, the injured part should be immediately plunged under cold running water for at least 10 minutes. Body hypothermia must be avoided. No attempt must be made to remove the bitumen adherent to the skin at the worksite. In the case of a circumferential burn with adhesion of the bitumen, the adhering material should be split to prevent a tourniquet effect as it cools. Do not put ice on the burn. Remove non-sticking garments carefully. DO NOT attempt to remove portions of clothing glued to burnt skin but cut round them. Seek medical attention in all cases of serious burns. Never use gasoline, kerosene or other solvents for washing of contaminated skin.</p> <p>COLD PRODUCT: Wash with plenty of soap and water. Wash with soap and water. Continue to rinse for at least 10 minutes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. In the event of any complaints or symptoms, avoid further exposure.</p>

SECTION 4: First aid measures

Ingestion	Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Stop if the exposed person feels sick as vomiting may be dangerous. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Protection of first-aiders	<p>No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.</p> <p>Hydrogen sulphide (H₂S) can accumulate in the headspace of product storage tanks and reach potentially hazardous concentrations. If there is any suspicion of inhalation of H₂S (hydrogen sulphide); Rescuers must wear breathing apparatus, belt and safety rope, and follow rescue procedures.</p> <p>Before attempting to rescue casualties, isolate area from all potential sources of ignition including disconnecting electrical supply. Ensure adequate ventilation and check that a safe, breathable atmosphere is present before entry into confined spaces.</p>
4.2 Most important symptoms and effects, both acute and delayed	
<u>Potential acute health effects</u>	
Eye contact	<p>HOT PRODUCT: Contact with hot/molten product will cause severe burns.</p> <p>COLD PRODUCT: minimal redness and irritation.</p>
Inhalation	Inhalation of oil mist or vapours at elevated temperatures may cause respiratory irritation.
Skin contact	Contact with hot/molten product will cause severe burns. May cause an allergic skin reaction. Negligible at ambient temperature.
Ingestion	Few or no symptoms expected. If any, slight nausea might occur.
4.3 Indication of any immediate medical attention and special treatment needed	
Notes to physician	Treatment should in general be symptomatic and directed to relieving any effects. If for any reason the product must be removed, this can be done using a slightly warmed medicinal liquid paraffin. Bitumen acts as a sterile layer and should only be removed by specialist medical care.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	Use dry chemical, CO ₂ , water spray (fog) or foam.
Unsuitable extinguishing media	Do not use direct water jets on the burning product; they could cause splattering and spread the fire. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

5.2 Special hazards arising from the substance or mixture

Hazards from the substance or mixture	In a fire or if heated, a pressure increase will occur and the container may burst. Contact of hot product with water will result in a violent expansion as the water turns to steam. This may cause splashing of hot product, or damage to, or complete loss of the tank roof. Respiratory problems or nausea by excessive exposure to hot product fumes. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.
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SECTION 5: Firefighting measures

Hazardous thermal decomposition products	Incomplete combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates, gases, including carbon monoxide, H ₂ S, SO _x (sulfur oxides) or sulfuric acid and unidentified organic and inorganic compounds.
5.3 Advice for firefighters	
Special precautions for fire-fighters	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	<p>Avoid breathing vapour or mist. Keep non-involved personnel away from the area of spillage. Alert emergency personnel. Except in case of small spillages, the feasibility of any actions should always be assessed and advised, if possible, by a trained, competent person in charge of managing the emergency. Stop leak if safe to do so. Avoid direct contact with the product. Stay upwind/keep distance from source. In case of large spillages, alert occupants in downwind areas.</p> <p>Eliminate all ignition sources if safe to do so. Spillages of limited amounts of product, especially in the open air when vapours will be usually quickly dispersed, are dynamic situations, which will presumably limit the exposure to dangerous concentrations.</p> <p>Note : recommended measures are based on the most likely spillage scenarios for this material; however, local conditions (wind, air temperature, wave/current direction and speed) may significantly influence the choice of appropriate actions. For this reason, local experts should be consulted when necessary. Local regulations may also prescribe or limit actions to be taken.</p>
For emergency responders	<p>Small spillages: normal antistatic working clothes are usually adequate. Wear suitable gloves. Splash goggles.</p> <p>Large spillages: full body suit of chemically resistant and thermal resistant material should be used. Work gloves providing adequate chemical resistance, specifically to aromatic hydrocarbons. If contact with hot product is possible or anticipated, gloves should be heat-resistant and thermally insulated. Safety helmet with integrated full face visor and neck protection. antistatic non-skid safety shoes or boots.</p> <p>Respiratory protection : A half or full-face respirator with filter(s) for organic vapours (and when applicable for H₂S) a Self Contained Breathing Apparatus (SCBA) can be used according to the extent of spill and predictable amount of exposure. If the situation cannot be completely assessed, or if an oxygen deficiency is possible, only SCBA's should be used.</p>

6.2 Environmental precautions

Water polluting material. May be harmful to the environment if released in large quantities. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Prevent product from entering sewers, rivers or other bodies of water. If necessary dike the product with dry earth, sand or similar non-combustible materials.

Note : solidified product may clog drains and sewers. In case of spillages in the water, the product will cool down rapidly and become solid. The solid product is denser than water and will slowly sink to the bottom, and usually no intervention will be feasible.

SECTION 6: Accidental release measures

6.3 Methods and material for containment and cleaning up

Small spill Stop leak if without risk. Absorb spilled product with suitable non-combustible materials. Collect solidified product with suitable means (e.g. shovels).

Large spill

When inside buildings or confined spaces, ensure adequate ventilation. Transfer collected product and other contaminated materials to suitable containers for recovery or safe disposal. Let hot product cool down naturally. If necessary, cautiously use water fog to help the cooling. Do not play direct jets of foam or water on the spilled molten product, as this may cause splattering. Approach the release from upwind. Contaminated absorbent material may pose the same hazard as the spilled product.

6.4 Reference to other sections

See Section 1 for emergency contact information.
See Section 8 for information on appropriate personal protective equipment.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

General information

For quality, technical, health, safety and environmental reasons, bitumen should not be over-heated. Bitumen temperature should be kept at least 30°C below flash point and should never exceed the industry recommended maximum temperature of 200°C. Excessive heating above the maximum recommended handling and storage temperature may cause degradation of the substance and evolution of irritant vapours and fumes.

Avoid contact of hot product with water. Risk of splashing of hot material. Do not allow water or any liquid to contact with hot product since this could cause splashing of hot material or boil-over. Do not breathe fumes from hot product.

Concentration of H₂S in tank headspaces may reach hazardous values, especially in case of prolonged storage. This situation is especially relevant for those operations which involve direct exposure to the vapours in the tank.

A specific assessment of inhalation risks from the presence of H₂S in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases must be made to help determine controls appropriate to local circumstances.

7.1 Precautions for safe handling

Protective measures

Do not ingest. Do not breathe dust/fume/gas/mist/vapours/spray. Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use.

Prevent the risk of slipping. Take precautionary measures against static discharge. Avoid splash filling of bulk volumes when handling hot liquid product. Ground/bond container and receiving equipment. Empty containers retain product residue and can be hazardous.

Avoid release to the environment.

Nota : See Section 8 for information on appropriate personal protective equipment. See section 13 for waste disposal information.

SECTION 7: Handling and storage

Advice on general occupational hygiene

Ensure that proper housekeeping measures are in place. Contaminated materials should not be allowed to accumulate in the workplaces and should never be kept inside the pockets. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Wash hands thoroughly after handling. Change contaminated clothes at the end of working shift. Do not use solvents or other products with a defatting effect on the skin. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities

Storage area layout, tank design, equipment and operating procedures must comply with the relevant regional, national or local legislation. Cleaning, inspection and maintenance of internal structure of storage tanks must be done only by properly equipped and qualified personnel as defined by national, local or company regulations. Use adequate personal protective equipment as needed.

Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, hydrogen sulphide (H₂S) and flammability.

Store separately from oxidising agents.

Recommended materials for containers, or container linings use mild steel, stainless steel. Not suitable : Some synthetic materials may be unsuitable for containers or container linings depending on the material specification and intended use. Compatibility should be checked with the manufacturer.

Self-heating leading to auto ignition at the surfaces of porous or fibrous materials impregnated with oils or bitumen, can occur at temperatures as low as 100°C. Oil and bitumen contamination of thermal insulation materials and the accumulation of oily rags or similar material near hot surfaces, should therefore be avoided, and lagging should be replaced where necessary by a non-absorbent type of insulation. Deposits (carbonaceous materials and iron sulphides) can develop on the internal walls and roofs of tanks in case of long term storage. These deposits may be pyrophoric and self-ignite in contact with the air.

Keep only in the original container or in a suitable container for this kind of product. Keep container tightly closed and sealed until ready for use. Do not store in unlabelled containers. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Product tanks may be heated by hot oil, electricity or flame tubes. Under circumstances where bitumen is being pumped from a tank containing heater tubes precautions should be taken to prevent the level dropping 150 mm above the tubes unless the heat has been switched off for a period of sufficient cooling. Where the product is being pumped from a storage tank or road tank care should be taken to avoid the risk of fire or explosion as a result of exposing hot heater tubes. Protect from sunlight.

7.3 Specific end use(s)

Recommendations

Not available.

Industrial sector specific solutions

Not available.

SECTION 8: Exposure controls/personal protection

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

8.1 Control parameters

Occupational exposure limits

Product/ingredient name	Exposure limit values
Asphalt *	EH40/2005 WELs (United Kingdom (UK), 12/2011). STEL: 10 mg/m ³ 15 minutes. TWA: 5 mg/m ³ 8 hours.
Paraffin waxes and Hydrocarbon waxes	EH40/2005 WELs (United Kingdom (UK), 12/2011). STEL: 6 mg/m ³ 15 minutes. Form: Fume TWA: 2 mg/m ³ 8 hours. Form: Fume
Asphalt	[Air contaminant] EH40/2005 WELs (United Kingdom (UK), 12/2011). STEL: 10 mg/m ³ 15 minutes. TWA: 5 mg/m ³ 8 hours.
Hydrogen chloride	[Air contaminant] EH40/2005 WELs (United Kingdom (UK), 12/2011). STEL: 8 mg/m ³ 15 minutes. Form: Gas and aerosol mists STEL: 5 ppm 15 minutes. Form: Gas and aerosol mists TWA: 2 mg/m ³ 8 hours. Form: Gas and aerosol mists TWA: 1 ppm 8 hours. Form: Gas and aerosol mists

Recommended monitoring procedures

If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

DNELs/DMELs

Product/ingredient name	Type	Exposure	Value	Population	Effects
Asphalt	DNEL	Long term Inhalation	2,9 mg/m ³	Workers	Local
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	DNEL	Long term Inhalation	29 mg/cm ²	Workers	Systemic
	DNEL	Long term Dermal	4,2 mg/kg bw/day	Workers	Systemic
	DNEL	Long term Inhalation	8,7 mg/m ³	Consumers	Systemic
	DNEL	Long term Dermal	2,5 mg/kg bw/day	Consumers	Systemic
	DNEL	Long term Oral	2,5 mg/kg bw/day	Consumers	Systemic

PNECs

SECTION 8: Exposure controls/personal protection

Product/ingredient name	Compartment Detail	Value	Method Detail
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	Fresh water	30,7 µg/l	Assessment Factors
	Marine water	30,7 µg/l	Assessment Factors
	Sewage Treatment Plant	2,3 mg/l	Assessment Factors
	Soil	9,44 mg/kg dwt	Assessment Factors
	Secondary Poisoning	20 mg/kg dwt	Assessment Factors

PNEC Summary

No PECs available.

8.2 Exposure controls

Appropriate engineering controls

Storage and handling temperatures should be kept as low as feasible to minimize fume production. When inside buildings or confined spaces, ensure adequate ventilation. Minimise exposure to fumes. Where hot product is handled in confined spaces, effective local ventilation must be provided. Do not enter empty storage tanks until measurements of available oxygen have been carried out.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location. Wash contaminated clothing before reuse.

Eye/face protection

If splashing is likely, full head and face protection (protective shield and/or safety goggles) should be used. For loading/unloading operations: wear safety helmet with integrated full face visor and neck protection.

Skin protection

Hand protection

Heat resistant gloves with long cuffs, or gauntlets (EN 374 - 407). Gloves must be periodically inspected and changed in case of wear, perforations or contaminations.

Body protection

Wear protective clothing for operations with hot material: heat resistant coveralls (with trousers legs over boots and sleeves over cuffs of gloves), heat resistant heavy duty antiskid boots (e. g. leather). Coveralls should be changed at the end of the work shift and cleaned as necessary to avoid transfer of product to clothes or underwear.

For loading/unloading operations: wear safety helmet with integrated full face visor and neck protection.

Other skin protection

Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection

Approved respiratory protection equipment shall be used in spaces where hydrogen sulphide may accumulate: full face mask with cartridge/filter type "B" (grey for inorganic vapours including H2S) or self-contained breathing apparatus (SCBA). If exposure levels cannot be determined or estimated with adequate confidence, or an oxygen deficiency is possible, only SCBA's should be used.

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state	Liquid.
Colour	Dark. Brown. Black.
Odour	Bitumen
Odour threshold	Not applicable.
pH	Not applicable.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Open cup: >220°C [COC]
Evaporation rate	>1 (butyl acetate = 1)
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	Not available.
Vapour pressure (Calculated)	Not available.
Density	0,95 to 1,1 g/cm ³ [15°C]
Solubility(ies)	Insoluble in water.
Partition coefficient: n-octanol/water	Not applicable.
Auto-ignition temperature	>300°C
Decomposition temperature	>350°C
Viscosity	Kinematic (40°C): Not applicable.
Viscosity	high
Explosive properties	Not available.
Oxidising properties	Not available.
Softening point	75 - 90
Penetration	25 - 55 X 10 ⁻¹ mm at 25 °C (test method EN 1426)

SECTION 10: Stability and reactivity

10.1 Reactivity	Contact of hot product with water will result in a violent expansion as the water turns to steam.
10.2 Chemical stability	This substance is stable under all ordinary circumstances at ambient temperatures, and if released into the environment.
10.3 Possibility of hazardous reactions	Under normal conditions of storage and use, hazardous reactions will not occur.
10.4 Conditions to avoid	Excessive heating above the maximum recommended handling and storage temperature may cause degradation of the substance and evolution of irritant vapours and fumes. Change bitumen or oil contaminated insulation. If necessary a non-absorbent type of insulation should be used. Self-heating, leading to auto-ignition at the surface of porous or fibrous materials impregnated with bitumen or condensates from bituminous fumes can occur below 100 °C.
10.5 Incompatible materials	Store away from oxidizing agents. Oil and bitumen contamination of thermal insulation materials and the accumulation of oily rags or similar material near hot surfaces, should therefore be avoided, and lagging should be replaced where necessary by a non-absorbent type of insulation.
10.6 Hazardous decomposition products	None under normal conditions at ambient temperatures. Combustion (incomplete) will likely generate oxides of carbon, sulphur and nitrogen, as well as additional undetermined organic compounds of the same elements.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure	Remarks
Asphalt *	LC50 Inhalation Vapour	Rat	>94,4 mg/m ³	4 hours	-
	LD50 Dermal	Rabbit	>5000 mg/kg	-	-
	LD50 Oral	Rat	>5000 mg/kg	-	-
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	LD50 Oral	Rat - Female	2500 mg/kg	-	-

Conclusion/Summary No known significant effects or critical hazards.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Observation	Remarks
Asphalt *	Skin - Non-irritant to skin.	Rabbit	8	-	-
	Eyes - Non-irritating to the eyes.	Rabbit	8	-	-
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	Skin - Visible necrosis	Rabbit	-	14 days	-

Skin No known significant effects or critical hazards.

Eyes No known significant effects or critical hazards.

Respiratory No known significant effects or critical hazards.

Sensitisation

Product/ingredient name	Route of exposure	Species	Result	Remarks
Asphalt *	skin	Guinea pig	Not sensitizing	-
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	skin	Guinea pig	Sensitising	-

Skin May cause an allergic skin reaction.

Respiratory No known significant effects or critical hazards.

Mutagenicity

Product/ingredient name	Test	Experiment	Result	Remarks
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	471 Bacterial Reverse Mutation Test	Experiment: In vitro	Negative	-
	476 In vitro Mammalian Cell Gene Mutation Test	Subject: Bacteria Experiment: In vitro	Negative	-
		Subject: Mammalian-Animal		

Conclusion/Summary No known significant effects or critical hazards.

Carcinogenicity

SECTION 11: Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure	Remarks
Asphalt *	Negative - Dermal - TDLo	Mouse	7,14 Repeated dose	104 weeks; 7 days per week	-
	Negative - Inhalation - NOAEC	Rat	104 g/m ³	104 weeks; 6 hours per day Repeated dose	-

Conclusion/Summary No known significant effects or critical hazards.

Reproductive toxicity

Product/ingredient name	Species	Dose	Exposure	Remarks
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	Rat - Male, Female	Oral	-	-

Conclusion/Summary Not available.

Teratogenicity

Conclusion/Summary No known significant effects or critical hazards.

Aspiration hazard

Not available.

Potential acute health effects

Eye contact HOT PRODUCT: Contact with hot/molten product will cause severe burns.

COLD PRODUCT: minimal redness and irritation.

Inhalation Inhalation of oil mist or vapours at elevated temperatures may cause respiratory irritation.

Skin contact Contact with hot/molten product will cause severe burns. May cause an allergic skin reaction. Negligible at ambient temperature.

Ingestion Few or no symptoms expected. If any, slight nausea might occur.

Potential chronic health effects

Product/ingredient name	Result	Species	Dose	Exposure
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	Sub-acute NOAEL Oral	Rat - Male, Female	300 mg/kg	-

General Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity No known significant effects or critical hazards.

Mutagenicity No known significant effects or critical hazards.

Teratogenicity No known significant effects or critical hazards.

Product/ingredient name No known significant effects or critical hazards.

Fertility effects No known significant effects or critical hazards.

Other information Not available.

SECTION 11: Toxicological information

Specific hazard

☑PAC's

Bitumen is not classified as dangerous under EC criteria, but they do contain very low concentrations of Polycyclic Aromatic Compounds (PAC's). In undiluted bitumens these PAC's are not considered bio-available. However, if paving grade bitumens are mixed with diluents it is believed that such materials may become bio-available if the product has low viscosity at ambient temperatures. Despite the known presence of PAC's there is no evidence that exposure to undiluted bitumens, or their fumes is harmful.

Hydrogen sulphide

Odour treshold of hydrogen sulphide is below 1 ppm. The "rotten eggs" odour cannot be relied upon to warn of the presence of dangerous concentrations because the gas rapidly deadens the sense of smell even at concentrations below hazardous levels. Prolonged exposure to concentrations over Occupational Exposure limits may cause irritation of the eyes and mucous membranes of the nose, throat and lungs. High concentrations may result in unconsciousness and death.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
☑Asphalt *	Acute NOEC ≥1000 mg/l Fresh water	Fish	21 days
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	Acute EC10 0,395 mg/l Fresh water	Algae	72 hours
	Acute EC50 0,638 mg/l Fresh water	Algae	72 hours
	Acute EC50 0,18 mg/l Fresh water	Daphnia	48 hours
	Acute LC50 0,19 mg/l Fresh water	Fish	96 hours
	Chronic NOEC 0,32 mg/l Fresh water	Daphnia	21 days

Conclusion/Summary Harmful to aquatic life with long lasting effects.

12.2 Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
☑Asphalt *	-	-	Not readily Inherent
Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	-	-	

Conclusion/Summary Not readily biodegradable.

12.3 Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
☑Fatty acids C18 unsat, reaction products with Pentaethylenehexamine	2,2	17,4	low

Conclusion/Summary Although all constituents of bitumen have log Kow in excess of 6 and hence, are potentially bio-accumulative, the low water solubility and high molecular weight make the bio-availability to aquatic organisms limited. Bio-accumulation is unlikely.

12.4 Mobility in soil

Mobility

If hot bitumen is spilled onto soil or water it quickly cools and becomes solid. The product is not mobile and will remain on the soil surface. Low mobility in soil, based on experimental data.

12.5 Results of PBT and vPvB assessment

Not applicable.

SECTION 12: Ecological information

Not applicable.

12.6 Other adverse effects Bitumen will normally sink to the sediment although in some circumstances it may float. The water solubility is so low that it could be considered as to be negligible.

SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

Product

Methods of disposal

Where possible (e.g. in the absence of relevant contamination), recycling of used substance is feasible and recommended. This substance can be burned or incinerated, subject to national/local authorizations, relevant contamination limits, safety regulations and air quality legislation. Contaminated or waste substance (not directly recyclable): Disposal can be carried out directly, or by delivery to qualified waste handlers. National legislation may identify a specific organization, and/or prescribe composition limits and methods for recovery or disposal.

Hazardous waste Yes.

European waste catalogue (EWC)

Waste code	Waste designation
13 08 02*	other emulsions

Packaging

Methods of disposal

The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Special precautions








This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14: Transport information

International transport regulations

HOT PRODUCT: If transported $\geq 100^{\circ}\text{C}$ classified as dangerous goods.

COLD PRODUCT ($<100^{\circ}\text{C}$): Not classified as hazardous for transport (ADR, RID, ADN, IMDG, ICAO/IATA).

	ADR/RID	ADN	IMO/IMDG Classification	ICAO/IATA Classification
14.1 UN number	3257	3257	3257	3257
14.2 UN proper shipping name	Elevated temperature liquid, n.o.s. (Fatty acids C18 unsat, reaction products with Pentaethylenehexamine)	Elevated temperature liquid, n.o.s. (Fatty acids C18 unsat, reaction products with Pentaethylenehexamine)	Elevated temperature liquid, n.o.s. (Fatty acids C18 unsat, reaction products with Pentaethylenehexamine)	Elevated temperature liquid, n.o.s. (Fatty acids C18 unsat, reaction products with Pentaethylenehexamine)
14.3 Transport hazard class(es)	9  	9  	9  	9 

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SECTION 14: Transport information

14.4 Packing group	III	III	III	III
14.5 Environmental hazards	No.	No.	No.	No.
Additional information	<p>Hazard identification number 99</p> <p>Special provisions 274; 580; 643</p> <p>Tunnel code D</p> <p>Remarks Emptied tank Class 9: Miscellaneous hazardous material. Latest cargo Elevated temperature liquid, n.o.s.</p>	<p>Remarks Special provisions 274 580 643</p>	<p>Emergency schedules F-A;S-P</p> <p>Special provisions 232; 274</p>	<p>Quantity limitation Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: Forbidden. Limited Quantities - Passenger Aircraft: Forbidden.</p>

14.6 Special precautions for user

Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

14.7 Transport in bulk according to Annex I of MARPOL 73/78 and the IBC Code

Asphalt solution

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisation

Annex XIV

None of the components are listed.

Substances of very high concern

None of the components are listed.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles Not applicable.

Other EU regulations

Seveso Directive

This product is not controlled under the Seveso Directive.

International lists

National inventory

Australia	Not determined.
Canada	Not determined.
China	Not determined.
Japan	Japan inventory (ENCS): Not determined. Japan inventory (ISHL): Not determined.
Malaysia	Not determined.
New Zealand	Not determined.

SECTION 15: Regulatory information

Philippines	Not determined.
Republic of Korea	Not determined.
Taiwan	Not determined.
United States	Not determined.
Thailand	Not determined.
Turkey	Not determined.
Viet Nam	Not determined.

15.2 Chemical safety assessment Complete.

SECTION 16: Other information

Revision comments Not available.

✔ Indicates information that has changed from previously issued version.

ADN = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway

ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road

ATE = Acute Toxicity Estimate

CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]

CMR = Carcinogen, Mutagen or Reproductive toxicant

CSA = Chemical Safety Assessment

CO₂ = carbon dioxide

DNEL = Derived No Effect Level

EC50 = Half maximal effective concentration

EUH statement = CLP-specific Hazard statement

IATA = International Air Transport Association

IC50 = Half maximal inhibitory concentration

IMDG = International Maritime Dangerous Goods

LC50 = Median lethal concentration

LD50 = Median lethal dose

PNEC = Predicted No Effect Concentration

PBT = Persistent, Bioaccumulative and Toxic

RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail

REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation [Regulation (EC) No. 1907/2006]

SCBA = Self-Contained Breathing Apparatus

SVHC = Substances of Very High Concern

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
Skin Sens. 1, H317	Calculation method
Aquatic Chronic 3, H412	Calculation method

United Kingdom (UK)

Full text of abbreviated H statements	H314	Causes severe skin burns and eye damage.
	H317	May cause an allergic skin reaction.
	H318	Causes serious eye damage.
	H410	Very toxic to aquatic life with long lasting effects.
	H412	Harmful to aquatic life with long lasting effects.

SECTION 16: Other information

Full text of classifications [CLP/GHS]	Aquatic Chronic 1, H410	LONG-TERM (CHRONIC) AQUATIC HAZARD - Category 1
	Aquatic Chronic 3, H412	LONG-TERM (CHRONIC) AQUATIC HAZARD - Category 3
	Eye Dam. 1, H318	SERIOUS EYE DAMAGE/EYE IRRITATION - Category 1
	Skin Corr. 1C, H314	SKIN CORROSION/IRRITATION - Category 1C
	Skin Sens. 1, H317	SKIN SENSITISATION - Category 1
	Skin Sens. 1A, H317	SKIN SENSITISATION - Category 1A

* This product could be a pure substance or a blend of the below given CAS numbers:

Substances	CAS number	REACH Registration number
Bitumen	8052-42-4	01-2119480172-44-XXXX
Bitumen, oxidized (PI<2)	64742-93-4	01-2119498270-36-XXXX
Residues (petroleum), vacuum	64741-56-6	01-2119498291-32-XXXX
Residues (petroleum), thermal cracked vacuum	92062-05-0	01-2119498290-34-XXXX

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Section 1 - Title

Short title of the exposure scenario	Formulation: Injection of the additive in warm Bitumen - Industrial
List of use descriptors	<p>Identified use name: Formulation: Injection of the additive in warm Bitumen - Industrial</p> <p>Process Category: PROC02, PROC08b</p> <p>Substance supplied to that use in form of: As such</p> <p>Sector of end use: Not applicable.</p> <p>Subsequent service life relevant for that use: No.</p> <p>Environmental Release Category: ERC03</p>
Environmental contributing scenarios	Formulation into solid matrix - ERC03
Health Contributing scenarios	<p>Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC02</p> <p>Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC08b</p>

Section 2 - Exposure controls

2.1 Control of environmental exposure

Product characteristics	Liquid.
Frequency and duration of use	Emission days: 210 days per year
Other conditions affecting environmental exposure	<p>Negligible wastewater emissions as process operates without water contact.</p> <p>Negligible air emissions as process operates in a contained system.</p> <p>Release fraction to soil from process (initial release prior to RMM): 0,1%</p>

2.2 Control of worker exposure

General measures applicable to all activities

Other conditions affecting workers exposure	<p>Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions - PROC2</p> <p>Location: Outdoor</p> <p>Frequency and duration of use: Covers use up to 15 minutes</p> <p>Transfer of substance or mixture (charging and discharging) at dedicated facilities - PROC8b</p> <p>Location : Outdoor</p> <p>Frequency and duration of use: Covers use up to 4 hours</p>
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Risk management measures (RMM)

PROC2
Wear suitable gloves tested to EN374.

Section 3 - Exposure estimation and reference to its source

3.1 Environment

Exposure assessment (environment):	Not available.
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3.2 Workers

Exposure assessment (human):	Not available.
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Section 1 - Title

Short title of the exposure scenario	Use in road and construction products - Professional
List of use descriptors	Identified use name: Use in road and construction products - Professional Process Category: PROC08a Sector of end use: Not applicable. Subsequent service life relevant for that use: No. Environmental Release Category: ERC08f
Environmental contributing scenarios	Widespread use leading to inclusion into/onto article (outdoor) - ERC08f
Health Contributing scenarios	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities - PROC08a

Section 2 - Exposure controls

2.1 Control of environmental exposure

Product characteristics	Liquid.
Frequency and duration of use	Emission days: 220 days per year
<u>Technical on-site conditions and measures to reduce or limit discharges, air emissions and releases to soil</u>	Air emission controls are not applicable as there is no direct release to air. Release fraction to wastewater from wide dispersive use: 0 Release to soil from process: 0,5

2.2 Control of worker exposure

General measures applicable to all activities

Frequency and duration of use	Covers use up to 8 hour(s)
Other conditions affecting workers exposure	Outdoor use

Section 3 - Exposure estimation and reference to its source

3.1 Environment

Exposure assessment (environment):	Not available.
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3.2 Workers

Exposure assessment (human):	Not available.
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