

COUPE HYDROGENE - HYDROGEN CUT

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Date of issue: 6/6/2017

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Version: 14.4

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

1.1. Product identifier

Product form : Substance
 Substance name : COUPE HYDROGENE - HYDROGEN CUT
 Chemical name : Fuel gases, Petroleum gas, [A combination of light gases. It consists predominantly of hydrogen and/or low molecular weight hydrocarbons.]
 EC No : 270-667-2
 CAS No : 68476-26-6
 REACH registration No : Total Olefins Antwerp (01-2119489781-24-0006) - Naphtachimie (01-2119489781-24-0004) - TP Development (01-2119489781-24-0015)
 Type of product : Extremely flammable gas
 Synonyms : FUEL GAZ ; 68476-26-6
 Product group : -

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

1.2.1. Relevant identified uses

Main use category : Professional use
 Use of the substance/mixture : Manufacture of substances
 Distribution of substance
 Formulation & (re)packing of substances and mixtures
 Blowing agent
 Functional Fluids
 Use as a fuel.
 Polymer production
 Polymer preparations and compounds

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

REFINING & CHEMICALS BRANCH
 TOTAL PETROCHEMICALS & REFINING SA/NV
 Rue de l'Industrie 52 Nijverheidsstraat - B-1040 BRUSSELS - BELGIUM
 T +32 (0)2.288.91.11
rc.fer-sds@total.com - www.total.com

1.4. Emergency telephone number

Emergency number : Emergency call Carechem 24 International :
 • for English speaking countries: +44 (0) 1235 239 670
 • for Europe (in local languages): + 33 1 49 00 00 49
 • for Africa and Middle East: + 44 (0) 1235 239 671 • for China:
 + 86 10 5100 3039
 • for Asia Pacific (Hong-Kong, Singapore, Taiwan, Philippines, India, Vietnam, Sri Lanka, Japan, Korea, Malaysia, Indonesia, Thailand) :
 + 65 3158 1074

Country	Organisation/Company	Address	Emergency number	Comment
	National Poisons Emergency number		08 45 46 47	
Ireland	National Poisons Information Centre Beaumont Hospital	PO Box 1297 Beaumont Road 9 Dublin	+353 1 809 2566 (Healthcare professionals-24/7) +353 1 809 2166 (public, 8am - 10pm, 7/7)	

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flammable gases, Category 1 H220
 Gases under pressure : Compressed gas H280
 Reproductive toxicity, Category 1A H360D
 Specific target organ toxicity — Repeated exposure, Category 2 H373



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Full text of H statements : see section 16

Adverse physicochemical, human health and environmental effects

The substance contains less than 0.1 % 1-3 butadiene (Einecs 203-450-8); it needs not to be classified as "Carcinogen" nor "Mutagen" (nota K). May damage the unborn child. In high concentrations vapours cause anaesthetic and narcotic effect. Product may release Hydrogen Sulphide: a specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances. Contact with the liquefied gas may cause frostbite. Extremely flammable gas. Take precautionary measures against static discharge during blending and transfer operations. In use may form flammable/explosive vapour-air mixture. The vapours are denser than air and may travel along the ground. Distance ignition possible.

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



Signal word (CLP) :

Danger

Hazard statements (CLP) :

H220 - Extremely flammable gas
H280 - Contains gas under pressure; may explode if heated
H360D - May damage the unborn child
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary statements (CLP) :

P201 - Obtain special instructions before use
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P243 - Take precautionary measures against static discharge
P260 - Do not breathe dust/fume/gas/mist/vapours/spray
P273 - Avoid release to the environment
P281 - Use personal protective equipment as required
P309+P311 - IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381 - Eliminate all ignition sources if safe to do so
P410+P403 - Protect from sunlight. Store in a well-ventilated place

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substance

Comments : UVCB
Chemical name : Fuel gases, Petroleum gas, [A combination of light gases. It consists predominantly of hydrogen and/or low molecular weight hydrocarbons.]
CAS No : 68476-26-6
EC No : 270-667-2

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Methane	(CAS No) 74-82-8 (EC No) 200-812-7 (EC Index No) 601-001-00-4	< 100	Flam. Gas 1, H220 Press. Gas
Hydrogen	(CAS No) 1333-74-0 (EC No) 215-605-7 (EC Index No) 001-001-00-9	< 100	Flam. Gas 1, H220 Press. Gas
Carbon monoxide	(CAS No) 630-08-0 (EC No) 211-128-3;403-880-8 (EC Index No) 006-001-00-2	< 1	Flam. Gas 1, H220 Press. Gas Acute Tox. 3 (Inhalation), H331 Repr. 1A, H360D STOT RE 1, H372
1,3-butadiene	(CAS No) 106-99-0 (EC No) 203-450-8 (EC Index No) 601-013-00-X	< 0.1	Flam. Gas 1, H220 Press. Gas Muta. 1B, H340 Carc. 1A, H350



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Hydrogen sulfide (traces)	(CAS No) 7783-06-4 (EC No) 231-977-3 (EC Index No) 016-001-00-4	Flam. Gas 1, H220 Press. Gas Acute Tox. 2 (Inhalation), H330 Aquatic Acute 1, H400
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Full text of H-statements: see section 16

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general	: Get medical advice/attention if you feel unwell.
First-aid measures after inhalation	: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a doctor. If breathing is difficult, give oxygen. If breathing stops, give artificial respiration. Place under medical observation.
First-aid measures after skin contact	: Wash skin with plenty of water. Remove/Take off immediately all contaminated clothing. In the event of contact with the liquid: treat resulting frostbite as a burn. Do not remove clothing adhering to the skin. In case of severe burns, seek hospital treatment.
First-aid measures after eye contact	: Do not wear contact lenses. Rinse immediately with plenty of water. Consult an eye specialist.
First-aid measures after ingestion	: Ingestion during handling is not likely. If necessary seek medical advice.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects	: Refer to § 11 for more details on effects.
Symptoms/effects after inhalation	: In case of inhalation of high concentrations : Dizziness, headaches, nausea. Drowsiness. Unconsciousness. anoxia (asphyxia). May cause respiratory irritation.
Symptoms/effects after skin contact	: Contact with the product may cause cold burns or frostbite.
Symptoms/effects after eye contact	: Direct contact with the liquefied gas may cause severe and possibly permanent eye injury due to frostbite from rapid liquid evaporation. Eye irritation.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	: Carbon dioxide. Dry powder. Foam.
Unsuitable extinguishing media	: Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard	: Extremely flammable gas.
Hazardous decomposition products in case of fire	: Thermal decomposition generates : Toxic fumes. Carbon oxides (CO, CO ₂). Hydrocarbons. Aldehydes. Ketones.

5.3. Advice for firefighters

Precautionary measures fire	: Remove all sources of ignition. The vapours are denser than air and may travel along the ground. Distance ignition possible. Heat may cause pressure rise with explosion of tanks/drums. Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Protection during firefighting	: Do not attempt to take action without suitable protective equipment. Complete protective clothing. Self-contained breathing apparatus.
Other information	: Notify fire brigade and environmental authorities. Evacuate unnecessary personnel. Use water spray or fog for cooling exposed containers.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures	: Evacuate unnecessary personnel. Use special care to avoid static electric charges. Do not smoke. No flames, no sparks. Eliminate all sources of ignition.
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6.1.1. For non-emergency personnel

Emergency procedures for non-emergency personnel	: Only qualified personnel equipped with suitable protective equipment may intervene.
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6.1.2. For emergency responders

Protective equipment	: Do not attempt to take action without suitable protective equipment.
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6.2. Environmental precautions

Avoid release to the environment.



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6.3. Methods and material for containment and cleaning up

- For containment : Stop leak without risks if possible. The vapours are denser than air and may travel along the ground. Distance ignition possible.
- Methods for cleaning up : Product evaporates when in contact with the air.

6.4. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection". For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Precautions for safe handling : Prevent shock/impact. In use, may form flammable/explosive vapour-air mixture. Provide good ventilation in process area to prevent formation of vapour. Use only outdoors or in a well-ventilated area. Take precautionary measures against static discharge during blending and transfer operations. Explosion-free electrical equipment and lighting with earth.
- Hygiene measures : Keep away from food and drink. Always wash hands after handling the product. Do not eat, drink or smoke when using this product.

7.2. Conditions for safe storage, including any incompatibilities

- Storage conditions : Product may release Hydrogen Sulphide: a specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances. Keep away from ignition sources. Proper grounding procedures to avoid static electricity should be followed. Explosive vapour/air mixtures may be formed. Containers (tanks) should be grounded and provided with adequate pressure relief valve. Store in a well-ventilated place. Keep container tightly closed. Protect from heat and direct sunlight.
- Special rules on packaging : Keep only in original container.
- Packaging materials : Stainless steel.

7.3. Specific end use(s)

Recommended to professional users.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Methane (74-82-8)		
Ireland	OEL (8 hours ref) (ppm)	1000 ppm
USA - ACGIH	Remark (ACGIH)	Refer to Appendix F (Minimal Oxygen Content) in "PELs® and BEIs®" book
Hydrogen (1333-74-0)		
USA - ACGIH	Remark (ACGIH)	Simple Asphyxiant (D) - Refer to Appendix F (Minimal Oxygen Content) in "PELs® and BEIs®" book
Carbon monoxide (630-08-0)		
Ireland	OEL (8 hours ref) (mg/m ³)	23 mg/m ³
Ireland	OEL (8 hours ref) (ppm)	20 ppm
Ireland	OEL (15 min ref) (mg/m ³)	115 mg/m ³
Ireland	OEL (15 min ref) (ppm)	100 ppm
United Kingdom	WEL TWA (mg/m ³)	35 mg/m ³
United Kingdom	WEL TWA (ppm)	30 ppm
United Kingdom	WEL STEL (mg/m ³)	232 mg/m ³
United Kingdom	WEL STEL (ppm)	200 ppm
USA - ACGIH	ACGIH TWA (ppm)	25 ppm
USA - ACGIH	Biological Exposure Indices (BEI)	3.5 % of hemoglobin (Medium: blood - Time: end of shift - Parameter: Carboxyhemoglobin (background, nonspecific) 20 ppm (Medium: end-exhaled air - Time: end of shift - Parameter: Carbon monoxide (background, nonspecific)
1,3-Butadiene (106-99-0)		
Ireland	OEL (8 hours ref) (mg/m ³)	2.2 mg/m ³
Ireland	OEL (8 hours ref) (ppm)	1 ppm
United Kingdom	WEL TWA (mg/m ³)	22 mg/m ³
United Kingdom	WEL TWA (ppm)	10 ppm
United Kingdom	WEL STEL (mg/m ³)	66 mg/m ³ (calculated)



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1,3-Butadiene (106-99-0)		
United Kingdom	WEL STEL (ppm)	30 ppm (calculated)
USA - ACGIH	Local name	1,3-Butadiene
USA - ACGIH	ACGIH TWA (ppm)	2 ppm
USA - ACGIH	Biological Exposure Indices (BEI)	2.5 mg/l (Medium: urine - Time: end of shift - Parameter: 1,2-Dihydroxy-4-(N-acetylcysteinyl)-butane (background, semi-quantitative) 2.5 pmol/g hemoglobin (Medium: blood - Time: not critical - Parameter: Mixture of N-1 and N-2-(hydroxybutenyl)valine hemoglobin adducts (semi-quantitative))

Hydrogen sulfide (7783-06-4)		
EU	IOELV TWA (mg/m ³)	7 mg/m ³
EU	IOELV TWA (ppm)	5 ppm
EU	IOELV STEL (mg/m ³)	14 mg/m ³
EU	IOELV STEL (ppm)	10 ppm
Ireland	OEL (8 hours ref) (mg/m ³)	7 mg/m ³
Ireland	OEL (8 hours ref) (ppm)	5 ppm
Ireland	OEL (15 min ref) (mg/m ³)	14 mg/m ³
Ireland	OEL (15 min ref) (ppm)	10 ppm
United Kingdom	WEL TWA (mg/m ³)	7 mg/m ³
United Kingdom	WEL TWA (ppm)	5 ppm
United Kingdom	WEL STEL (mg/m ³)	14 mg/m ³
United Kingdom	WEL STEL (ppm)	10 ppm
USA - ACGIH	ACGIH TWA (ppm)	1 ppm
USA - ACGIH	ACGIH STEL (ppm)	5 ppm

COUPE HYDROGENE - HYDROGEN CUT (68476-26-6)	
DNEL/DMEL (Workers)	
Long-term - systemic effects, dermal	23.4 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	2.21 mg/m ³
DNEL/DMEL (General population)	
Long-term - systemic effects, inhalation	0.0664 mg/m ³

8.2. Exposure controls

Appropriate engineering controls:

The substance is classified as extremely flammable and therefore the following conditions must be met to ensure safe use: "Risks are controlled by storage and use under conditions which avoid all ignition sources."

. Safety shower. Eye fountain.

Personal protective equipment:

Gas mask with filter type AX.

Hand protection:

cold-insulating gloves

Eye protection:

Do not wear contact lenses. Safety glasses

Skin and body protection:

Wear suitable protective clothing. Safety foot-wear

Respiratory protection:

Ensure good ventilation of the work station. In case of insufficient ventilation, wear suitable respiratory equipment



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Environmental exposure controls:

Avoid release to the environment.

Other information:

Do not eat, drink or smoke during use. Handle in accordance with good industrial hygiene and safety procedures.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Appearance	: Gases under pressure. Pressurized liquefied gas.
Colour	: Colourless.
Odour	: Faint hydrocarbon.
Odour threshold	: No data available
pH	: -
Relative evaporation rate (butylacetate=1)	: No data available
Melting point	: -138 - -188 °C
Freezing point	: No data available
Boiling point	: -162 - 0 °C
Flash point	: -104 - -60 °C
Auto-ignition temperature	: > 287 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: Extremely flammable gas
Vapour pressure	: -
Relative vapour density at 20 °C	: No data available
Relative density	: No data available
Solubility	: Soluble in aromatic hydrocarbons. Soluble in most organic solvents. Water: 24 - 60 mg/l
Log Pow	: 1 - 2.8
Viscosity, kinematic	: -
Viscosity, dynamic	: -
Explosive properties	: No data available
Oxidising properties	: No data available
Explosive limits	: 1.8 - 15 vol %

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Extremely flammable gas.

10.2. Chemical stability

Spontaneous polymerisation.

10.3. Possibility of hazardous reactions

In use may form flammable/explosive vapour-air mixture.

10.4. Conditions to avoid

Avoid contact with hot surfaces. No flames, no sparks. Eliminate all sources of ignition. Avoid the build-up of electrostatic charge.

10.5. Incompatible materials

No additional information available

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	: Not classified (Based on available data, the classification criteria are not met)
Additional information	: Inhalation may affect the nervous system causing headache, possibly dizziness, nausea, weakness, loss of coordination and unconsciousness May release poisonous hydrogen sulfide



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Hydrogen sulfide (7783-06-4)	
LC50 inhalation rat	820 mg/m ³

Skin corrosion/irritation : Not classified (Based on available data, the classification criteria are not met)
pH: -

Additional information : Contact with the product may cause cold burns or frostbite

Serious eye damage/irritation : Not classified (Based on available data, the classification criteria are not met)
pH: -

Additional information : May cause eye irritation

Respiratory or skin sensitisation : Not classified (Based on available data, the classification criteria are not met)

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : May damage the unborn child.

Specific target organ toxicity (single exposure) : Not classified

Additional information : May cause drowsiness or dizziness

Specific target organ toxicity (repeated exposure) : May cause damage to organs through prolonged or repeated exposure.

Methane (74-82-8)	
LOAEC (inhalation, rat, gas, 90 days)	12168 ppmv/6h/day

NOAEC (inhalation, rat, gas, 90 days)	3990 ppmv/6h/day
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Aspiration hazard : Not classified (Based on available data, the classification criteria are not met)

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : Do not allow product to spread into the environment.

Methane (74-82-8)	
LC50 fish 1	147.54 mg/l

LC50 other aquatic organisms 1	69.43 mg/l
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EC50 other aquatic organisms 1	19.37 mg/l
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1,3-Butadiene (106-99-0)	
LC50 fish 1	71.5 mg/l (Exposure time: 24 h - Species: Lagodon rhomboides)

EC50 Daphnia 1	24.8 mg/l (Exposure time: 96 h - Species: Daphnia magna)
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Hydrogen sulfide (7783-06-4)	
LC50 fish 1	0.0448 mg/l

LC50 fish 2	0.016 mg/l
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12.2. Persistence and degradability

COUPE HYDROGENE - HYDROGEN CUT (68476-26-6)	
Persistence and degradability	Inherently biodegradable. Product is expected to undergo degradation in the presence of sunlight.

Hydrogen (1333-74-0)	
Persistence and degradability	Not readily biodegradable.

1,3-Butadiene (106-99-0)	
Persistence and degradability	Product released into the atmosphere is expected to undergo degradation in the presence of sunlight.

12.3. Bioaccumulative potential

COUPE HYDROGENE - HYDROGEN CUT (68476-26-6)	
Log Pow	1 - 2.8

Bioaccumulative potential	Low bioaccumulation potential.
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Methane (74-82-8)	
Log Kow	1.09

1,3-Butadiene (106-99-0)	
BCF fish 1	13 - 19.1

Log Pow	1.85 (23 °C)
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Hydrogen sulfide (7783-06-4)	
Log Pow	0.45 (25°C)



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12.4. Mobility in soil

COUPE HYDROGENE - HYDROGEN CUT (68476-26-6)

Ecology - soil because of its high volatility, the product is unlikely to cause ground or water pollution.

Methane (74-82-8)

Log Koc 0.6

12.5. Results of PBT and vPvB assessment

No additional information available

12.6. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste) : Disposal must be done according to official regulations.
Waste treatment methods : Do not discharge the product into the environment. Hazardous waste. Dispose of in accordance with relevant local regulations. Use only registered transporters. Empty containers should be taken for recycling, recovery or waste in accordance with local regulation.
Additional information : Handle empty containers with care because residual vapours are flammable. Flammable vapours may accumulate in the container.

SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

ADR	IMDG	IATA	ADN	RID
14.1. UN Number				
2034	2034	2034	2034	2034
14.2. UN proper shipping name				
HYDROGEN AND METHANE MIXTURE, COMPRESSED	HYDROGEN AND METHANE MIXTURE, COMPRESSED	Hydrogen and methane mixture, compressed	HYDROGEN AND METHANE MIXTURE, COMPRESSED	HYDROGEN AND METHANE MIXTURE, COMPRESSED
Transport document description				
UN 2034 HYDROGEN AND METHANE MIXTURE, COMPRESSED, 2.1, (B/D)	UN 2034 HYDROGEN AND METHANE MIXTURE, COMPRESSED, 2.1	UN 2034 Hydrogen and methane mixture, compressed, 2.1	UN 2034 HYDROGEN AND METHANE MIXTURE, COMPRESSED, 2.1	UN 2034 HYDROGEN AND METHANE MIXTURE, COMPRESSED, 2.1
14.3. Transport hazard class(es)				
2.1	2.1	2.1	2.1	2.1
				
14.4. Packing Group				
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
14.5. Environmental hazards				
Dangerous for the environment : No	Dangerous for the environment : No Marine Pollutant : No	Dangerous for the environment : No	Dangerous for the environment : No	Dangerous for the environment : No
No supplementary information available				

14.6. Special precautions for user

- Overland transport

Classification code (ADR) : 1F
Special provisions (ADR) : 662
Limited quantities (ADR) : 0
Excepted quantities (ADR) : E0
Packing instructions (ADR) : P200
Mixed packing provisions (ADR) : MP9
Portable tank and bulk container instructions (ADR) : (M)
Tank code (ADR) : CxBN(M)
Tank special provisions (ADR) : TA4, TT9
Vehicle for tank carriage : FL

6/7/2017

EN (English)

SDS Reference number: ATOF-037

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Transport category (ADR) : 2
Special provisions for carriage - Loading, unloading and handling (ADR) : CV9, CV10, CV36
Special provisions for carriage - Operation (ADR) : S2, S20
Hazard identification number (Kemler No.) : 23
Orange plates :



Tunnel restriction code (ADR) : B/D
EAC code : 2SE

- Transport by sea (IMDG)

Limited quantities (IMDG) : 0
Excepted quantities (IMDG) : E0
Packing instructions (IMDG) : P200
EmS-No. (Fire) : F-D
EmS-No. (Spillage) : S-U
Stowage category (IMDG) : E

- Air transport (IATA)

PCA Excepted quantities (IATA) : E0
PCA Limited quantities (IATA) : Forbidden
PCA limited quantity max net quantity (IATA) : Forbidden
PCA packing instructions (IATA) : Forbidden
PCA max net quantity (IATA) : Forbidden
CAO packing instructions (IATA) : 200
CAO max net quantity (IATA) : 150kg
Special provisions (IATA) : A1
ERG code (IATA) : 10L

- Inland waterway transport

Classification code (ADN) : 1F
Limited quantities (ADN) : 0
Excepted quantities (ADN) : E0
Equipment required (ADN) : PP, EX, A
Ventilation (ADN) : VE01
Number of blue cones/lights (ADN) : 1

- Rail transport

Classification code (RID) : 1F
Limited quantities (RID) : 0
Excepted quantities (RID) : E0
Packing instructions (RID) : P200
Mixed packing provisions (RID) : MP9
Portable tank and bulk container instructions (RID) : (M)
Tank codes for RID tanks (RID) : CxBN(M)
Special provisions for RID tanks (RID) : TU38, TE22, TA4, TT9
Transport category (RID) : 2
Special provisions for carriage - Loading, unloading and handling (RID) : CW9, CW10, CW36
Colis express (express parcels) (RID) : CE3
Hazard identification number (RID) : 23

14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code

Not applicable



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SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

No REACH Annex XVII restrictions

COUPE HYDROGENE - HYDROGEN CUT is not on the REACH Candidate List

COUPE HYDROGENE - HYDROGEN CUT is not on the REACH Annex XIV List

15.1.2. National regulations

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Complies the United States TSCA (Toxic Substances Control Act) inventory

Listed on the Canadian DSL (Domestic Substances List)

Listed on the AICS (Australian Inventory of Chemical Substances)

Listed on the China Inventory of Existing Chemical Substances (IECSC)

Listed on the Korean ECL (Existing Chemicals List)

15.2. Chemical safety assessment

A chemical safety assessment has been carried out

SECTION 16: Other information

Training advice : Training staff on good practice. Manipulations are to be done only by qualified and authorised persons.

Other information : Use good personal hygiene practices.

Full text of H- and EUH-statements:

Acute Tox. 2 (Inhalation)	Acute toxicity (inhal.), Category 2
Acute Tox. 3 (Inhalation)	Acute toxicity (inhal.), Category 3
Aquatic Acute 1	Hazardous to the aquatic environment — Acute Hazard, Category 1
Carc. 1A	Carcinogenicity, Category 1A
Compressed gas	Gases under pressure : Compressed gas
Flam. Gas 1	Flammable gases, Category 1
Muta. 1B	Germ cell mutagenicity, Category 1B
Press. Gas	Gases under pressure
Repr. 1A	Reproductive toxicity, Category 1A
STOT RE 1	Specific target organ toxicity — Repeated exposure, Category 1
STOT RE 2	Specific target organ toxicity — Repeated exposure, Category 2
H220	Extremely flammable gas
H280	Contains gas under pressure; may explode if heated
H330	Fatal if inhaled
H331	Toxic if inhaled
H340	May cause genetic defects
H350	May cause cancer
H360D	May damage the unborn child
H372	Causes damage to organs through prolonged or repeated exposure
H373	May cause damage to organs through prolonged or repeated exposure
H400	Very toxic to aquatic life

SDS EU (REACH Annex II)

This information applies to the PRODUCT AS SUCH and conforming to specifications of TOTAL.

In case of formulations or mixtures, it is necessary to ascertain that a new danger will not appear.

The information contained is based on our knowledge of the product, at the date of publishing and it is given quite sincerely. However the revision of some data is in progress.

Users are advised of possible additional hazards when the product is used in applications for which it was not intended. This sheet shall only be used and reproduced for prevention and security purposes.

The references to legislative, regulatory and codes of practice documents cannot be considered as exhaustive.

It is the responsibility of the person receiving the product to refer to the totality of the official documents concerning the use, the possession and the handling of the product.

It is also the responsibility of the handlers of the product to pass on to any subsequent persons who will come into contact with the product. (usage, storage, cleaning of containers, other processes) the totality of the information contained within this safety data sheet and necessary for safety at work, the protection of health and the protection of environment.



Annex: Exposure Scenarios for Petroleum Gases*

***The 'Petroleum gases' category covers hydrocarbon streams containing petroleum gases (alkanes/alkenes) in the C1-C5 range. The majority of the members of this category contain <0.1% 1,3-butadiene**

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1. Exposure scenario 1: Manufacture of petroleum gases streams in Other Petroleum Gases - Industrial

1.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Manufacture of petroleum gases
Use Descriptor	Sector of Use: Industrial (SU3, SU8, SU9)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15
	Environmental Release Categories: ERC1, ERC4
Processes, tasks, activities covered	Manufacture of the Substance or use as an intermediate or process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.



General measures (carcinogens) [G18].	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance. Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to Minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. [G20].
General exposures (closed systems) [CS15].	Handle substance within a closed system [E47].
General exposures (closed systems) [CS15]. With sample collection [CS56]. With occasional controlled exposure [CS140].	Handle substance within a closed system [E47].
General exposures (closed systems) [CS15]. Use in contained batch processes [CS37].	Handle substance within a closed system [E47].
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	Handle substance within a predominantly closed system provided with extract ventilation [E49]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11], OR [G9] Ensure activity is undertaken outdoor [69]. Avoid carrying out activities involving exposure for more than 1 hour [OC27].
Process sampling [CS2].	Handle substance within a closed system [E47]. Use a sampling system designed to control exposure [E89]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11], OR [G9] Ensure activity is undertaken outdoor [69].
Laboratory activities [CS36].	Handle within a fume cupboard or implement suitable equivalent methods to minimize exposure [E12].
Bulk transfers [CS14]. (open systems) [CS108].	Handle substance within a closed system [E47]. Ensure material transfers are under containment or extract ventilation [E66].
Bulk transfers [CS14]. (closed systems) [CS107].	Ensure material transfers are under containment or extract ventilation [E66].
Equipment cleaning and maintenance [CS39].	Drain down system prior to equipment break-in or maintenance [E65]. Provide extract ventilation to points where emissions occur [E54].
Storage [CS67]. With occasional controlled exposure [CS140].	Ensure material transfers are under containment or extract ventilation [E66]. Store substance within a closed system [E84].



Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.
4.2. Environment	No additional risk management measures required.[DSU7]



2. Exposure scenario 2: Distribution of petroleum gases - Industrial

2.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Distribution of petroleum gases
Use Descriptor	Sector of Use: Industrial (SU3, SU8, SU9)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15
	Environmental Release Categories: ERC1 - 7
Processes, tasks, activities covered	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its distribution and associated laboratory activities
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.



General measures (carcinogens) [G18]	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance. Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. [G20].
General exposures (closed systems) [CS15].	Handle substance within a closed system [E47].
General exposures (closed systems) [CS15]. With sample collection [CS56]. With occasional controlled exposure [CS140].	Handle substance within a closed system [E47]. Sample via a closed loop or other system to avoid exposure [E8]
General exposures (closed systems) [CS15]. Use in contained batch processes [CS37].	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Ensure material transfers are under containment or extract ventilation [E66].
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Sample via a closed loop or other system to avoid exposure [E8]
Process sampling [CS2].	Sample via a closed loop or other system to avoid exposure [E8].
Laboratory activities [CS36].	Handle within a fume cupboard or implement suitable equivalent methods to minimize exposure [E12].
Bulk transfers [CS14]. (closed systems) [CS107].	Handle substance within a closed system [E47]. Ensure material transfers are under containment or extract ventilation [E66].
Drum and small package filling [CS6].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Ensure material transfers are under containment or extract ventilation [E66].
Equipment cleaning and maintenance [CS39].	Drain down and flush system prior to equipment break-in or maintenance [E55]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
Storage [CS67]. With occasional controlled exposure [CS140].	Store substance within a closed system [E84]. Ensure operation is undertaken outdoors [E69].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation



3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.
4.2. Environment	No additional risk management measures required [DSU7]



3. Exposure scenario 3: Formulation of petroleum gases - Industrial

3.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Formulation & (re)packaging of substances and mixtures of petroleum gases
Use Descriptor	Sector of Use: Industrial (SU3, SU10)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15
	Environmental Release Categories: ERC2
Processes, tasks, activities covered	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, large and small scale packing, maintenance and associated laboratory activities
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.
General measures (carcinogens) [G18]	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance. Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its



	<p>use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance. [G20].</p>
General exposures (closed systems) [CS15].	Handle substance within a closed system [E47].
General exposures (closed systems) [CS15]. With sample collection [CS56]. With occasional controlled exposure [CS140].	Handle substance within a closed system [E47]. Sample via a closed loop or other system to avoid exposure [E8]
General exposures (closed systems) [CS15]. Use in contained batch processes [CS37].	Handle substance within a closed system [E47]. Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].
General exposures (open systems) [CS16]. Batch process [CS55]. With sample collection [CS56].	Sample via a closed loop or other system to avoid exposure [E8]
Process sampling [CS2].	Sample via a closed loop or other system to avoid exposure [E8].
Laboratory activities [CS36].	Handle within a fume cupboard or implement suitable equivalent methods to minimize exposure [E12].
Bulk transfers [CS14].	Ensure material transfers are under containment or extract ventilation [E66].
Mixing operations (open systems) [CS30].	Provide extract ventilation to points where emissions occur [E54]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
Drum and small package filling [CS6].	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].
Equipment cleaning and maintenance [CS39].	Drain down and flush system prior to equipment break-in or maintenance [E55]. Clear spills immediately [C&H13]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENVT4].
Storage [CS67]. With occasional controlled exposure [CS140].	Ensure material transfers are under containment or extract ventilation [E66]. Store substance within a closed system [E84].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.



3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.
4.2. Environment	No additional risk management measures required.[DSU7]



4. Exposure scenario 4: Use of petroleum gases in blowing agents - Industrial

4.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Use in blowing agents of petroleum gases
Use Descriptor	Sector of Use: Industrial (SU3)
	Process Categories: PROC1, PROC2, PROC3, PROC8b, PROC9, PROC12
	Environmental Release Categories: ERC 4
Processes, tasks, activities covered	Use as a blowing agent for rigid and flexible foams, including material transfers, mixing and injection, curing, cutting, storage and packing
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAV2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.
Use in blowing agents of petroleum gases	
General measures (carcinogens) [G18]	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance. Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory



	<p>protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance. [G20].</p>
Mixing operations (closed systems) [CS29].	Handle substance within a closed system [E47]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
Material transfers [CS3].	<p>Ensure material transfers are under containment or extract ventilation [E66].</p> <p>Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].</p>
Storage [CS67].	Ensure material transfers are under containment or extract ventilation [E66]. Store substance within a closed system [E84].
Drum and small package filling [CS6].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
Semi-bulk packaging [CS128].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.
4.2. Environment	No additional risk management measures required.[DSU7]



5. Exposure scenario 5: Use of petroleum gases in fuels - Industrial

5.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Use in Fuels of petroleum gases
Use Descriptor	Sector of Use: Industrial (SU3)
	Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16
	Environmental Release Categories: ERC7
Processes, tasks, activities covered	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.



General measures (carcinogens) [G18].	<p>Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance.</p> <p>Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance. [G20].</p>
Bulk transfers [CS14].	Provide a good of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Ensure material transfers are under containment or extract ventilation [E66].
Drum/batch transfers [CS8].	Ensure material transfers are under containment or extract ventilation [E66]. {Wear suitable gloves tested to EN374 [PPE15]}.
General exposures (closed systems) [CS15].	Handle substance within a closed system [E47]. {Wear suitable gloves tested to EN374 [PPE15]}.
General exposures (closed systems) [CS15]. With occasional controlled exposure [CS140].	Handle substance within a predominantly closed system provided with extract ventilation [E49].
General exposures (closed systems) [CS15]. Batch process [CS55].	Handle substance within a predominantly closed system provided with extract ventilation [E49]. Provide a good of general ventilation (not less than 3 to 5 air changes per hour) [E11].
General exposures (open systems) [CS16].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
General exposures (open systems) [CS16]. (closed systems) [CS107]. Batch process [CS55].	Handle substance within a predominantly closed system provided with extract ventilation [E49]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
Equipment maintenance [CS5].	Drain down and flush system prior to equipment break-in or maintenance [E55]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
Vessel and container cleaning [CS103].	<p>Drain down and flush system prior to equipment break-in or maintenance [E55]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].</p> <p>Only allow access to authorized persons [AP1]</p> <p>Apply vessel entry procedures including use of forced supplied air. [AP15]</p>



Storage [CS67].	Store substance within a closed system [E84].
Storage [CS67]. With occasional controlled exposure [CS140].	Provide extract ventilation to points where emissions occur [E54]. Store substance within a closed system [E84].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.
4.2. Environment	No additional risk management measures required.[DSU7]



6. Exposure scenario 6: Use of petroleum gases in fuels – Professional

6.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Use in Fuels of petroleum gases
Use Descriptor	Sector of Use: Professional (SU22)
	Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16
	Environmental Release Categories: ERC 9A, ERC 9B
Processes, tasks, activities covered	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.



General measures (carcinogens) [G18]	<p>Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance.</p> <p>Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. [G20].</p>
Bulk transfers [CS14].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Ensure material transfers are under containment or extract ventilation [E66]. Avoid carrying out activities involving exposure for more than 4 hours [OC28].
Drum/batch transfers [CS8].	Ensure material transfers are under containment or extract ventilation [E66]. Ensure operation is undertaken outdoors [E69]; or [G9]; Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Avoid carrying out operation involving exposure for more than 15 minutes [OC26].
General exposures (closed systems) [CS15].	Handle substance within a closed system [E47].
General exposures (closed systems) [CS15]. With occasional controlled exposure [CS140].	Ensure material transfers are under containment or extract ventilation [E66]. Ensure operation is undertaken outdoors [E69]; or [G9]; Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].
General exposures (open systems) [CS16]. (closed systems) [CS107]. Batch process [CS55].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Ensure material transfers are under containment or extract ventilation [E66].
General exposures (open systems) [CS16].	Ensure operation is undertaken outdoors [E69]; or [G9]; Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11].
Equipment cleaning and maintenance [CS39].	Drain down and flush system prior to equipment break-in or maintenance [E55]. Ensure material transfers are under containment or extract ventilation [E66]. Ensure operation is undertaken outdoors [E69]; or [G9]; Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].



Vessel and container cleaning [CS103]	<p>Drain down and flush system prior to equipment break-in or maintenance [E55]. Ensure material transfers are under containment or extract ventilation [E66]. Ensure operation is undertaken outdoors [E69]; or [G9]; Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].</p> <p>Only allow access to authorized persons [AP1]</p> <p>Apply vessel entry procedures including use of forced supplied air. [AP15]</p>
Storage [CS67].	Store substance within a closed system [E84].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.
4.2. Environment	No additional risk management measures required.[DSU7]



7. Exposure scenario 7: Use of petroleum gases in fuels – Consumer

7.1. Exposure scenario

Section 1		Exposure Scenario Title
Title		Fuels
Sector of Use (SU code)		21
Use Descriptor (PC codes)		PC13
Processes, tasks, activities covered		Covers consumer uses in liquid fuels
Environmental Release Category		
Specific Environmental Release Category		
Section 2		Operational conditions and risk management measures
Field for additional statements to explain scenario if required - pending better understanding from ECHA		Consumer exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21.
Section 2.1		Control of consumer exposure
Product characteristics		
Physical form of product		liquid
Vapour pressure		255000
Concentration of substance in product		Unless otherwise stated, cover concentrations up to 5% [ConsOC1]
Amounts used		Unless otherwise stated, covers use amounts up to 45000g [ConsOC2]; covers skin contact area up to 0cm ² [ConsOC5]
Frequency and duration of use/exposure		Unless otherwise stated, covers use frequency up to 0.143 times per day [ConsOC4]; covers exposure up to 0.05 hours per event [ConsOC14]
Other Operational Conditions affecting exposure		Unless otherwise stated assumes use at ambient temperatures [ConsOC15]; assumes use in a 20 m ³ room [ConsOC11]; assumes use with typical ventilation [ConsOC8].
Section 2.1.1		Product categories
PC13: Fuels-Liquid - subcategories added: Automotive Refuelling	OC	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 52 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 45000g [ConsOC2]; covers outdoor use [ConsOC12]; covers use in room size of 100m ³ [ConsOC11]; for each use event, covers exposure up to 0.05hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated
PC13: Fuels--Domestic use of LPG cylinders uses in heating and cooking	OC	Unless otherwise stated, covers concentrations up to 5% [ConsOC1]; covers use up to 26 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 13000g [ConsOC2]; covers use in room size of



		20m3[ConsOC11]; for each use event, covers exposure up to 0.03hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated
Section 2.2		Control of environmental exposure
Substance is not classified – environmental exposure assessment not required		
Section 3		Exposure Estimation
3.1. Health		When the recommended risk management measures (RMMs) when available and operational conditions (OCs) are observed, exposure of consumers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment		Qualitative approach used to conclude safe use.[EE8]
Section 4		Guidance to check compliance with the Exposure Scenario
4.1. Health		Check that RMMs and OCs are as described or of equivalent efficiency.
4.2. Environment		No additional risk management measures required.[DSU7]



8. Exposure scenario 8: Use of petroleum gases in functional fluids - Industrial

8.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Use in functional fluids for Other Petroleum Gases
Use Descriptor	Sector of Use: Industrial (SU3)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC 8a, PROC 8b, PROC9
	Environmental Release Categories: ERC 7
Processes, tasks, activities covered	Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in industrial equipment including maintenance and related material transfers.
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Gas or Liquefied gas, vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2].
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%; Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.
General measures (carcinogens) [G18]	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance. Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of



	wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. [G20].
Bulk transfers [CS14].	Handle substance within a closed system [E47].
Bulk transfers [CS14]. With occasional controlled exposure [CS137]	Handle substance within a closed system [E47]. Provide extract ventilation to material transfer points and other openings [E82].
Bulk transfers [CS14]. Batch process [CS55].	Handle substance within a closed system [E47]. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].; Ensure material transfers are under containment or extract ventilation [E66].
Bulk transfers [CS14].	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].; Ensure material transfers are under containment or extract ventilation [E66].
Drum/batch transfers [CS8]. Dedicated facility [CS81].	Ensure material transfers are under containment or extract ventilation [E66].
Filling / preparation of equipment from drums or containers. [CS45]. Manual [CS34].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].; Provide extract ventilation to points where emissions occur [E54].
General exposures (closed systems) [CS15].	Minimize exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings [E60].
General exposures (open systems) [CS16].	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). [E11].; Provide extract ventilation to points where emissions occur [E54].
Equipment maintenance [CS5].	Drain down system prior to equipment break-in or maintenance [E65]. Provide extract ventilation to points where emissions occur [E54].
Storage [CS67]	Store substance within a closed system [E84].
Storage [CS67] With occasional controlled exposure [CS137]	Store substance within a closed system [E84].; Ensure material transfers are under containment or extract ventilation [E66].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.
4.2. Environment	No additional risk management measures required.[DSU7]



9. Exposure scenario 9: Use of petroleum gases in functional fluids – Professional

9.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Use in functional fluids of petroleum gases
Use Descriptor	Sector of Use: Professional (SU22)
	Process Categories: PROC1, PROC2, PROC3, PROC 8a, PROC9, PROC20
	Environmental Release Categories: ERC 9A, ERC 9B
Processes, tasks, activities covered	Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in professional equipment including maintenance and related material transfers.
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.



General measures (carcinogens) [G18]	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance. Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. [G20].
Drum/batch transfers [CS8]. Non-dedicated facility [CS82].	Ensure material transfers are under containment or extract ventilation [E66]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Avoid carrying out activities involving exposure for more than 4 hours [OC28].
Filling / preparation of equipment from drums or containers [CS45].	Ensure material transfers are under containment or extract ventilation [E66]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
General exposures (closed systems) [CS15].	Handle substance within a closed system [E47].
Equipment maintenance [CS5]. Non-dedicated facility [CS82].	Drain down system prior to equipment break-in or maintenance [E65]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Provide extract ventilation to points where emissions occur [E54].
Storage [CS67]. With occasional controlled exposure [CS140].	Ensure operation is undertaken outdoors [E69]. Ensure material transfers are under containment or extract ventilation [E66]. Store substance within a closed system [E84].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.



4.2. Environment	No additional risk management measures required.[DSU7]



10. Exposure scenario 10: Use of petroleum gases in polymer production – Industrial

10.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Use in polymer production of petroleum gases
Use Descriptor	Sector of Use: Industrial (SU3, SU8, SU9)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC14, PROC21
	Environmental Release Categories: ERC6A, ERC6C
Processes, tasks, activities covered	Manufacture of polymers from monomers in continuous and batch processes, include sparging, discharging, and reactor maintenance and immediate polymer product formation (i.e. compounding, pelletisation, product off-gassing).
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.



General measures (carcinogens) [G18]	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance. Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance [G20].
General exposures (closed systems) [CS15]. Continuous process [CS54]. No sampling [CS57].	Handle substance within a closed system [E47]. No specific measures identified [E118].
Bulk transfers [CS14]. With sample collection [CS56].	Ensure material transfers are under containment or extract ventilation [E66]. Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11].
Equipment maintenance [CS5].	Drain down system prior to equipment break-in or maintenance [E65]. Clear spills immediately [C&H13]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22]. Retain drain downs in sealed storage pending disposal or for subsequent recycle [ENV4].
Storage [CS67]. With occasional controlled exposure [CS140].	Provide a good standard of general or controlled ventilation (not less than 3 to 5 air changes per hour) [E11]. Store substance within a closed system [E84]. Avoid carrying out activities involving exposure for more than 1 hour [OC 27].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.



4.2. Environment	No additional risk management measures required.[DSU7]



11. Exposure scenario 11: Use of petroleum gases in polymer processing – Industrial

11.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Use in polymer processing of petroleum gases
Use Descriptor	Sector of Use: Industrial (SU3, SU10)
	Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC13, PROC14, PROC21
	Environmental Release Categories: ERC 4
Processes, tasks, activities covered	Processing of formulated polymers including material transfers, additives handling (e.g. pigments, stabilizers, fillers, plasticizers, etc.), moulding, curing and forming activities, material re-works, storage and associated maintenance.
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure is > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures
	Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.



General measures (carcinogens) [G18]	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance. Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance [G20].
Bulk transfers [CS14]. (closed systems) [CS107].	Handle substance within a closed system [E47].
Bulk transfers [CS14]. (closed systems) [CS107]. With occasional controlled exposure [CS140].	Handle substance within a closed system [E47]. Ensure material transfers are under containment or extract ventilation [E66].
Bulk transfers [CS14]. Dedicated facility [CS81].	Ensure material transfers are under containment or extract ventilation [E66].
Bulk transfers [CS14]. Drum/batch transfers [CS8].	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour) [E11]. Ensure material transfers are under containment or extract ventilation [E66].
Bulk transfers [CS14]. Small package filling [CS7].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Ensure material transfers are under containment or extract ventilation [E66].
Equipment maintenance [CS5].	Drain down and flush system prior to equipment break-in or maintenance [E55]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
Storage [CS67]. With occasional controlled exposure [CS140].	Handle substance within a closed system [E47]. Provide extract ventilation to points where emissions occur [E54]. Store substance within a closed system [E84].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.



4.2. Environment	No additional risk management measures required.[DSU7]



12. Exposure scenario 12: Use of petroleum gases in polymer processing – Professional

12.1. Exposure scenario

Section 1	Exposure Scenario Title
Title	Use in polymer processing of petroleum gases
Use Descriptor	Sector of Use: Professional (SU22)
	Process Categories: PROC1, PROC2, PROC6, PROC8a, PROC8b, PROC14, PROC21
	Environmental Release Categories: ERC 8A, ERC 8D
Processes, tasks, activities covered	Processing of formulated polymers including material transfers, moulding and forming activities, material re-works and associated maintenance.
Section 2	Operational conditions and risk management measures
Field for additional statements to explain scenario if required.	Worker exposure was estimated using ECETOC TRAv2 unless otherwise indicated. G21
Section 2.1	Control of worker exposure
Product characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa [OC5].
Concentration of substance in product	Covers percentage substance in the product up to 100 % (unless stated differently) [G13].
Amounts used	Not applicable
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	Not applicable
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a maximum Butadiene content of 1% and a maximum Benzene content of 1%. Assumes a good basic standard of occupational hygiene is implemented [G1].
Contributing Scenarios	Risk Management Measures Note: list RMM standard phrases according to the control hierarchy indicated in the ECHA template: 1. Technical measures to prevent release, 2. Technical measures to prevent dispersion, 3. Organizational measures, 4. Personal protection. Phrases between brackets are good practice advice only.
General measures (carcinogens) [G18]	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimize exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance. Where there is potential for exposure: Restrict access to authorized persons; provide specific activity training to operators to minimize exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing



	<p>scenarios; clear up spills immediately and dispose of wastes safely.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance. [G20].</p>
Bulk transfers [CS14]. (closed systems) [CS107].	Handle substance within a closed system [E47].
Bulk transfers [CS14]. (closed systems) [CS107]. With occasional controlled exposure [CS140].	Handle substance within a closed system [E47]. Provide extract ventilation to points where emissions occur [E54]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40].
Material transfers [CS3].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Ensure material transfers are under containment or extract ventilation [E66]. Avoid carrying out operation for more than 4 hours [OC12].
Equipment maintenance [CS5].	Drain down system prior to equipment break-in or maintenance [E65]. Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Wear a respirator conforming to EN140 with Type A filter or better [PPE22].
Storage [CS67].	Store substance within a closed system [E84].
Storage [CS67]. With occasional controlled exposure [CS140].	Provide a good standard of general or controlled ventilation (10 to 15 air changes per hour) [E40]. Provide extract ventilation to points where emissions occur [E54]. Store substance within a closed system [E84].

Section 2.2	Control of environmental exposure
Substance is not classified – environmental exposure assessment not required	
Section 3	Exposure Estimation
3.1. Health	When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposure of workers and indirect human exposure via the environment is not expected to exceed the predicted DNELs and the resulting risk characterization ratios are expected to be less than 1.
3.2. Environment	Qualitative approach used to conclude safe use.[EE8]
Section 4	Guidance to check compliance with the Exposure Scenario
4.1. Health	Check that RMMs and OCs are as described or of equivalent efficiency.
4.2. Environment	No additional risk management measures required.[DSU7]



