

Danger



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

1.1. Product identifier

SDS no : SDS 01527

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

Relevant identified uses : Industrial and professional use for chemical analysis, calibration, (routine) quality control, laboratory use, under controlled conditions.

Uses advised against : Consumer use.

Uses other than those listed above are not supported, contact your supplier for more information on other uses.

1.3. Details of the supplier of the safety data sheet

Air Liquide UK Ltd.
Station Road
Coleshill
B46 1JY Birmingham
United Kingdom
safety.aluk@airliquide.com

1.4. Emergency telephone number

Emergency telephone number : 01675 462695 (Available 24/7)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Physical hazards	Gases under pressure : Compressed gas	H280
Health hazards	Acute toxicity (inhalation:gas) Category 4	H332
	Reproductive toxicity, Category 1A	H360

2.2. Label elements

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

Hazard pictograms (CLP) :



GHS04

GHS07

GHS08

Signal word (CLP) : Danger

Hazard statements (CLP) : H280 - Contains gas under pressure; may explode if heated.
H332 - Harmful if inhaled.
H360 - May damage fertility or the unborn child.

Precautionary statements (CLP)

- Prevention : P280 - Wear protective gloves, protective clothing, eye protection.
P202 - Do not handle until all safety precautions have been read and understood.
P260 - Do not breathe gas, vapours.

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

- Response : P308+P313 - IF exposed or concerned: Get medical advice/attention.
P304+P340+P315 - IF INHALED : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice / attention.
- Storage : P403 - Store in a well-ventilated place.
- Supplemental information : Restricted to professional users.

2.3. Other hazards

Not classified as PBT or vPvB.
The substance/mixture has no endocrine disrupting properties.

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP] ATE, EUH-statements, M-Factors
Nitrogen	CAS-No.: 7727-37-9 EC-No.: 231-783-9 EC Index-No.: --- REACH-no: *1	78.85	Press. Gas (Comp.), H280
Carbon dioxide	CAS-No.: 124-38-9 EC-No.: 204-696-9 EC Index-No.: --- REACH-no: *1	≤ 20	Press. Gas (Liq.), H280
Carbon monoxide	CAS-No.: 630-08-0 EC-No.: 211-128-3 EC Index-No.: 006-001-00-2 REACH-no: 01-2119480165-39	≤ 0.7	Flam. Gas 1B, H221 Press. Gas (Comp.), H280 Acute Tox. 3 (Inhalation:gas), H331 Repr. 1A, H360D STOT RE 1, H372
Nitric oxide	CAS-No.: 10102-43-9 EC-No.: 233-271-0 EC Index-No.: --- REACH-no: 01-2120766630-54	≤ 0.35	Ox. Gas 1, H270 Press. Gas (Comp.), H280 Skin Corr. 1B, H314 Eye Dam. 1, H318 Acute Tox. 1 (Inhalation:gas), H330
Propane	CAS-No.: 74-98-6 EC-No.: 200-827-9 EC Index-No.: 601-003-00-5 REACH-no: 01-2119486944-21	≤ 0.1	Flam. Gas 1A, H220 Press. Gas (Liq.), H280

Name	Product identifier	Specific concentration limits (%)
Nitric oxide	CAS-No.: 10102-43-9 EC-No.: 233-271-0 EC Index-No.: --- REACH registration No: 01-2120766630-54	(0.5 ≤ C ≤ 100) STOT SE 3, H335

Full text of H- and EUH-statements: see section 16

Contains no other components or impurities which will influence the classification of the product.

*1: Listed in Annex IV / V REACH, exempted from registration.

*3: Registration not required: Substance manufactured or imported < 1t/y.

SECTION 4: First aid measures

4.1. Description of first aid measures

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.
- Skin contact : Adverse effects not expected from this product.
- Eye contact : Adverse effects not expected from this product.
- Ingestion : Ingestion is not considered a potential route of exposure.

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

See section 11.

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

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media : Water spray or fog.
Product does not burn, use fire control measures appropriate for the surrounding fire.
- Unsuitable extinguishing media : Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

- Specific hazards : Exposure to fire may cause containers to rupture/explode.
- Hazardous combustion products : Carbon monoxide. Nitric oxide/nitrogen dioxide.

5.3. Advice for firefighters

- Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
If possible, stop flow of product.
Use water spray or fog to knock down fire fumes if possible.
Move containers away from the fire area if this can be done without risk.
- Special protective equipment for fire fighters : Wear gas tight chemically protective clothing in combination with self contained breathing apparatus.
Standard EN 943-2: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Gas-tight chemical protective suits for emergency teams.
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel : Act in accordance with local emergency plan.
Try to stop release.
Evacuate area.
Ensure adequate air ventilation.
Stay upwind.
See section 8 of the SDS for more information on personal protective equipment.
- For emergency responders : Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
See section 5.3 of the SDS for more information.

6.2. Environmental precautions

Try to stop release.

6.3. Methods and material for containment and cleaning up

Ventilate area.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Safe use of the product

: Do not breathe gas.
Avoid release of product into atmosphere.
The product must be handled in accordance with good industrial hygiene and safety procedures.
Only experienced and properly instructed persons should handle gases under pressure.
Consider pressure relief device(s) in gas installations.
Ensure the complete gas system was (or is regularly) checked for leaks before use.
Do not smoke while handling product.
Avoid exposure, obtain special instructions before use.
Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
Avoid suck back of water, acid and alkalis.

Safe handling of the gas receptacle

: Refer to supplier's container handling instructions.
Do not allow backfeed into the container.
Protect containers from physical damage; do not drag, roll, slide or drop.
When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.
Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.
If user experiences any difficulty operating valve discontinue use and contact supplier.
Never attempt to repair or modify container valves or safety relief devices.
Damaged valves should be reported immediately to the supplier.
Keep container valve outlets clean and free from contaminants particularly oil and water.
Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
Close container valve after each use and when empty, even if still connected to equipment.
Never attempt to transfer gases from one cylinder/container to another.
Never use direct flame or electrical heating devices to raise the pressure of a container.
Do not remove or deface labels provided by the supplier for the identification of the content of the container.
Suck back of water into the container must be prevented.
Open valve slowly to avoid pressure shock.

7.2. Conditions for safe storage, including any incompatibilities

Observe all regulations and local requirements regarding storage of containers.
Containers should not be stored in conditions likely to encourage corrosion.
Container valve guards or caps should be in place.
Containers should be stored in the vertical position and properly secured to prevent them from falling over.
Stored containers should be periodically checked for general condition and leakage.
Keep container below 50°C in a well ventilated place.
Store containers in location free from fire risk and away from sources of heat and ignition.
Keep away from combustible materials.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Carbon monoxide (630-08-0)	
EU - Binding Occupational Exposure Limit (BOEL)	
Local name	Carbon monoxide
BOEL TWA	23 mg/m ³
	20 ppm
BOEL STEL	117 mg/m ³
	100 ppm
Regulatory reference	DIRECTIVE (EU) 2022/431 (amending Directive 2004/37/EC)
Austria - Occupational Exposure Limits	
Local name	Kohlenstoffmonoxid (Kohlenoxid)
MAK (mg/m ³)	33 mg/m ³ (gilt für Arbeiten im Tunnel- und Untertagebau bis 21.8.2023) 23 mg/m ³
MAK (OEL TWA)	30 ppm (gilt für Arbeiten im Tunnel- und Untertagebau bis 21.8.2023) 20 ppm
MAK (OEL STEL)	66 mg/m ³ (4x 15(Miw) min) (gilt für Arbeiten im Tunnel- und Untertagebau bis 21.8.2023)
	66 mg/m ³ (4x 15(Miw) min)
	60 ppm (4x 15(Miw) min) (gilt für Arbeiten im Tunnel- und Untertagebau bis 21.8.2023) 60 ppm (4x 15(Miw) min)
Regulatory reference	BGBI. II Nr. 156/2021
Belgium - Occupational Exposure Limits	
Local name	Carbone (monoxyde de) # Koolstofmonoxide
OEL TWA	23 mg/m ³
	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Bulgaria - Occupational Exposure Limits	
Local name	Въглероден моноксид
OEL TWA	23 mg/m ³ За мините с подземен добив и прокарването на подземни тунели граничните стойности влизат в сила от 21 август 2023 г.
	20 ppm За мините с подземен добив и прокарването на подземни тунели граничните стойности влизат в сила от 21 август 2023 г.
OEL STEL	117 mg/m ³ За мините с подземен добив и прокарването на подземни тунели граничните стойности влизат в сила от 21 август 2023 г.
	100 ppm За мините с подземен добив и прокарването на подземни тунели граничните стойности влизат в сила от 21 август 2023 г.

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Remark	• (Химични агенти, за които са определени гранични стойности във въздуха на работната среда за Европейската общност)
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Bulgaria - Biological limit values	
Local name	Въглероден монооксид
BLV	5 % Биомаркер за експозиция/биомаркер за ефект: карбокси хемоглобин - Биологична среда: кръв - Време на пробовземане: В края на експозицията или в края на работната смяна - Специфични ефекти: Няма
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Croatia - Occupational Exposure Limits	
Local name	Ugljikov monoksid
GVI (OEL TWA)	35 mg/m ³ za djelatnosti podzemnog rudarenja i bušenja tunela, do 21. 8. 2023. 23 mg/m ³ 30 ppm za djelatnosti podzemnog rudarenja i bušenja tunela, do 21. 8. 2023. 20 ppm
KGVI (OEL STEL)	232 mg/m ³ za djelatnosti podzemnog rudarenja i bušenja tunela, do 21. 8. 2023. 117 mg/m ³ 200 ppm za djelatnosti podzemnog rudarenja i bušenja tunela, do 21. 8. 2023. 100 ppm
Remark	Direktiva: 2017/164/EU. Napomena: Repr 1A
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 1/2021)
Croatia - Biological limit values	
Local name	Ugljikov monoksid
BLV	0.05 Karakteristični pokazatelj: Karboksihemoglobin (COHb) - Biološki uzorak: krv - Vrijeme uzorkovanja: na kraju radne smjene - Napomena: pušenje značajno povisuje nalaz; interferencija endogenog CO 0.56 mol/l Karakteristični pokazatelj: ugljikov monoksid - Biološki uzorak: krv - Vrijeme uzorkovanja: na kraju radne smjene - Napomena: pušenje značajno povisuje nalaz; interferencija endogenog CO 12.5 ml/l Karakteristični pokazatelj: ugljikov monoksid - Biološki uzorak: krv - Vrijeme uzorkovanja: na kraju radne smjene - Napomena: pušenje značajno povisuje nalaz; interferencija endogenog CO 0.75 µmol/l Karakteristični pokazatelj: ugljikov monoksid - Biološki uzorak: krajnje izdahnuti zrak - Vrijeme uzorkovanja: na kraju radne smjene 18 ppm Karakteristični pokazatelj: ugljikov monoksid - Biološki uzorak: krajnje izdahnuti zrak - Vrijeme uzorkovanja: na kraju radne smjene
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 91/2018)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Cyprus - Occupational Exposure Limits	
Local name	Μονοξειδίο του άνθρακα
OEL TWA	23 mg/m ³
	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Regulatory reference	Κανονισμοί του 2019 (Κ.Δ.Π. 16/2019)
Czech Republic - Occupational Exposure Limits	
Local name	Oxid uhelnatý
PEL (OEL TWA)	23 mg/m ³ 30 mg/m ³
	19.8 ppm 25.8 ppm
NPK-P (OEL C)	117 mg/m ³ 150 mg/m ³
	100.5 ppm 128 ppm
Remark	B - u látky je zaveden biologický expoziční test (BET) v moči nebo krvi, P - u látky nelze vyloučit závažné pozdní účinky (s větou H372, H373), T - toxický pro reprodukci kategorie 1A a 1B (s větou H360 včetně příslušných kódů).
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
Czech Republic - Biological limit values	
Local name	Oxid uhelnatý
BLV	5 % of hemoglobin Ukazatel: Karbonylhemoglobin - Biologický vzorek: krvi - Doba odběru:
Regulatory reference	Vyhláška č. 107/2013 Sb. (kterou se mění vyhláška č. 432/2003 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Carbonmonoxid (Kulilte; Kulmonoxid)
OEL TWA	23 mg/m ³ 29 mg/m ³ I minedrift og tunnelbyggeri gælder frem til og med 21. august 2023 for Carbonmonoxid
	20 ppm 25 ppm I minedrift og tunnelbyggeri gælder frem til og med 21. august 2023 for Carbonmonoxid
OEL STEL	117 mg/m ³
	100 ppm
Remark	E (betyder, at stoffet har en EF-grænseværdi)
Regulatory reference	BEK nr 1054 af 28/06/2022
Estonia - Occupational Exposure Limits	
Local name	Süsinikmonooksiid
OEL TWA	23 mg/m ³

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Remark	R (Reproduktiivtoksiline aine), 9 (Lämmastikdioksiidil ja süsinikmonooksiidil on heitgaasides koos kantserogeensete ainetega eraldi määratud piirnormid. Bensini- ja vedelgaasimootorite heitgaaside indikaator on süsinikmonooksiid, diiselmootoritel lämmastikdioksiid. Nende puhul ei arvestata aditiivset efekti)
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 15.05.2021, 1)
Finland - Occupational Exposure Limits	
Local name	Hillimonoksidi
HTP (OEL TWA)	23 mg/m ³
	20 ppm
HTP (OEL STEL)	87 mg/m ³
	75 ppm
Remark	Melu
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveystministeriö)
France - Occupational Exposure Limits	
Local name	Monoxyde de carbone
VME (OEL TWA)	23 mg/m ³
	20 ppm
VLE (OEL C/STEL)	117 mg/m ³
	100 ppm
Remark	Valeurs réglementaires contraignantes
Regulatory reference	Article R4412-149 du Code du travail (réf.: INRS ED 984, 2016; Décret n° 2019-1487; Décret n° 2020-1546; Décret n° 2021-434; Décret n° 2021-1849)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Kohlenstoffmonoxid
AGW (OEL TWA)	35 mg/m ³
	30 ppm
Peak exposure limitation factor	2(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); Z - Ein Risiko der Fruchtschädigung kann auch bei Einhaltung des AGW und des BGW nicht ausgeschlossen werden; EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich)
Regulatory reference	TRGS900
Germany - Biological limit values (TRGS 903)	
Local name	Kohlenstoffmonoxid (Kohlenmonoxid)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Biological limit value	5 % Parameter: CO-Hb - Untersuchungsmaterial: B = Vollblut - Probenahmezeitpunkt: b) Expositionsende, bzw. Schichtende - Festlegung/Begründung: 05/2013 DFG
Remark	Ableitung des BGW als Höchstwert wegen akut toxischer Effekte. Gesonderte Bewertung für Raucher
Regulatory reference	TRGS 903
Gibraltar - Occupational Exposure Limits	
Local name	Carbon monoxide
OEL TWA	23 mg/m ³
	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Regulatory reference	Factories (Control of Chemical Agents at Work) Regulations 2003 (LN. 2018/181)
Greece - Occupational Exposure Limits	
Local name	Μονοξείδιο του άνθρακα
OEL TWA	23 mg/m ³
	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Regulatory reference	Π.Δ. 82/2018 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	SZÉN-MONOXID
AK (OEL TWA)	23 mg/m ³ 33 mg/m ³ A földalatti bányászat és az alagútás terén
CK (OEL STEL)	117 mg/m ³ 66 mg/m ³ A földalatti bányászat és az alagútás terén
Remark	BHM (biológiai hatásmutató); EU4 (2017/164 EU irányelvben közölt érték); R+T (Azok az anyagok, amelyek RÖVID és TARTÓS expozíciója is egészségkárosodást okoz)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Hungary - Biological Exposure Indices	
Local name	Szén-monoxid
BEI	5 % of hemoglobin Biológiai expozíciós (hatás) mutató: CO Hb - Biológiai minta: vérben - Mintavétel ideje: m.u. (műszak után)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	Carbon monoxide
OEL TWA	23 mg/m ³

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Remark	Repr.1A (Substances which are known human reproductive toxicants), IOELV (Indicative Occupational Exposure Limit Values)
Regulatory reference	Chemical Agents Code of Practice 2021
Ireland - Biological limit values	
Local name	Carbon monoxide
Ireland - BMGV	30 ppm Parameter: CO - Medium: end-exhaled air - Sampling time: End of Shift 3.5 % of hemoglobin Parameter: COHb - Medium: blood - Sampling time: End of Shift
Regulatory reference	Biological Monitoring Guidelines (HSA, 2011)
Italy - Occupational Exposure Limits	
Local name	Monossido di carbonio
OEL TWA	23 mg/m ³
	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Regulatory reference	Allegato XXXVIII del D.Lgs. 9 aprile 2008, n. 81 e s.m.i.
Latvia - Occupational Exposure Limits	
Local name	Oglekļa (II) oksīds (oglekļa monoksīds)
OEL TWA	20 mg/m ³
	17 ppm
OEL STEL	117 mg/m ³
	100 ppm
Remark	Ietekme uz dzirdi
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325 (Grozījumi Ministru kabineta 2018. gada 10. jūlijā noteikumiem Nr. 407)
Lithuania - Occupational Exposure Limits	
Local name	Anglies monoksidas
IPRV (OEL TWA)	23 mg/m ³
	20 ppm
TPRV (OEL STEL)	117 mg/m ³
	100 ppm
Remark	R (reprodukcijai toksiškas poveikis); Ū (ūmus poveikis)
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Luxembourg - Occupational Exposure Limits	
Local name	Monoxyde de carbone
OEL TWA	23 mg/m ³
	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Remark	Dans les mines souterraines et tunnels en percement cette valeur limite est applicable à partir du 22 août 2023
Regulatory reference	Mémorial A N° 226 de 2021 concernant la protection de la sécurité et de la santé des salariés contre les risques liés à des agents chimiques sur le lieu de travail
Malta - Occupational Exposure Limits	
Local name	Carbon monoxide
OEL TWA	23 mg/m ³
	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Regulatory reference	S.L.424.24 - Chemical Agents at Work Regulations (L.N.356 of 2021)
Netherlands - Occupational Exposure Limits	
Local name	Koolmonoxide
TGG-8u (OEL TWA)	23 mg/m ³
	20 ppm
TGG-15min (OEL STEL)	117 mg/m ³
	100 ppm
Regulatory reference	Arbeidsomstandighedenregeling 2023
Poland - Occupational Exposure Limits	
Local name	Tlenek węgla
NDS (OEL TWA)	23 mg/m ³
NDSch (OEL STEL)	117 mg/m ³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Monóxido de carbono
OEL TWA	25 ppm
Remark	IBE (Índice biológico de exposição)
Regulatory reference	Norma Portuguesa NP 1796:2014
Portugal - Biological Exposure Indices	
Local name	Monóxido de carbono

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

BEI	3.5 % of hemoglobin Parâmetro: Carboxihemoglobina - Meio: sangue - Momento da amostragem: Fim do turno - Notação: Vb (Valor basal), Ne (Não específico) 20 ppm Parâmetro: Monóxido de carbono - Meio: fração final do ar exalado - Momento da amostragem: Fim do turno - Notação: Vb (Valor basal), Ne (Não específico)
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Monoxid de carbon
OEL TWA	20 mg/m ³ Exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor 23 mg/m ³ 17.5 ppm Exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor 20 ppm
OEL STEL	30 mg/m ³ Exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor 117 mg/m ³ 26 ppm Exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor 100 ppm
Remark	R1A - poate dăuna fătului; poate dăuna fertilității. Începând cu data intrării în vigoare a prezentei hotărâri și până la 21 august 2023 se instituie o perioadă de tranziție în cazul exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
Romania - Biological limit values	
Local name	Monoxid de carbon
BLV	5 % of hemoglobin Indicador biologic: COHb (carboxihemoglobină) - Material biologic: sânge - Momentul recoltării: sfârșit de schimb
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 584/2018)
Serbia - Occupational Exposure Limits	
Local name	угљенмоноксид
OEL TWA	23 mg/m ³ 20 ppm
OEL STEL	117 mg/m ³ 100 ppm
Remark	ЕУ**** – напомена да се ради о хемијским материјама за које су утврђене индикативне граничне вредности изложености према Директиви 2017/164/ЕУ (четврта листа)
Regulatory reference	ПРАВИЛНИК о превентивним мерама за безбедан и здрав рад при излагању хемијским материјама („Службени гласник РС”, бр. 106/09, 117/17 и 107/21)
Slovakia - Occupational Exposure Limits	
Local name	Výfukové plyny ako CO

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

NPHV (OEL TWA)	25 mg/m ³ NPEL majú prechodné obdobie do 21. augusta 2023, ktoré sa týka expozície zamestnancov pri podzemnej ťažbe a razení tunelov 23 mg/m ³
	20 ppm NPEL majú prechodné obdobie do 21. augusta 2023, ktoré sa týka expozície zamestnancov pri podzemnej ťažbe a razení tunelov 20 ppm
NPHV (OEL STEL)	117 mg/m ³
	100 ppm
Remark	Osobitný limit je určený pre oxid uhoľnatý (CO) a oxid dusičitý (NO ₂), ktoré sa vyskytujú vo výfukových plynch, na hodnotenie kombinovaných účinkov vrátane karcinogénnych. Tieto chemické faktory potom slúžia ako indikátory expozície, pričom za akceptovateľnú expozíciu sa považuje dodržanie oboch limitov.
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
Slovakia - Biological limit values	
Local name	Oxid uhoľnatý
BLV	5 % Zisťovaný faktor: CO-Hb - Vyšetrovaný materiál: krv - Čas odberu vzorky: b) koniec expozície alebo pracovnej zmeny
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (Zmena: 471/2011 Z.z.)
Slovenia - Occupational Exposure Limits	
Local name	ogljikov monoksid
OEL TWA	23 mg/m ³
	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Remark	BAT (Biološka mejna vrednost), EU
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
Slovenia - Biological limit values	
Local name	ogljikov monoksid
BLV	5 % Parameter: CO-Hb - Biološki vzorec: kri - Čas vzorčenja: ob koncu delovne izmene
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
Spain - Occupational Exposure Limits	
Local name	Monóxido de carbono
VLA-ED (OEL TWA)	23 mg/m ³ 29 mg/m ³ Para este agente existe un periodo transitorio, que terminará, a más tardar, el 21 de agosto de 2023, para los sectores de la minería subterránea y la construcción de túneles.
	20 ppm 25 ppm Para este agente existe un periodo transitorio, que terminará, a más tardar, el 21 de agosto de 2023, para los sectores de la minería subterránea y la construcción de túneles.
VLA-EC (OEL STEL)	117 mg/m ³

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

	100 ppm
Remark	VLI (Agente químico para el que la U.E. estableció en su día un valor límite indicativo), TR1A (Cuando las pruebas utilizadas para la clasificación procedan principalmente de datos en humanos), VLB® (Agente químico que tiene Valor Límite Biológico), , r (Esta sustancia tiene establecidas restricciones a la fabricación, la comercialización o el uso en los términos especificados en el "Reglamento (CE) nº 1907/2006 sobre Registro, Evaluación, Autorización y Restricción de sustancias y preparados químicos" (REACH) de 18 de diciembre de 2006 (DOUE L 369 de 30 de diciembre de 2006). Las restricciones de una sustancia pueden aplicarse a todos los usos o sólo a usos concretos. El anexo XVII del Reglamento REACH contiene la lista de todas las sustancias restringidas y especifica los usos que se han restringido).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2023. INSHT
Spain - Biological limit values	
Local name	Monóxido de carbono
BLV	3.5 % of hemoglobin Parámetro: Carboxihemoglobina - Medio: Sangre - Momento de muestreo: Final de la jornada laboral - Notas: F (Fondo. El indicador está generalmente presente en cantidades detectables en personas no expuestas laboralmente. Estos niveles de fondo están considerados en el valor VLB), I (Significa que el indicador biológico es inespecífico puesto que puede encontrarse después de la exposición a otros agentes químicos) 20 ppm Parámetro: CO - Medio: Aire alveolar (fracción final del aire exhalado) - Momento de muestreo: Final de la jornada laboral - Notas: F (Fondo. El indicador está generalmente presente en cantidades detectables en personas no expuestas laboralmente. Estos niveles de fondo están considerados en el valor VLB), I (Significa que el indicador biológico es inespecífico puesto que puede encontrarse después de la exposición a otros agentes químicos)
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2023. INSHT
Sweden - Occupational Exposure Limits	
Local name	Kolmonoxid (Avgaser som kolmonoxid)
NGV (OEL TWA)	23 mg/m ³ 25 mg/m ³ När det gäller underjord- eller tunnelarbete
	20 ppm 20 ppm När det gäller underjord- eller tunnelarbete
KGV (OEL STEL)	117 mg/m ³ 117 mg/m ³ När det gäller underjord- eller tunnelarbete
	100 ppm 100 ppm När det gäller underjord- eller tunnelarbete
Remark	B (Ämnet kan orsaka hörselskada. Exponering för ämnet nära det befintliga yrkeshygieniska gränsvärdet och vid samtidig exponering för buller nära insatsvärdet 80 dB kan orsaka hörselskada); R (Ämnet är reproduktionsstörande. Med reproduktionsstörande ämnen avses ämnen som kan medföra skadliga effekter på fortplantningsförmågan eller avkommans utveckling); V (Vägledande kortidsgränsvärde ska användas som ett rekommenderat högsta värde som inte bör överskridas)
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

United Kingdom - Occupational Exposure Limits	
Local name	Carbon monoxide
WEL TWA (OEL TWA)	23 mg/m ³ 35 mg/m ³ Limits applicable to underground mining & tunnelling industries ONLY until 21/8/23
	20 ppm 30 ppm Limits applicable to underground mining & tunnelling industries ONLY until 21/8/23
WEL STEL (OEL STEL)	117 mg/m ³ 232 mg/m ³ Limits applicable to underground mining & tunnelling industries ONLY until 21/8/23
	100 ppm 200 ppm Limits applicable to underground mining & tunnelling industries ONLY until 21/8/23
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
United Kingdom - Biological limit values	
Local name	Carbon monoxide
BMGV	30 ppm Parameter: carbon monoxide - Medium: end-tidal breath - Sampling time: Post shift
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
Iceland - Occupational Exposure Limits	
Local name	Kolsýringur
OEL TWA	23 mg/m ³
	20 ppm
OEL STEL	117 mg/m ³
	100 ppm
Regulatory reference	Reglugerð um mengunarmörk og aðgerðir til að draga úr mengun á vinnustöðum (Nr. 1069/2018)
Norway - Occupational Exposure Limits	
Local name	Karbonmonoksid
Grenseverdi (OEL TWA)	23 mg/m ³ 29 mg/m ³ For bransjene gruvedrift under jord og tunnelvirksomhet gjelder følgende grenseverdi for karbonmonoksid frem til 21. august 2023
	20 ppm 25 ppm For bransjene gruvedrift under jord og tunnelvirksomhet gjelder følgende grenseverdi for karbonmonoksid frem til 21. august 2023
Kortidsverdi (OEL STEL)	117 mg/m ³
	100 ppm 100 ppm For bransjene gruvedrift under jord og tunnelvirksomhet gjelder følgende grenseverdi for karbonmonoksid frem til 21. august 2023

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Remark	R: Kjemikalier som skal betraktes som reproduksjonstoksiske; E: EU har en veiledende grenseverdi og/eller anmerkning for stoffet; 6) Enkelte bedrifter innen smelteverkindustrien vil av teknisk-økonomiske årsaker ikke kunne overholde denne korttidsverdien. Det er disse bedriftenes ansvar å dokumentere et forsvarlig arbeidsmiljø. Det skal utarbeides skriftlig instruks for arbeid i CO-atmosfære.
Regulatory reference	FOR-2021-06-28-2248
North Macedonia - Occupational Exposure Limits	
Local name	Јаглерод моноксид
OEL TWA	35 mg/m ³ 30 ppm
KTV	2
Short time value [mg/m ³]	70 mg/m ³
Short time value [ppm]	60 ppm
Remark	(KTV) краткотрајна вредност (КТВ) значи концентрација на опасни хемиски супстанци во воздухот на работното место внатре во зона на дишење, на која работникот без опасност по здравјето може да е изложен на покусо време. Изложеноста на краткотрајни вредности може да трае највеќе 15 минути и не смее да се повтори повеќе од четирипати во работната смена, при што меѓу две изложености на оваа концентрација мора да измине најмалку 60 минути. Краткотрајната вредност е изразена во mg/m ³ или во ml/m ³ (ppm) а е дадена како многукратни дозволени пречекорувања на граничната вредност; (BAT) биолошка гранична вредност – праг на биолошка гранична вредност, што значи предупредување на опасна хемиска супстанца и нејзини метаболити во ткивата, телесните течности или издишувањето на воздухот, без оглед на тоа, дали опасната хемиска супстанца е внесена во организмот со вдишување, голтање или преку кожата
Regulatory reference	Правилник за минималните барања за безбедност и здравје при работа на вработени од ризици поврзани со изложување на хемиски супстанци („Службен весник на Република Македонија” бр.46/10)
Switzerland - Occupational Exposure Limits	
Local name	Monoxyde de carbone / Kohlenmonoxid [Kohlenoxid, Kohlenstoffmonoxid]
MAK (OEL TWA)	35 mg/m ³ 30 ppm
KZGW (OEL STEL)	70 mg/m ³ 60 ppm
Critical toxicity	COHb / COHb
Notation	SS _B , O ^B , B / SS _B , O ^L , B
Remark	NIOSH
Regulatory reference	www.suva.ch, 01.01.2023
Switzerland - BAT	
Local name	Monoxyde de carbone / Kohlenmonoxid

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

BAT	5 % (Paramètre biologique: CO-hémoglobine; Substrat d'examen: Sang complet; Moment du prélèvement: Fin de l'exposition, de la période de travail.) / (Biologischer Parameter: CO-Hämoglobin; Untersuchungsmaterial: Vollblut; Probennahmezeitpunkt: Expositionsende, bzw. Schichtende.)
Remark	Effet toxique aigu. Paramètre non spécifique. Influence de l'environnement. / Akuttoxischer Effekt. Nicht spezifischer Parameter. Umwelteinflüsse.
Regulatory reference	Ordonnance 832.30 (OPA), article 50 al. 3, www.suva.ch/valeurs-limites / Verordnung 832.30 (VUV), Art. 50 Abs. 3, www.suva.ch/grenzwerte
USA - ACGIH - Occupational Exposure Limits	
Local name	Carbon monoxide
ACGIH OEL TWA	25 ppm
Remark (ACGIH)	TLV® Basis: COHb-emia. Notations: BEI
Regulatory reference	ACGIH 2023

Carbon dioxide (124-38-9)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Carbon dioxide
IOEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC
Albania - Occupational Exposure Limits	
Local name	Dioksid karboni
OEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	VENDIM Nr. 522, datë 6.8.2014 PËR MIRATIMIN E RREGULLORES "PËR MBROJTJEN E SIGURISË DHE SHËNDETIT TË PUNËMARRËSVE NGA RISQET E LIDHURA ME AGJENTËT KIMIKE NË PUNË"
Austria - Occupational Exposure Limits	
Local name	Kohlenstoffdioxid
MAK (mg/m ³)	9000 mg/m ³
MAK (OEL TWA)	5000 ppm
MAK (OEL STEL)	18000 mg/m ³ (3x 60(Mow) min)
	10000 ppm (3x 60(Mow) min)
Regulatory reference	BGBI. II Nr. 156/2021
Belgium - Occupational Exposure Limits	
Local name	Carbone (dioxyde de) # Koolstofdioxyde
OEL TWA	9131 mg/m ³
	5000 ppm
OEL STEL	54784 mg/m ³
	30000 ppm

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Remark	A: la mention "A" signifie que l'agent libère un gaz ou une vapeur qui n'ont en eux-mêmes aucun effet physiologique mais peuvent diminuer le taux d'oxygène dans l'air. Lorsque le taux d'oxygène descend en dessous de 17-18 % (vol/vol) le manque d'oxygène provoque des suffocations qu'aucun symptôme préalable n'annonce. # A: de vermelding "A" betekent dat dit agens gas of damp vrijgeeft dat of die op zich geen fysiologische werking heeft, maar het zuurstofgehalte in de lucht verlaagt. Wanneer het zuurstofgehalte daalt onder de 17-18 % (vol/vol), veroorzaakt het zuurstoftekort verstikking, die zich manifesteert zonder dat er een waarschuwing aan voorafgaat.
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Bulgaria - Occupational Exposure Limits	
Local name	Въглероден диоксид
OEL TWA	9000 mg/m ³ 5000 ppm
Remark	• (Химични агенти, за които са определени гранични стойности във въздуха на работната среда за Европейската общност)
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Croatia - Occupational Exposure Limits	
Local name	Ugljikov dioksid
GVI (OEL TWA)	9000 mg/m ³ 5000 ppm
Remark	Direktiva: 2006/15/EZ
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 1/2021)
Cyprus - Occupational Exposure Limits	
Local name	Διοξειδίο του άνθρακα
OEL TWA	9000 mg/m ³ 5000 ppm
Regulatory reference	Κανονισμοί του 2007 (Κ.Δ.Π. 295/2007)
Czech Republic - Occupational Exposure Limits	
Local name	Oxid uhličitý
PEL (OEL TWA)	9000 mg/m ³ 4923 ppm
NPK-P (OEL C)	45000 mg/m ³ 24615 ppm
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Carbondioxid (Kuldioxid; Kulsyre)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

OEL TWA	9000 mg/m ³
	5000 ppm
Remark	E (betyder, at stoffet har en EF-grænseværdi)
Regulatory reference	BEK nr 1054 af 28/06/2022
Estonia - Occupational Exposure Limits	
Local name	Süsinikdioksiid
OEL TWA	9000 mg/m ³
	5000 ppm
Remark	8 (Süsinikdioksiid on õhu saastatuse indikaatoriks töökohtadel, kus õhk saastub töötajate suure füüsilise aktiivsuse tõttu)
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 15.05.2021, 1)
Finland - Occupational Exposure Limits	
Local name	Hilidioksiidi
HTP (OEL TWA)	9100 mg/m ³
	5000 ppm
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveystministeriö)
France - Occupational Exposure Limits	
Local name	Carbone (dioxyde de)
VME (OEL TWA)	9000 mg/m ³
	5000 ppm
Remark	Valeurs réglementaires indicatives
Regulatory reference	Arrêté du 30 juin 2004 modifié (réf.: INRS ED 984, 2016)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Kohlenstoffdioxid
AGW (OEL TWA)	9100 mg/m ³
	5000 ppm
Peak exposure limitation factor	2(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich)
Regulatory reference	TRGS900
Gibraltar - Occupational Exposure Limits	
Local name	Carbon dioxide
OEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	Factories (Control of Chemical Agents at Work) Regulations 2003 (LN. 2018/181)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Greece - Occupational Exposure Limits	
Local name	Διοξείδιο του άνθρακα
OEL TWA	9000 mg/m ³
	5000 ppm
OEL STEL	54000 mg/m ³
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	SZÉN-DIOXID
AK (OEL TWA)	9000 mg/m ³
Remark	EU2 (2006/15/EK irányelvben közölt érték); N (Irritáló anyagok, egyszerű fojtógázok, csekély egészségkárosító hatással bíró anyagok)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	Carbon dioxide
OEL TWA	9000 mg/m ³
	5000 ppm
Remark	IOELV (Indicative Occupational Exposure Limit Values)
Regulatory reference	Chemical Agents Code of Practice 2021
Italy - Occupational Exposure Limits	
Local name	Anidride carbonica
OEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	Allegato XXXVIII del D.Lgs. 9 aprile 2008, n. 81 e s.m.i.
Latvia - Occupational Exposure Limits	
Local name	Oglekļa dioksīds
OEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325 (Grozījumi Ministru kabineta 2011. gada 1. februārī noteikumiem Nr. 92)
Lithuania - Occupational Exposure Limits	
Local name	Anglies dioksidas
IPRV (OEL TWA)	9000 mg/m ³
	5000 ppm
Remark	Anglies dioksidas dažnai laikomas kaip indikatorius darbo patalpose, kuriose oro teršalai susidaro dėl žmonių buvimo jose.
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Luxembourg - Occupational Exposure Limits	
Local name	Dioxyde de carbone
OEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	Mémorial A N° 226 de 2021 concernant la protection de la sécurité et de la santé des salariés contre les risques liés à des agents chimiques sur le lieu de travail
Malta - Occupational Exposure Limits	
Local name	Carbon dioxide
OEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	S.L.424.24 - Chemical Agents at Work Regulations (L.N.356 of 2021)
Netherlands - Occupational Exposure Limits	
Local name	Kooldioxide
TGG-8u (OEL TWA)	9000 mg/m ³
	5000 ppm
Regulatory reference	Arbeidsomstandighedenregeling 2023
Poland - Occupational Exposure Limits	
Local name	Ditlenek węgla
NDS (OEL TWA)	9000 mg/m ³
NDSch (OEL STEL)	27000 mg/m ³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Dióxido de carbono
OEL TWA	5000 ppm
OEL STEL	30000 ppm
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Dioxid de carbon
OEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
Serbia - Occupational Exposure Limits	
Local name	угљен-диоксид
OEL TWA	9000 mg/m ³
	5000 ppm

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Remark	ЕУ** – напомена да се ради о хемијским материјама за које су утврђене индикативне граничне вредности изложености према Директиви 2006/15/ЕЗ (друга листа)
Regulatory reference	ПРАВИЛНИК о превентивним мерама за безбедан и здрав рад при излагању хемијским материјама („Службени гласник РС”, бр. 106/09, 117/17 и 107/21)
Slovakia - Occupational Exposure Limits	
Local name	Oxid uhľičitý
NPHV (OEL TWA)	9000 mg/m³
	5000 ppm
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	ogljikov dioksid
OEL TWA	9000 mg/m³
	5000 ppm
OEL STEL	18000 mg/m³
	10000 ppm
Remark	EU
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
Spain - Occupational Exposure Limits	
Local name	Dióxido de carbono
VLA-ED (OEL TWA)	9150 mg/m³
	5000 ppm
Remark	VLI (Agente químico para el que la U.E. estableció en su día un valor límite indicativo).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2023. INSHT
Sweden - Occupational Exposure Limits	
Local name	Koldioxid
NGV (OEL TWA)	9000 mg/m³
	5000 ppm
KGV (OEL STEL)	18000 mg/m³
	10000 ppm
Remark	V (Vägledande korttidsgränsvärde ska användas som ett rekommenderat högsta värde som inte bör överskridas); 34 (Koldioxid används ofta som indikatorsubstans i arbetslokaler där luftföroreningar huvudsakligen uppkommer genom de personer som vistas där)
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
United Kingdom - Occupational Exposure Limits	
Local name	Carbon dioxide
WEL TWA (OEL TWA)	9150 mg/m³

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

	5000 ppm
WEL STEL (OEL STEL)	27400 mg/m ³
	15000 ppm
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
Iceland - Occupational Exposure Limits	
Local name	Koldíoxíð (koltvísýringur, kolsýra)
OEL TWA	9000 mg/m ³
	5000 ppm
Regulatory reference	Reglugerð um mengunarmörk og aðgerðir til að draga úr mengun á vinnustöðum (Nr. 390/2009)
Norway - Occupational Exposure Limits	
Local name	Karbondioksid
Grenseverdi (OEL TWA)	9000 mg/m ³
	5000 ppm
Remark	E: EU har en veiledende grenseverdi og/eller anmerkning for stoffet.
Regulatory reference	FOR-2021-06-28-2248
North Macedonia - Occupational Exposure Limits	
Local name	Јаглерод диоксид
OEL TWA	9000 mg/m ³
	5000 ppm
Remark	(EU) European Union – гранична вредност, определена на ниво на Европската унија
Regulatory reference	Правилник за минималните барања за безбедност и здравје при работа на вработени од ризици поврзани со изложување на хемиски супстанции („Службен весник на Република Македонија“ бр.46/10)
Switzerland - Occupational Exposure Limits	
Local name	Gaz carbonique / Kohlendioxid [Kohlenstoffdioxid]
MAK (OEL TWA)	9000 mg/m ³
	5000 ppm
Critical toxicity	Asphyxie / Asphyxie
Remark	NIOSH
Regulatory reference	www.suva.ch, 01.01.2023
USA - ACGIH - Occupational Exposure Limits	
Local name	Carbon dioxide
ACGIH OEL TWA	5000 ppm
ACGIH OEL STEL	30000 ppm
Remark (ACGIH)	TLV® Basis: Asphyxia
Regulatory reference	ACGIH 2023

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Nitric oxide (10102-43-9)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Nitrogen monoxide
IOEL TWA	2.5 mg/m ³
	2 ppm
Regulatory reference	COMMISSION DIRECTIVE (EU) 2017/164
Albania - Occupational Exposure Limits	
Local name	Monoksid azoti
OEL TWA	30 mg/m ³
	25 ppm
Regulatory reference	VENDIM Nr. 522, datë 6.8.2014 PËR MIRATIMIN E RREGULLORES "PËR MBROJTJEN E SIGURISË DHE SHËNDETIT TË PUNËMARRËSVE NGA RISQET E LIDHURA ME AGJENTËT KIMIKË NË PUNË"
Austria - Occupational Exposure Limits	
Local name	Stickstoffmonoxid
MAK (mg/m ³)	30 mg/m ³ (gilt für Arbeiten im Tunnel- und Untertagebau bis 21.8.2023) 2.5 mg/m ³
MAK (OEL TWA)	25 ppm (gilt für Arbeiten im Tunnel- und Untertagebau bis 21.8.2023) 2 ppm
Regulatory reference	BGBI. II Nr. 156/2021
Belgium - Occupational Exposure Limits	
Local name	Azote (monoxyde d') # Stikstofmonoxide
OEL TWA	2.5 mg/m ³
	2 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Bulgaria - Occupational Exposure Limits	
Local name	Азотен моноксид
OEL TWA	2.5 mg/m ³ За мините с подземен добив и прокарването на подземни тунели граничните стойности влизат в сила от 21 август 2023 г.
	2 ppm За мините с подземен добив и прокарването на подземни тунели граничните стойности влизат в сила от 21 август 2023 г.
Remark	• (Химични агенти, за които са определени гранични стойности във въздуха на работната среда за Европейската общност)
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Croatia - Occupational Exposure Limits	
Local name	Dušikov monoksid
GVI (OEL TWA)	30 mg/m ³ za djelatnosti podzemnog rudarenja i bušenja tunela, do 21. 8. 2023. 2.5 mg/m ³

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

	25 ppm za djelatnosti podzemnog rudarenja i bušenja tunela, do 21. 8. 2023. 2 ppm
Remark	Direktiva: 2017/164/EU
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 1/2021)
Cyprus - Occupational Exposure Limits	
Local name	Μονοξειδίο του αζώτου
OEL STEL	2.5 mg/m ³ 2 ppm
Regulatory reference	Κανονισμοί του 2019 (Κ.Δ.Π. 16/2019)
Czech Republic - Occupational Exposure Limits	
Local name	Oxid dusnatý
PEL (OEL TWA)	2.5 mg/m ³ 2 ppm
NPK-P (OEL C)	5 mg/m ³ 4 ppm
Remark	I - dráždí sliznice (oči, dýchací cesty), respektive kůže.
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Nitrogenoxid (Nitrose gasser)
OEL TWA	2.5 mg/m ³ 30 mg/m ³ I minedrift og tunnelbyggeri gælder frem til og med 21. august 2023 for Nitrogenoxid 2 ppm 25 ppm I minedrift og tunnelbyggeri gælder frem til og med 21. august 2023 for Nitrogenoxid
Remark	E (betyder, at stoffet har en EF-grænseværdi)
Regulatory reference	BEK nr 1054 af 28/06/2022
Estonia - Occupational Exposure Limits	
Local name	Lämmastikmonooksiid
OEL TWA	2.5 mg/m ³ 30 mg/m ³ Allmaakaevandustes (Kehtiv kuni 21.08.2023) 25 ppm Allmaakaevandustes (Kehtiv kuni 21.08.2023) 2 ppm
OEL STEL	60 mg/m ³ Allmaakaevandustes (Kehtiv kuni 21.08.2023) 50 ppm Allmaakaevandustes (Kehtiv kuni 21.08.2023)
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 15.05.2021, 1)
Finland - Occupational Exposure Limits	
Local name	Typpioksiidi

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

HTP (OEL TWA)	12.5 mg/m ³ Poikkeus koskien maanalaista kaivos- ja tunnelityötä 2.5 mg/m ³
	10 ppm Poikkeus koskien maanalaista kaivos- ja tunnelityötä 2 ppm
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
France - Occupational Exposure Limits	
Local name	Monoxyde d'azote
VME (OEL TWA)	2.5 mg/m ³
	2 ppm
Remark	Valeurs réglementaires contraignantes
Regulatory reference	Article R4412-149 du Code du travail (réf.: INRS ED 984, 2016; Décret n° 2019-1487; Décret n° 2020-1546; Décret n° 2021-434; Décret n° 2021-1849)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Stickstoffmonoxid
AGW (OEL TWA)	2.5 mg/m ³
	2 ppm
Peak exposure limitation factor	2(II)
Remark	EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich); AGS - Ausschuss für Gefahrstoffe; 22b - Für den Bereich Bergbau gilt bis 21. August 2023 ein Wert in Höhe von 30 mg/m ³ bzw. 25 ppm
Regulatory reference	TRGS900
Gibraltar - Occupational Exposure Limits	
Local name	Nitrogen monoxide
OEL TWA	30 mg/m ³
	25 ppm
Regulatory reference	Factories (Control of Chemical Agents at Work) Regulations 2003 (LN. 2018/181)
Greece - Occupational Exposure Limits	
Local name	Μονοξείδιο του αζώτου
OEL TWA	2.5 mg/m ³
	2 ppm
Regulatory reference	Π.Δ. 82/2018 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	NITROGÉN-MONOXID
AK (OEL TWA)	2.5 mg/m ³
	30 mg/m ³ A földalatti bányászat és az alagútás terén
Remark	EU4 (2017/164 EU irányelvben közölt érték, EU91 (91/322/EGK irányelvben közölt érték); R (Azok az anyagok, amelyek egészségkárosító hatása RÖVID expozíció hatására jelentkezik)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	Nitric oxide [Nitrogen monoxide]
OEL TWA	30 mg/m ³ apply to underground mining and tunnelling sector only until 21st August 2023 2.5 mg/m ³ 25 ppm apply to underground mining and tunnelling sector only until 21st August 2023 2 ppm
OEL STEL	45 mg/m ³ apply to underground mining and tunnelling sector only until 21st August 2023 35 ppm apply to underground mining and tunnelling sector only until 21st August 2023
Remark	IOELV (Indicative Occupational Exposure Limit Values)
Regulatory reference	Chemical Agents Code of Practice 2021
Italy - Occupational Exposure Limits	
Local name	Monossido di azoto
OEL TWA	2.5 mg/m ³
OEL STEL	2 mg/m ³
Regulatory reference	Allegato XXXVIII del D.Lgs. 9 aprile 2008, n. 81 e s.m.i.
Latvia - Occupational Exposure Limits	
Local name	Slāpekļa monoksīds
OEL TWA	2.5 mg/m ³ 2 ppm
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumi Nr. 325 (Grozījumi Ministru kabineta 2011. gada 1. februārī noteikumi Nr. 92)
Lithuania - Occupational Exposure Limits	
Local name	Azoto monoksidas
IPRV (OEL TWA)	2.5 mg/m ³ 2 ppm
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Luxembourg - Occupational Exposure Limits	
Local name	Monoxyde d'azote
OEL TWA	2.5 mg/m ³ 2 ppm
Remark	Dans les mines souterraines et tunnels en percement cette valeur limite est applicable à partir du 22 août 2023
Regulatory reference	Mémorial A N° 226 de 2021 concernant la protection de la sécurité et de la santé des salariés contre les risques liés à des agents chimiques sur le lieu de travail

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Malta - Occupational Exposure Limits	
Local name	Nitrogen monoxide
OEL TWA	2.5 mg/m ³
	2 ppm
Regulatory reference	S.L.424.24 - Chemical Agents at Work Regulations (L.N.356 of 2021)
Netherlands - Occupational Exposure Limits	
Local name	Stikstofmonoxide
TGG-8u (OEL TWA)	2.5 mg/m ³
	2 ppm
Regulatory reference	Arbeidsomstandighedenregeling 2023
Poland - Occupational Exposure Limits	
Local name	Tlenek azotu
NDS (OEL TWA)	2.5 mg/m ³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Óxido nítrico
OEL TWA	25 ppm
Remark	IBEM (Índice biológico de exposição)
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Monoxid de azot
OEL TWA	30 mg/m ³ Exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor
	2.5 mg/m ³
	24 ppm Exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor
Remark	2 ppm
	Începând cu data intrării în vigoare a prezentei hotărâri și până la 21 august 2023 se instituie o perioadă de tranziție în cazul exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
Serbia - Occupational Exposure Limits	
Local name	азот моноксид
OEL TWA	3 mg/m ³
	2 ppm
Remark	ЕУ**** – напомена да се ради о хемијским материјама за које су утврђене индикативне граничне вредности изложености према Директиви 2017/164/ЕУ (четврта листа)
Regulatory reference	ПРАВИЛНИК о превентивним мерама за безбедан и здрав рад при излагању хемијским материјама („Службени гласник РС”, бр. 106/09, 117/17 и 107/21)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Slovakia - Occupational Exposure Limits	
Local name	Oxid dusnatý (NO)
NPHV (OEL TWA)	30 mg/m ³ NPEL majú prechodné obdobie do 21. augusta 2023, ktoré sa týka expozície zamestnancov pri podzemnej ťažbe a razení tunelov 2.5 mg/m ³
	25 ppm NPEL majú prechodné obdobie do 21. augusta 2023, ktoré sa týka expozície zamestnancov pri podzemnej ťažbe a razení tunelov 2 ppm
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	dušikov monoksid
OEL TWA	2.5 mg/m ³
	2 ppm
OEL STEL	5 mg/m ³
	4 ppm
Remark	EU
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
Spain - Occupational Exposure Limits	
Local name	Monóxido de nitrógeno
VLA-ED (OEL TWA)	2.5 mg/m ³ 31 mg/m ³ Para este agente existe un periodo transitorio, que terminará, a más tardar, el 21 de agosto de 2023, para los sectores de la minería subterránea y la construcción de túneles.
	2 ppm 25 ppm Para este agente existe un periodo transitorio, que terminará, a más tardar, el 21 de agosto de 2023, para los sectores de la minería subterránea y la construcción de túneles.
Remark	VLI (Agente químico para el que la U.E. estableció en su día un valor límite indicativo).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2023. INSHT
Sweden - Occupational Exposure Limits	
Local name	Kvävemonoxid
NGV (OEL TWA)	2.5 mg/m ³ 30 mg/m ³ När det gäller underjord- eller tunnelarbete
	2 ppm 25 ppm När det gäller underjord- eller tunnelarbete
KGV (OEL STEL)	60 mg/m ³ När det gäller underjord- eller tunnelarbete
	50 ppm När det gäller underjord- eller tunnelarbete
Remark	V (Vägledande korttidsgränsvärde ska användas som ett rekommenderat högsta värde som inte bör överskridas)
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

United Kingdom - Occupational Exposure Limits	
Local name	Nitrogen monoxide
WEL TWA (OEL TWA)	2.5 mg/m ³ 30 mg/m ³ Limit applicable to underground mining & tunnelling industries ONLY until 21/8/23
	2 ppm 25 ppm Limit applicable to underground mining & tunnelling industries ONLY until 21/8/23
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
Iceland - Occupational Exposure Limits	
Local name	Köfnunarefniseinoxíð
OEL TWA	2.5 mg/m ³
	2 ppm
Regulatory reference	Reglugerð um mengunarmörk og aðgerðir til að draga úr mengun á vinnustöðum (Nr. 1069/2018)
Norway - Occupational Exposure Limits	
Local name	Nitrogenmonoksid (Nitrogenoksid)
Grenseverdi (OEL TWA)	2.5 mg/m ³ 30 mg/m ³ For bransjene gruvedrift under jord og tunnel-virksomhet gjelder følgende grenseverdi for nitrogenmonoksid frem til 21. august 2023
	2 ppm 25 ppm For bransjene gruvedrift under jord og tunnel-virksomhet gjelder følgende grenseverdi for nitrogenmonoksid frem til 21. august 2023
Remark	E: EU har en veiledende grenseverdi og/eller anmerkning for stoffet; 14) Enkelte bedrifter vil av teknisk-økonomiske årsaker ikke kunne overholde grenseverdiene. Det er disse bedriftenes ansvar å dokumentere et forsvarlig arbeidsmiljø. Det forutsettes at bedriften(e) har en plan for reduksjon av eksponering og at man kan vise lavere verdier over tid. Arbeidstilsynet, ansattrepresentanter og verneombud skal konsulteres og informeres om årlige planer og oppnådde resultater.
Regulatory reference	FOR-2021-06-28-2248
North Macedonia - Occupational Exposure Limits	
Local name	азотен моноксид
OEL TWA	30 mg/m ³
	25 ppm
Remark	(EU) European Union – гранична вредност, определена на ниво на Европската унија
Regulatory reference	Правилник за минималните барања за безбедност и здравје при работа на вработени од ризици поврзани со изложување на хемиски супстанции („Службен весник на Република Македонија” бр.46/10)
Switzerland - Occupational Exposure Limits	
Local name	Monoxyde d'azote / Stickstoffmonoxid
MAK (OEL TWA)	6 mg/m ³
	5 ppm

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Critical toxicity	Poumons / Lunge
Notation	P / P
Remark	NIOSH, DFG
Regulatory reference	www.suva.ch, 01.01.2023
USA - ACGIH - Occupational Exposure Limits	
Local name	Nitric oxide
ACGIH OEL TWA	25 ppm
Remark (ACGIH)	TLV® Basis: Hypoxia/cyanosis; nitrosyl-Hb form; URT irr. Notations: BEIM
Regulatory reference	ACGIH 2023

Propane (74-98-6)	
Austria - Occupational Exposure Limits	
Local name	Propan (R 290)
MAK (mg/m³)	1800 mg/m³
MAK (OEL TWA)	1000 ppm
MAK (OEL STEL)	3600 mg/m³ (3x 60(Mow) min)
	2000 ppm (3x 60(Mow) min)
Regulatory reference	BGBI. II Nr. 156/2021
Belgium - Occupational Exposure Limits	
Local name	Hydrocarbures aliphatiques sous forme gazeuse: (Alcanes C1-C3) # Alifatische koolwaterstoffen in gas-vorm: Alkanen (C1-C3)
OEL TWA	1000 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Bulgaria - Occupational Exposure Limits	
Local name	Пропан
OEL TWA	1800 mg/m³
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Denmark - Occupational Exposure Limits	
Local name	Propan (Flaskegas)
OEL TWA	1800 mg/m³
	1000 ppm
Regulatory reference	BEK nr 1054 af 28/06/2022
Estonia - Occupational Exposure Limits	
Local name	Propaan
OEL TWA	1800 mg/m³
	1000 ppm

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 15.05.2021, 1)
Finland - Occupational Exposure Limits	
Local name	Propaani
HTP (OEL TWA)	1500 mg/m ³
	800 ppm
HTP (OEL STEL)	2000 mg/m ³
	1100 ppm
Remark	Happea syrjäyttämällä tukahduttavat kaasut.
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Propan
AGW (OEL TWA)	1800 mg/m ³
	1000 ppm
Peak exposure limitation factor	4(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission)
Regulatory reference	TRGS900
Greece - Occupational Exposure Limits	
Local name	Προπάνιο
OEL TWA	1800 mg/m ³
	1000 ppm
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Ireland - Occupational Exposure Limits	
Local name	Aliphatic hydrocarbon gases Alkanes (C1-C3): Propane
Remark	Asphx. (Gaseous chemical substances which may not produce significant physiological effects in the exposed employee, but when present in high concentrations will act as simple asphyxiants)
Regulatory reference	Chemical Agents Code of Practice 2021
Latvia - Occupational Exposure Limits	
Local name	Propāns
OEL TWA	1800 mg/m ³
	1000 ppm
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325 (Grozījumi Ministru kabineta 2015. gada 7. aprīlī noteikumiem Nr. 163)
Poland - Occupational Exposure Limits	
Local name	Propan
NDS (OEL TWA)	1800 mg/m ³
Regulatory reference	Dz. U. 2018 poz. 1286

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Romania - Occupational Exposure Limits	
Local name	Propan
OEL TWA	1400 mg/m ³
	778 ppm
OEL STEL	1800 mg/m ³
	1000 ppm
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
Slovenia - Occupational Exposure Limits	
Local name	propan
OEL TWA	1800 mg/m ³
	1000 ppm
OEL STEL	7200 mg/m ³
	4000 ppm
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
Spain - Occupational Exposure Limits	
Local name	Propano
VLA-ED (OEL TWA)	1000 ppm Hidrocarburos alifáticos alcanos (C1 – C4) y sus mezclas, gases (Butano; Etano; Metano; Propano)
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2023. INSHT
Iceland - Occupational Exposure Limits	
Local name	Própan (flöskugas)
OEL TWA	1800 mg/m ³
	1000 ppm
Regulatory reference	Reglugerð um mengunarmörk og aðgerðir til að draga úr mengun á vinnustöðum (Nr. 390/2009)
Norway - Occupational Exposure Limits	
Local name	Propan
Grenseverdi (OEL TWA)	900 mg/m ³
	500 ppm
Regulatory reference	FOR-2021-06-28-2248
North Macedonia - Occupational Exposure Limits	
Local name	Пропан
OEL TWA	1800 mg/m ³
	1000 ppm
KTV	4
Short time value [mg/m ³]	7200 mg/m ³
Short time value [ppm]	4000 ppm

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

Remark	(КТВ) краткотрајна вредност (КТВ) значи концентрација на опасни хемиски супстанции во воздухот на работното место внатре во зона на дишење, на која работникот без опасност по здравјето може да е изложен на покусно време. Изложеноста на краткотрајни вредности може да трае највеќе 15 минути и не смее да се повтори повеќе од четирипати во работната смена, при што меѓу две изложености на оваа концентрација мора да измине најмалку 60 минути. Краткотрајната вредност е изразена во mg/m ³ или во ml/m ³ (ppm) а е дадена како многукратни дозволени пречекорувања на граничната вредност
Regulatory reference	Правилник за минималните барања за безбедност и здравје при работа на вработени од ризици поврзани со изложување на хемиски супстанции („Службен весник на Република Македонија“ бр.46/10)
Switzerland - Occupational Exposure Limits	
Local name	Propane / Propan
MAK (OEL TWA)	1800 mg/m ³
	1000 ppm
KZGW (OEL STEL)	7200 mg/m ³
	4000 ppm
Critical toxicity	Formel / Formal
Remark	NIOSH
Regulatory reference	www.suva.ch, 01.01.2023
USA - ACGIH - Occupational Exposure Limits	
Local name	Propane
Remark (ACGIH)	TLV® Basis: Simple Asphyxiant
Regulatory reference	ACGIH 2023

Carbon monoxide (630-08-0)	
DNEL: Derived no effect level (Workers)	
Acute - local effects, inhalation	117 ppm
Acute - systemic effects, inhalation	117 mg/m ³
Long-term - local effects, inhalation	23 ppm
Long-term - systemic effects, inhalation	23 mg/m ³

PNEC (Predicted No-Effect Concentration) : None established.

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Product to be handled in a closed system and under strictly controlled conditions.
Provide adequate general and local exhaust ventilation.
Preferably use permanent leak-tight installations (e.g. welded pipes).
Systems under pressure should be regularly checked for leakages.
Ensure exposure is below occupational exposure limits (where available).
Gas detectors should be used when toxic gases may be released.
Consider the use of a work permit system e.g. for maintenance activities.

8.2.2. Individual protection measures, e.g. personal protective equipment

- A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered:
PPE compliant to the recommended EN/ISO standards should be selected.
- Eye/face protection : Wear safety glasses with side shields.
Standard EN 166 - Personal eye-protection - specifications.
 - Skin protection : Wear working gloves when handling gas containers.
Standard EN 388 - Protective gloves against mechanical risks, performance level 1 or higher.
 - Hand protection : Wear safety shoes while handling containers.
Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
 - Other : Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
Consult respiratory device supplier's product information for the selection of the appropriate device.
When indicated by a risk assessment, Respiratory Protective Equipment must be used. The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD.
Keep self contained breathing apparatus readily available for emergency use.
Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.
 - Respiratory protection : None in addition to the above sections.
 - Thermal hazards

8.2.3. Environmental exposure controls

Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

- Appearance
- Physical state at 20°C / 101.3kPa : Gas.
 - Colour : Mixture contains one or more component(s) which have the following colour(s):
Colourless Brownish gas.
- Odour : Odour threshold is subjective and inadequate to warn of overexposure.
Mixture contains one or more component(s) which have the following odour:
Pungent. Stenchant often added. Sweetish.
- Melting point / Freezing point : Not applicable for gases and gas mixtures.
- Boiling point : Not applicable for gas mixtures.
It is technically not possible to determine the boiling point or range of this mixture.
Component with lowest boiling point: Nitrogen -196 °C
- Flammability : Non flammable.
- Lower explosion limit : Not available
- Upper explosion limit : Not available
- Flash point : Not applicable for gases and gas mixtures.
- Auto-ignition temperature : Non flammable.
- Decomposition temperature : Not applicable.
- pH : Not applicable for gases and gas mixtures.
- Viscosity, kinematic : Not applicable for gases and gas mixtures.
- Water solubility [20°C] : Mixture is partially soluble in water
- Partition coefficient n-octanol/water (Log Kow) : Not available
- Vapour pressure [20°C] : Not applicable.
- Vapour pressure [50°C] : Not applicable.
- Density and/or relative density : Not applicable.
- Relative vapour density (air=1) : Lighter or similar to air.
- Particle characteristics : Not applicable for gases and gas mixtures.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Explosion limits : Non flammable.
Oxidising properties : No oxidising properties.

9.2.2. Other safety characteristics

Other data : None.

SECTION 10: Stability and reactivity

10.1. Reactivity

Data for mixtures are not available.
This mixture contains components with the following reactivity : Can form explosive mixture with air. May react violently with oxidants. Violently oxidises organic material.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

None.

10.4. Conditions to avoid

Avoid moisture in installation systems.

10.5. Incompatible materials

For additional information on compatibility refer to ISO 11114.

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 hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity : Harmful if inhaled.

Carbon monoxide (630-08-0)	
LC50 Inhalation - Rat [ppm]	3760 ppm/1h (ADR) 1300 ppm/4h (CLP)
Nitric oxide (10102-43-9)	
LC50 Inhalation - Rat [ppm]	57.5 ppm/4h
Propane (74-98-6)	
LC50 Inhalation - Rat [ppm]	20000 ppm/4h

Skin corrosion/irritation : Classification criteria are not met.
Serious eye damage/irritation : Classification criteria are not met.
Respiratory or skin sensitisation : No known effects from this product.
Germ cell mutagenicity : No known effects from this product.
Carcinogenicity : No known effects from this product.
Toxic for reproduction : Fertility : May damage fertility.
Toxic for reproduction : unborn child : May damage the unborn child.

STOT-single exposure : No known effects from this product.
STOT-repeated exposure : Classification criteria are not met.
Aspiration hazard : Not applicable for gases and gas mixtures.

11.2. Information on other hazards

Other information : The substance/mixture has no endocrine disrupting properties.

SECTION 12: Ecological information

12.1. Toxicity

Assessment : Classification criteria are not met.
EC50 48h - Daphnia magna [mg/l] : No data available.
EC50 72h - Algae [mg/l] : No data available.
LC50 96 h - Fish [mg/l] : No data available.

Nitrogen (7727-37-9)

EC50 48h - Daphnia magna [mg/l]	No data available.
EC50 72h - Algae [mg/l]	No data available.
LC50 96 h - Fish [mg/l]	No data available.

Carbon monoxide (630-08-0)

EC50 48h - Daphnia magna [mg/l]	No data available.
EC50 72h - Algae [mg/l]	No data available.
LC50 96 h - Fish [mg/l]	No data available.

Carbon dioxide (124-38-9)

EC50 48h - Daphnia magna [mg/l]	No data available.
EC50 72h - Algae [mg/l]	No data available.
LC50 96 h - Fish [mg/l]	No data available.

Nitric oxide (10102-43-9)

EC50 48h - Daphnia magna [mg/l]	No data available.
EC50 72h - Algae [mg/l]	No data available.
LC50 96 h - Fish [mg/l]	No data available.

Propane (74-98-6)

EC50 48h - Daphnia magna [mg/l]	27.1 mg/l
EC50 72h - Algae [mg/l]	11.9 mg/l
LC50 96 h - Fish [mg/l]	49.9 mg/l

12.2. Persistence and degradability

Assessment : No data available.

12.3. Bioaccumulative potential

Assessment : No data available.

12.4. Mobility in soil

Assessment : Because of its high volatility, the product is unlikely to cause ground or water pollution.
Partition into soil is unlikely.

12.5. Results of PBT and vPvB assessment

Assessment : Not classified as PBT or vPvB.

12.6. Endocrine disrupting properties

Assessment : The substance/mixture has no endocrine disrupting properties.

12.7. Other adverse effects

Other adverse effects : No known effects from this product.
Effect on the ozone layer : No effect on the ozone layer.
Effect on global warming : Contains greenhouse gas(es).

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Contact supplier if guidance is required.
Must not be discharged to atmosphere.
Ensure that the emission levels from local regulations or operating permits are not exceeded.
Refer to the EIGA code of practice Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org> for more guidance on suitable disposal methods.
Return unused product in original container to supplier.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended) : 16 05 04 *: Gases in pressure containers (including halons) containing hazardous substances.

13.2. Additional information

External treatment and disposal of waste should comply with applicable local and/or national regulations.

SECTION 14: Transport information

14.1. UN number or ID number

In accordance with ADR / RID / IMDG / IATA / ADN
UN-No. : 1956

14.2. UN proper shipping name

Transport by road/rail/inland waterways (ADR/RID/ADN) : COMPRESSED GAS, N.O.S. (Nitrogen, Nitric oxide)

Transport by air (ICAO-TI / IATA-DGR) : Compressed gas, n.o.s. (Nitrogen, Nitric oxide)

Transport by sea (IMDG) : COMPRESSED GAS, N.O.S. (Nitrogen, Nitric oxide)

14.3. Transport hazard class(es)

Labelling



2.2 : Non-flammable, non-toxic gases.

Transport by road/rail/inland waterways (ADR/RID/ADN)

Class : 2

Classification code : 1A
Hazard identification number : 20
Tunnel Restriction : E - Passage forbidden through tunnels of category E

Transport by air (ICAO-TI / IATA-DGR)

Class / Div. (Sub. risk(s)) : 2.2

Transport by sea (IMDG)

Class / Div. (Sub. risk(s)) : 2.2

Emergency Schedule (EmS) - Fire : F-C

Emergency Schedule (EmS) - Spillage : S-V

14.4. Packing group

Transport by road/rail/inland waterways : Not applicable.

(ADR/RID/ADN)

Transport by air (ICAO-TI / IATA-DGR) : Not applicable.

Transport by sea (IMDG) : Not applicable.

14.5. Environmental hazards

Transport by road/rail/inland waterways : None.

(ADR/RID/ADN)

Transport by air (ICAO-TI / IATA-DGR) : None.

Transport by sea (IMDG) : None.

14.6. Special precautions for user

Packing Instruction(s)

Transport by road/rail/inland waterways : P200.

(ADR/RID/ADN)

Transport by air (ICAO-TI / IATA-DGR)

Passenger and Cargo Aircraft : 200.

Cargo Aircraft only : 200.

Transport by sea (IMDG) : P200.

Special transport precautions

: Avoid transport on vehicles where the load space is not separated from the driver's compartment.

Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

Before transporting product containers:

- Ensure there is adequate ventilation.

- Ensure that containers are firmly secured.

- Ensure valve is closed and not leaking.

- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.

- Ensure valve protection device (where provided) is correctly fitted.

14.7. Maritime transport in bulk according to IMO instruments

Not applicable.

SECTION 15: Regulatory information

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

EU-Regulations

Restrictions on use : Restricted to professional users (Annex XVII REACH).

Contains no substance(s) listed on the REACH Candidate List.

Other information, restriction and prohibition regulations : Contains no substance(s) listed on the PIC list (Regulation EU 649/2012 concerning the export and import of hazardous chemicals).

Seveso Directive : 2012/18/EU (Seveso III) : Not covered.

National regulations

Water hazard class (WGK) : nwg - Non-hazardous to water.

Regulatory reference : Ensure all national/local regulations are observed.

15.2. Chemical safety assessment

A CSA does not need to be carried out for this product.

SECTION 16: Other information

Indication of changes	: Safety data sheet in accordance with commission regulation (EU) No 2020/878.
Abbreviations and acronyms	: ATE - Acute Toxicity Estimate. CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008. REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006. EINECS - European Inventory of Existing Commercial Chemical Substances. CAS# - Chemical Abstract Service number. PPE - Personal Protection Equipment. LC50 - Lethal Concentration to 50 % of a test population. RMM - Risk Management Measures. PBT - Persistent, Bioaccumulative and Toxic. vPvB - Very Persistent and Very Bioaccumulative. STOT- SE : Specific Target Organ Toxicity - Single Exposure. CSA - Chemical Safety Assessment. EN - European Standard. UN - United Nations. ADR - Agreement concerning the International Carriage of Dangerous Goods by Road. IATA - International Air Transport Association. IMDG code - International Maritime Dangerous Goods. RID - Regulations concerning the International Carriage of Dangerous Goods by Rail. WGK - Water Hazard Class. STOT - RE : Specific Target Organ Toxicity - Repeated Exposure. UFI : Unique Formula Identifier.
Training advice	: Users of breathing apparatus must be trained. Ensure operators understand the toxicity hazard.
Further information	: Classification using data from databases maintained by the European Industrial Gases Association (EIGA). Data is maintained in EIGA doc 169 : 'Classification and Labelling Guide', downloadable at : http://www.eiga.eu . Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP).

Full text of H- and EUH-statements	
Acute Tox. 1 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 1
Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3
Acute Tox. 4 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 4
Eye Dam. 1	Serious eye damage/eye irritation, Category 1
Flam. Gas 1A	Flammable gases, Category 1A
Flam. Gas 1B	Flammable gases, Category 1B
H220	Extremely flammable gas.
H221	Flammable gas.
H270	May cause or intensify fire; oxidiser.
H280	Contains gas under pressure; may explode if heated.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H330	Fatal if inhaled.

Safety Data Sheet

4 component mix in Nitrogen

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878
Reference number: SDS 01527

H331	Toxic if inhaled.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H360	May damage fertility or the unborn child.
H360D	May damage the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
Ox. Gas 1	Oxidising Gases, Category 1
Press. Gas (Comp.)	Gases under pressure : Compressed gas
Press. Gas (Liq.)	Gases under pressure : Liquefied gas
Repr. 1A	Reproductive toxicity, Category 1A
Skin Corr. 1B	Skin corrosion/irritation, Category 1, Sub-Category 1B
STOT RE 1	Specific target organ toxicity – Repeated exposure, Category 1
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Respiratory tract irritation

DISCLAIMER OF LIABILITY

: Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
Details given in this document are believed to be correct at the time of going to press.
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

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