

Tecto Gas Bottle - Quad Gas Pentane (H₂S,CO,C₅H₁₂,O₂/N₂) - GDS5789

Warning



- 112L of gas
- 1,000 PSI
- 69 BAR



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

1.1. Product identifier

Trade name : AG1045 - Quad Gas Pentane (H₂S,CO,C₅H₁₂,O₂/N₂)

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

AG Gases & Equipment Ltd Ltd
Unit 1A, Britannic House Broom Street
GB- ST1 2ER Stoke on Trent – Staffordshire
Great Britain
T +44 (0)1782 616611
www.agequip.co.uk

1.4. Emergency telephone number

Emergency telephone number : +44 (0)1782 616611

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

2.2. Label elements

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

Hazard pictograms (CLP) :



GHS04

Signal word (CLP) :

Warning

Hazard statements (CLP) :

H280 - Contains gas under pressure; may explode if heated.

Precautionary statements (CLP)

- Storage

: P410+P403 - Protect from sunlight. Store in a well-ventilated place.

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]
Nitrogen	CAS-No.: 7727-37-9 EC-No.: 231-783-9 EC Index-No.: --- REACH-no: *1	≤ 81.899	Press. Gas (Comp.), H280
oxygen	CAS-No.: 7782-44-7 EC-No.: 231-956-9 EC Index-No.: 008-001-00-8 REACH-no: *1	18 – 21	Ox. Gas 1, H270 Press. Gas (Comp.), H280
pentane	CAS-No.: 109-66-0 EC-No.: 203-692-4 EC Index-No.: 601-006-00-1	0.1 – 0.75	Flam. Liq. 2, H225 Asp. Tox. 1, H304 STOT SE 3, H336 Aquatic Chronic 2, H411
carbon monoxide	CAS-No.: 630-08-0 EC-No.: 211-128-3 EC Index-No.: 006-001-00-2 REACH-no: 01-2119480165-39	0.0005 – 0.05	Flam. Gas 1B, H221 Press. Gas (Comp.), H280 Acute Tox. 3 (Inhalation:gas), H331 Repr. 1A, H360D STOT RE 1, H372
hydrogen sulphide	CAS-No.: 7783-06-4 EC-No.: 231-977-3 EC Index-No.: 016-001-00-4 REACH-no: 01-2119445737-29	0.0005 – 0.05	Flam. Gas 1A, H220 Press. Gas (Liq.), H280 Acute Tox. 2 (Inhalation:gas), H330 STOT SE 3, H335 Aquatic Acute 1, H400

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 : Adverse effects not expected from this product.
- 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

None.



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 : Supports combustion.
Exposure to fire may cause containers to rupture/explode.
- Hazardous combustion products : carbon monoxide. Sulphur 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 : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.

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.
Stay upwind.
See section 8 of the SDS for more information on personal protective equipment
- For emergency responders : See section 5.3 of the SDS for more information.

6.2. Environmental precautions

None.

6.3. Methods and material for containment and cleaning up

None.

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

- : 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.
- Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
- Use only oxygen approved lubricants and oxygen approved sealings.
- Avoid suck back of water, acid and alkalis.
- Do not breathe gas.
- Avoid release of product into work area.

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)	
Austria - Occupational Exposure Limits	
Local name	Kohlenstoffmonoxid (Kohlenoxid)
MAK (mg/m³)	33 mg/m³ (gilt für Arbeiten im Tunnel- und Untertagebau bis 21.8.2023) 23 mg/m³
MAK (OEL TWA) [ppm]	30 ppm (gilt für Arbeiten im Tunnel- und Untertagebau bis 21.8.2023) 20 ppm
MAK (OEL STEL)	66 mg/m³ (4x 15(Miw) min) (gilt für Arbeiten im Tunnel- und Untertagebau bis 21.8.2023) 66 mg/m³ (4x 15(Miw) min)
MAK (OEL STEL) [ppm]	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	BGBl. II Nr. 382/2020
Belgium - Occupational Exposure Limits	
Local name	Carbone (monoxyde de) # Koolstofmonoxide
OEL TWA	23 mg/m³
OEL TWA [ppm]	20 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	100 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 19/11/2020
Bulgaria - Occupational Exposure Limits	
Local name	Въглероден монооксид
OEL TWA	40 mg/m³ За мините с подземен добив и прокарването на подземни тунели, до 21 август 2023 г. 23 mg/m³ За мините с подземен добив и прокарването на подземни тунели граничните стойности влизат в сила от 21 август 2023 г.
OEL TWA [ppm]	20 ppm За мините с подземен добив и прокарването на подземни тунели граничните стойности влизат в сила от 21 август 2023 г.
OEL STEL	200 mg/m³ За мините с подземен добив и прокарването на подземни тунели, до 21 август 2023 г. 117 mg/m³ За мините с подземен добив и прокарването на подземни тунели граничните стойности влизат в сила от 21 август 2023 г.
OEL STEL [ppm]	100 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.5 от 17 Януари 2020 г.)



Croatia - Occupational Exposure Limits	
Local name	Ugljikov monoksid
GVI (OEL TWA) [1]	35 mg/m ³ za djelatnosti podzemnog rudarenja i bušenja tunela, do 21. 8. 2023. 23 mg/m ³
GVI (OEL TWA) [2]	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
KGVI (OEL STEL) [ppm]	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 izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 91/2018)
Cyprus - Occupational Exposure Limits	
Local name	Μονοξείδιο του άνθρακα
OEL TWA	23 mg/m ³
OEL TWA [ppm]	20 ppm
OEL STEL	117 mg/m ³
OEL STEL [ppm]	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
PEL (OEL TWA) [ppm]	19.8 ppm
NPK-P (OEL C)	117 mg/m ³
NPK-P (OEL C) [ppm]	100.5 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 41/2020 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Carbonmonoxid (Kulilte; Kulmonoxid)
OEL TWA [1]	23 mg/m ³ 29 mg/m ³ I minedrift og tunnelbyggeri gælder frem til og med 21. august 2023 for Carbonmonoxid
OEL TWA [2]	20 ppm 25 ppm I minedrift og tunnelbyggeri gælder frem til og med 21. august 2023 for Carbonmonoxid
Remark	E (betyder, at stoffet har en EF-grænseværdi)



Regulatory reference	BEK nr 290 af 13/02/2021
Estonia - Occupational Exposure Limits	
Local name	Süsinikmonooksiid
OEL TWA	23 mg/m³
OEL TWA [ppm]	20 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	100 ppm
Remark	R (Reproduktiivtoksiline aine), 9 (Lämmastikdioksiidil ja süsinikmonooksiidil on heitgaasides koos kantserogeensete ainetega eraldi määratud piirnõrmed. Bensiini- 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, 17.10.2019, 2); Vabariigi Valitsuse 10. märtsi 2019. a määruse nr 84
Finland - Occupational Exposure Limits	
Local name	Hiilimonoksidi
HTP (OEL TWA) [1]	23 mg/m³
HTP (OEL TWA) [2]	20 ppm
HTP (OEL STEL)	87 mg/m³
HTP (OEL STEL) [ppm]	75 ppm
Remark	Melu
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveystoiministeriö)
France - Occupational Exposure Limits	
Local name	Monoxyde de carbone
VME (OEL TWA)	23 mg/m³
VME (OEL TWA) [ppm]	20 ppm
VLE (OEL C/STEL)	117 mg/m³
VLE (OEL C/STEL) [ppm]	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)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Kohlenstoffmonoxid
AGW (OEL TWA) [1]	35 mg/m³
AGW (OEL TWA) [2]	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
Regulatory reference	TRGS900



Gibraltar - Occupational Exposure Limits	
Local name	Carbon monoxide
OEL TWA	23 mg/m³
OEL TWA [ppm]	20 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	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/m³
OEL TWA [ppm]	20 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	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/m³ 33 mg/m³ A földalatti bányászat és az alagútás terén
CK (OEL STEL)	117 mg/m³ 66 mg/m³ 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 kitétt munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	Carbon monoxide
OEL TWA [1]	23 mg/m³
OEL TWA [2]	20 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	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 2020
Italy - Occupational Exposure Limits	
Local name	Monossido di carbonio
OEL TWA	23 mg/m³
OEL TWA [ppm]	20 ppm



OEL STEL	117 mg/m³
OEL STEL [ppm]	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/m³
OEL TWA [ppm]	17 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	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/m³
IPRV (OEL TWA) [ppm]	20 ppm
TPRV (OEL STEL)	117 mg/m³
TPRV (OEL STEL) [ppm]	100 ppm
Remark	R (reprodukcijai toksiskas poveikis); Ū (ūmus poveikis)
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Luxembourg - Occupational Exposure Limits	
Local name	Monoxyde de carbone
OEL TWA	23 mg/m³
OEL TWA [ppm]	20 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	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° 684 de 2018 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/m³
OEL TWA [ppm]	20 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	100 ppm
Regulatory reference	S.L.424.24 - Chemical Agents at Work Regulations (L.N.57 of 2018)



Netherlands - Occupational Exposure Limits	
Local name	Koolmonoxide
MAC-TGG (OEL TWA)	23 mg/m³
MAC-15 (OEL STEL)	117 mg/m³
Regulatory reference	Arbeidsomstandighedenregeling 2021
Poland - Occupational Exposure Limits	
Local name	Tlenek węgla
NDS (OEL TWA)	23 mg/m³
NDSch (OEL STEL)	117 mg/m³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Monóxido de carbono
OEL TWA [ppm]	25 ppm
Remark	IBE (Índice biológico de exposição)
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Monoxid de carbon
OEL TWA	20 mg/m³ Exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor 23 mg/m³
OEL TWA [ppm]	17.5 ppm Exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor 20 ppm
OEL STEL	30 mg/m³ Exploatărilor miniere subterane și al șantierelor de săpare a tunelurilor și puțurilor 117 mg/m³
OEL STEL [ppm]	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)
Slovakia - Occupational Exposure Limits	
Local name	Oxid uhoľnatý
NPHV (OEL TWA) [1]	35 mg/m³ NPEL majú prechodné obdobie do 21. augusta 2023, ktoré sa týka expozície zamestnancov pri podzemnej ťažbe a razení tunelov 23 mg/m³
NPHV (OEL TWA) [2]	30 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)	70 mg/m³ NPEL majú prechodné obdobie do 21. augusta 2023, ktoré sa týka expozície zamestnancov pri podzemnej ťažbe a razení tunelov 117 mg/m³
NPHV (OEL STEL) [ppm]	60 ppm NPEL majú prechodné obdobie do 21. augusta 2023, ktoré sa týka expozície zamestnancov pri podzemnej ťažbe a razení tunelov 100 ppm
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	ogljikov monoksid
OEL TWA	23 mg/m³
OEL TWA [ppm]	20 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	100 ppm
Remark	BAT (Biološka mejna vrednost), EU
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) [1]	23 mg/m³ 29 mg/m³ 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-ED (OEL TWA) [2]	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/m³
VLA-EC (OEL STEL) [ppm]	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 2021. INSHT
Sweden - Occupational Exposure Limits	
Local name	Kolmonoxid (Avgaser som kolmonoxid)
NGV (OEL TWA)	23 mg/m³ 25 mg/m³ När det gäller underjord- eller tunnelarbete



NGV (OEL TWA) [ppm]	20 ppm 20 ppm När det gäller underjord- eller tunnelarbete
KTV (OEL STEL)	117 mg/m³ 117 mg/m³ När det gäller underjord- eller tunnelarbete
KTV (OEL STEL) [ppm]	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 korttidsgränsvärde ska användas som ett rekommenderat högsta värde som inte bör överskridas)
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
United Kingdom - Occupational Exposure Limits	
Local name	Carbon monoxide
WEL TWA (OEL TWA) [1]	23 mg/m³ 35 mg/m³ Limits applicable to underground mining & tunnelling industries ONLY until 21/8/23
WEL TWA (OEL TWA) [2]	20 ppm 30 ppm Limits applicable to underground mining & tunnelling industries ONLY until 21/8/23
WEL STEL (OEL STEL)	117 mg/m³ 232 mg/m³ Limits applicable to underground mining & tunnelling industries ONLY until 21/8/23
WEL STEL (OEL STEL) [ppm]	100 ppm 200 ppm Limits 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	Kolsýringur
OEL TWA	23 mg/m³
OEL TWA [ppm]	20 ppm
OEL STEL	117 mg/m³
OEL STEL [ppm]	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) [1]	23 mg/m³ 29 mg/m³ For bransjene gruvedrift under jord og tunnelvirksomhet gjelder følgende grenseverdi for karbonmonoksid frem til 21. august 2023
Grenseverdi (OEL TWA) [2]	20 ppm 25 ppm For bransjene gruvedrift under jord og tunnelvirksomhet gjelder følgende grenseverdi for karbonmonoksid frem til 21. august 2023



Korttidsverdi (OEL STEL)	117 mg/m ³
Korttidsverdi (OEL STEL) [ppm]	100 ppm 100 ppm For bransjene gruvedrift under jord og tunnelvirksomhet gjelder følgende grenseverdi for karbonmonoksid frem til 21. august 2023
Remark	R: Kjemikalier som skal betraktes som reproduksjonstoksiske; E: EU har en veiledende grenseverdi 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-2020-04-06-695
North Macedonia - Occupational Exposure Limits	
Local name	Јаглерод монооксид
OEL TWA	35 mg/m ³
OEL TWA [ppm]	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 супстанции во воздухот на работното место внатре во зона на дишење, на која работникот без опасност по здравјето може да е изложен на покосо 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 супстанции („Службен весник на Република Македонија“ бр.46/10)
Switzerland - Occupational Exposure Limits	
Local name	Monoxyde de carbone / Kohlenmonoxid [Kohlenoxid, Kohlenstoffmonoxid]
MAK (OEL TWA) [1]	35 mg/m ³
MAK (OEL TWA) [2]	30 ppm
KZGW (OEL STEL)	70 mg/m ³
KZGW (OEL STEL) [ppm]	60 ppm
Critical toxicity	COHb / COHb
Notation	SS _B , O ^B , B / SS _B , O ^L , B
Remark	NIOSH
Regulatory reference	www.suva.ch, 01.01.2021



hydrogen sulphide (7783-06-4)	
Austria - Occupational Exposure Limits	
Local name	Schwefelwasserstoff
MAK (mg/m³)	7 mg/m³
MAK (OEL TWA) [ppm]	5 ppm
OEL C	7 mg/m³
OEL C [ppm]	5 ppm
Regulatory reference	BGBl. II Nr. 382/2020
Belgium - Occupational Exposure Limits	
Local name	Hydrogène (sulfure d') # Waterstofsulfide
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 19/11/2020
Bulgaria - Occupational Exposure Limits	
Local name	Сероводород
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 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.5 от 17 Януари 2020 г.)
Croatia - Occupational Exposure Limits	
Local name	Vodikov sulfid
GVI (OEL TWA) [1]	7 mg/m³
GVI (OEL TWA) [2]	5 ppm
KGVI (OEL STEL)	14 mg/m³
KGVI (OEL STEL) [ppm]	10 ppm
Remark	Direktiva: 2009/161/EU
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 91/2018)
Cyprus - Occupational Exposure Limits	
Local name	Υδρόθειο



OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	Κανονισμοί του 2012 (Κ.Δ.Π. 70/2012)
Czech Republic - Occupational Exposure Limits	
Local name	Sirovodík (Sulfan)
PEL (OEL TWA)	7 mg/m³
PEL (OEL TWA) [ppm]	5 ppm
NPK-P (OEL C)	14 mg/m³
NPK-P (OEL C) [ppm]	10 ppm
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 41/2020 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Hydrogensulfid (Svovlbrinte)
OEL TWA [1]	7 mg/m³
OEL TWA [2]	5 ppm
Regulatory reference	BEK nr 290 af 13/02/2021
Estonia - Occupational Exposure Limits	
Local name	Vesiniksulfiid
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 17.10.2019, 2); Vabariigi Valitsuse 10. märtsi 2019. a määruse nr 84
Finland - Occupational Exposure Limits	
Local name	Rikkivety
HTP (OEL TWA) [1]	7 mg/m³
HTP (OEL TWA) [2]	5 ppm
HTP (OEL STEL)	14 mg/m³
HTP (OEL STEL) [ppm]	10 ppm
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
France - Occupational Exposure Limits	
Local name	Hydrogène sulfuré (Sulfure d'hydrogène)
VME (OEL TWA)	7 mg/m³
VME (OEL TWA) [ppm]	5 ppm
VLE (OEL C/STEL)	14 mg/m³



VLE (OEL C/STEL) [ppm]	10 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)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Hydrogensulfid
AGW (OEL TWA) [1]	7.1 mg/m³
AGW (OEL TWA) [2]	5 ppm
Peak exposure limitation factor	2(l)
Remark	EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich); DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); AGS - Ausschuss für Gefahrstoffe; Y - Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden
Regulatory reference	TRGS900
Gibraltar - Occupational Exposure Limits	
Local name	Hydrogen sulphide
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	Factories (Control of Chemical Agents at Work) Regulations 2003 (LN. 2018/181)
Greece - Occupational Exposure Limits	
Local name	Υδρόθειο
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	10 mg/m³
OEL STEL [ppm]	14 ppm
Regulatory reference	Π.Δ. 12/2012 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	KÉN-HIDROGÉN
AK (OEL TWA)	7 mg/m³
CK (OEL STEL)	14 mg/m³
Remark	i (ingerlő anyag, amely izgatja a bőrt, nyálkahártyát, szemet vagy mindhármat); EU3 (2009/161 /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	Hydrogen sulphide
OEL TWA [1]	7 mg/m³
OEL TWA [2]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Remark	IOELV (Indicative Occupational Exposure Limit Values)
Regulatory reference	Chemical Agents Code of Practice 2020
Italy - Occupational Exposure Limits	
Local name	Acido solfidrico
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	Allegato XXXVIII del D.Lgs. 9 aprile 2008, n. 81 e s.m.i.
Latvia - Occupational Exposure Limits	
Local name	Sērūdeņradis
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 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	Vandenilio sulfidas
IPRV (OEL TWA)	7 mg/m³
IPRV (OEL TWA) [ppm]	5 ppm
TPRV (OEL STEL)	14 mg/m³
TPRV (OEL STEL) [ppm]	10 ppm
NRV (OEL C)	20 mg/m³
NRV (OEL C) [ppm]	15 ppm
Remark	Ū (ūmus poveikis)
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Luxembourg - Occupational Exposure Limits	
Local name	Sulfure d'hydrogène



OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	Mémorial A N° 684 de 2018 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	Hydrogen sulphide
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	S.L.424.24 - Chemical Agents at Work Regulations (L.N.57 of 2018)
Netherlands - Occupational Exposure Limits	
Local name	Zwavelwaterstof
MAC-TGG (OEL TWA)	2.3 mg/m³
Regulatory reference	Arbeidsomstandighedenregeling 2021
Poland - Occupational Exposure Limits	
Local name	Siarkowodór
NDS (OEL TWA)	7 mg/m³
NDSch (OEL STEL)	14 mg/m³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Ácido sulfídrico
OEL TWA [ppm]	1 ppm
OEL STEL [ppm]	5 ppm
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Hidrogen sulfurat/Sulfură de hidrogen
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
Serbia - Occupational Exposure Limits	
Local name	водоник сулфид



OEL TWA	7 mg/m ³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m ³
OEL STEL [ppm]	10 ppm
Regulatory reference	ПРАВИЛНИК о превентивним мерама за безбедан и здрав рад при излагању хемијским материјама („Службени гласник РС”, бр. 106/09 и 117/17)
Slovakia - Occupational Exposure Limits	
Local name	Sírovodík (sulfán)
NPHV (OEL TWA) [1]	7 mg/m ³
NPHV (OEL TWA) [2]	5 ppm
NPHV (OEL STEL)	14 mg/m ³
NPHV (OEL STEL) [ppm]	10 ppm
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	vodikov sulfid
OEL TWA	7 mg/m ³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m ³
OEL STEL [ppm]	10 ppm
Remark	Y (Snovi, pri katerih ni nevarnosti za zarodek ob upoštevanju mejnih vrednosti in bat vrednosti), EU
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
Spain - Occupational Exposure Limits	
Local name	Sulfuro de hidrógeno
VLA-ED (OEL TWA) [1]	7 mg/m ³
VLA-ED (OEL TWA) [2]	5 ppm
VLA-EC (OEL STEL)	14 mg/m ³
VLA-EC (OEL STEL) [ppm]	10 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 2021. INSHT
Sweden - Occupational Exposure Limits	
Local name	Vätesulfid (Svavelväte)
NGV (OEL TWA)	7 mg/m ³
NGV (OEL TWA) [ppm]	5 ppm
KTV (OEL STEL)	14 mg/m ³
KTV (OEL STEL) [ppm]	10 ppm



Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
United Kingdom - Occupational Exposure Limits	
Local name	Hydrogen sulphide
WEL TWA (OEL TWA) [1]	7 mg/m³
WEL TWA (OEL TWA) [2]	5 ppm
WEL STEL (OEL STEL)	14 mg/m³
WEL STEL (OEL STEL) [ppm]	10 ppm
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
Iceland - Occupational Exposure Limits	
Local name	Vetnissúlfíð (brennisteinsvetni)
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	Reglugerð um mengunarmörk og aðgerðir til að draga úr mengun á vinnustöðum (Nr. 1296/2012)
Norway - Occupational Exposure Limits	
Local name	Hydrogensulfid
Grenseverdi (OEL TWA) [1]	7 mg/m³
Grenseverdi (OEL TWA) [2]	5 ppm
Takverdi (OEL C) [1]	14 mg/m³
Takverdi (OEL C) [2]	10 ppm
Remark	E: EU har en veiledende grenseverdi for stoffet.
Regulatory reference	FOR-2020-04-06-695
North Macedonia - Occupational Exposure Limits	
Local name	водород сулфид
OEL TWA	14 mg/m³
OEL TWA [ppm]	10 ppm
KTV	1
Short time value [mg/m³]	14 mg/m³
Short time value [ppm]	10 ppm
Remark	(KTV) 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 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/m³ или во ml/m³(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	Hydrogène sulfuré / Schwefelwasserstoff
MAK (OEL TWA) [1]	7.1 mg/m³
MAK (OEL TWA) [2]	5 ppm
KZGW (OEL STEL)	14.2 mg/m³
KZGW (OEL STEL) [ppm]	10 ppm
Notation	SS _C / SS _C
Regulatory reference	www.suva.ch, 01.01.2021
Turkey - Occupational Exposure Limits	
Local name	Hidrojen sülfid
OEL TWA	7 mg/m³
OEL TWA [ppm]	5 ppm
OEL STEL	14 mg/m³
OEL STEL [ppm]	10 ppm
Regulatory reference	12 Ağustos 2013 Tarihli ve 28733 Sayılı Resmî Gazete

pentane (109-66-0)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Pentane
IOEL TWA	3000 mg/m³
IOEL TWA [ppm]	1000 ppm
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC
Austria - Occupational Exposure Limits	
Local name	n-Pentan
MAK (mg/m³)	1800 mg/m³
MAK (OEL TWA) [ppm]	600 ppm
MAK (OEL STEL)	3600 mg/m³
MAK (OEL STEL) [ppm]	1200 ppm
Regulatory reference	BGBl. II Nr. 186/2015
Belgium - Occupational Exposure Limits	
Local name	Pentane, tous isomères # Pentaan, alle isomeren
OEL TWA	1800 mg/m³
OEL TWA [ppm]	600 ppm
OEL STEL	2250 mg/m³
OEL STEL [ppm]	750 ppm



Regulatory reference	Koninklijk besluit/Arrêté royal 02/09/2018
Bulgaria - Occupational Exposure Limits	
Local name	n-Пентан
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 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.73 от 4 септември 2018 г.)
Croatia - Occupational Exposure Limits	
Local name	Pentan
GVI (OEL TWA) [1]	3000 mg/m ³
GVI (OEL TWA) [2]	1000 ppm
Remark	EU** (naznaka da se radi o tvarima za koje su utvrđene indikativne granične vrijednosti izloženosti prema Direktivi 2006/15/ EC (druga lista)); F+ (vrlo lako zapaljivo); Xn (Štetno); N (opasno za okoliš)
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN, br. 75/13)
Czech Republic - Occupational Exposure Limits	
Local name	Pentan
PEL (OEL TWA)	3000 mg/m ³
PEL (OEL TWA) [ppm]	1020 ppm
NPK-P (OEL C)	4500 mg/m ³ (3)
NPK-P (OEL C) [ppm]	1526 ppm (3)
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (zpracovány změny č. 246/2018 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Pentan
OEL TWA [1]	1500 mg/m ³
OEL TWA [2]	500 ppm
Regulatory reference	BEK nr 655 af 31/05/2018
Estonia - Occupational Exposure Limits	
Local name	Pentaan
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Vabariigi Valitsuse 18. septembri 2001. a määruse nr 293 (RT I, 30.11.2011, 5)
Finland - Occupational Exposure Limits	
Local name	n-Pentaani



HTP (OEL TWA) [1]	1500 mg/m³
HTP (OEL TWA) [2]	500 ppm
HTP (OEL STEL)	1900 mg/m³
HTP (OEL STEL) [ppm]	630 ppm
Regulatory reference	HTP-ARVOT 2018 (Sosiaali- ja terveystieteiden ministeriö)
France - Occupational Exposure Limits	
Local name	n-Pentane
VME (OEL TWA)	3000 mg/m³
VME (OEL TWA) [ppm]	1000 ppm
Remark	Valeurs réglementaires contraignantes
Regulatory reference	Article R4412-149 du Code du travail (réf.: INRS ED 984, 2016)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Pentan
AGW (OEL TWA) [1]	3000 mg/m³
AGW (OEL TWA) [2]	1000 ppm
Peak exposure limitation factor	2(II)
Remark	DFG;EU;Y
Regulatory reference	TRGS900
Greece - Occupational Exposure Limits	
Local name	Πεντάνιο (όλα τα ισομερή)
OEL TWA	2950 mg/m³
OEL TWA [ppm]	1000 ppm
OEL STEL	2950 mg/m³
OEL STEL [ppm]	1000 ppm
Regulatory reference	Π.Δ. 90/1999
Hungary - Occupational Exposure Limits	
Local name	n-PENTÁN
AK (OEL TWA)	2950 mg/m³
Regulatory reference	25/2000. (IX. 30.) EüM-SZCSM együttes rendelet a munkahelyek kémiai biztonságáról
Ireland - Occupational Exposure Limits	
Local name	n-Pentane
OEL TWA [1]	3000 mg/m³
OEL TWA [2]	1000 ppm
Regulatory reference	Code of Practice for the Chemical Agents Regulations 2018
Italy - Occupational Exposure Limits	
Local name	Pentano



OEL TWA	2000 mg/m³
OEL TWA [ppm]	667 ppm
Regulatory reference	Allegato XXXVIII del D.Lgs. 9 aprile 2008, n. 81 e s.m.i.
Latvia - Occupational Exposure Limits	
Local name	Pentāns
OEL TWA	3000 mg/m³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Ministru kabineta 2007.gada 15.maija noteikumiem Nr.325
Lithuania - Occupational Exposure Limits	
Local name	Pentanas
IPRV (OEL TWA)	3000 mg/m³
IPRV (OEL TWA) [ppm]	1000 ppm
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Luxembourg - Occupational Exposure Limits	
Local name	Pentane
OEL TWA	3000 mg/m³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Mémorial A N° 684 de 2018
Malta - Occupational Exposure Limits	
Local name	Pentane
OEL TWA	3000 mg/m³
OEL TWA [ppm]	1000 ppm
Regulatory reference	S.L.424.24 (L.N.57 of 2018)
Netherlands - Occupational Exposure Limits	
Local name	n-Pentaan
MAC-TGG (OEL TWA)	1800 mg/m³
Regulatory reference	Arbeidsomstandighedenregeling 2018
Poland - Occupational Exposure Limits	
Local name	Pentan
NDS (OEL TWA)	3000 mg/m³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Pentano , todos os isómeros
OEL TWA [ppm]	1000 ppm
Regulatory reference	Norma Portuguesa NP 1796:2014



Romania - Occupational Exposure Limits	
Local name	Pentan
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Hotărârea nr. 584/2018
Slovakia - Occupational Exposure Limits	
Local name	Pentán
NPHV (OEL TWA) [1]	3000 mg/m ³
NPHV (OEL TWA) [2]	1000 ppm
Regulatory reference	Nariadenie vlády č. 33/2018 Z.z.
Slovenia - Occupational Exposure Limits	
Local name	pentan
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
OEL STEL	6000 mg/m ³
OEL STEL [ppm]	2000 ppm
Regulatory reference	Uradni list RS, št. 78/2018 z dne 4.12.2018
Spain - Occupational Exposure Limits	
Local name	n-Pentano
VLA-ED (OEL TWA) [1]	3000 mg/m ³
VLA-ED (OEL TWA) [2]	1000 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 2019. INSHT
Sweden - Occupational Exposure Limits	
Local name	n-Pentan
NGV (OEL TWA)	1800 mg/m ³
NGV (OEL TWA) [ppm]	600 ppm
KTV (OEL STEL)	2000 mg/m ³
KTV (OEL STEL) [ppm]	750 ppm
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
United Kingdom - Occupational Exposure Limits	
Local name	Pentane
WEL TWA (OEL TWA) [1]	1800 mg/m ³
WEL TWA (OEL TWA) [2]	600 ppm
Regulatory reference	EH40/2005 (Third edition, 2018). HSE



Iceland - Occupational Exposure Limits	
Local name	Pentan, allir isómerar
OEL TWA	1500 mg/m³
OEL TWA [ppm]	500 ppm
Regulatory reference	Reglugerð um mengunarmörk og aðgerðir til að draga úr mengun á vinnustöðum (Nr. 390/2009)
Norway - Occupational Exposure Limits	
Local name	Pentan
Grenseverdi (OEL TWA) [1]	750 mg/m³
Grenseverdi (OEL TWA) [2]	250 ppm
Regulatory reference	FOR-2018-08-21-1255
Switzerland - Occupational Exposure Limits	
Local name	Pentane (tous les isomères) / Pentan (alle Isomere)
MAK (OEL TWA) [1]	1800 mg/m³
MAK (OEL TWA) [2]	600 ppm
KZGW (OEL STEL)	3600 mg/m³
KZGW (OEL STEL) [ppm]	1200 ppm
Remark	Kritische Toxizität: PNS; Messmethoden: NIOSH; Notationen: SS _c
Regulatory reference	www.suva.ch, 01.11.2018
Turkey - Occupational Exposure Limits	
Local name	Pentan
OEL TWA	3000 mg/m³
OEL TWA [ppm]	1000 ppm
Regulatory reference	12 Ağustos 2013 Tarihli ve 28733 Sayılı Resmî Gazete
USA - ACGIH - Occupational Exposure Limits	
Local name	Pentane
ACGIH OEL TWA [ppm]	1000 ppm
Remark (ACGIH)	TLV® Basis: Narcosis; resp tract irr
Regulatory reference	ACGIH 2019
carbon monoxide (630-08-0)	
DNEL: Derived no effect level (Workers)	
Acute - local effects, inhalation	117 ppm
Acute - systemic effects, inhalation	117 mg/m³
Long-term - local effects, inhalation	23 ppm
Long-term - systemic effects, inhalation	23 mg/m³



hydrogen sulphide (7783-06-4)	
DNEL: Derived no effect level (Workers)	
Acute - local effects, inhalation	14 mg/m³
Acute - systemic effects, inhalation	14 mg/m³
Long-term - local effects, inhalation	7 mg/m³
Long-term - systemic effects, inhalation	7 mg/m³

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

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Provide adequate general and local exhaust ventilation.
Systems under pressure should be regularly checked for leakages.
Ensure exposure is below occupational exposure limits (where available).
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 risk.
: Wear safety shoes while handling containers.
Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
 - Respiratory protection : Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.
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.
Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.
 - Thermal hazards : None in addition to the above sections.

8.2.3. Environmental exposure controls

None necessary.

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.
- Odour
- : There may be no odour warning properties, odour is subjective and inadequate to warn of overexposure.
Mixture contains one or more component(s) which have the following odour: Rotten eggs.
Odour threshold is subjective and inadequate to warn of overexposure.
- pH : Not applicable for gases and gas mixtures.
- Melting point / Freezing point : Not applicable for gases and gas mixtures.



Boiling point	: Not applicable for gas mixtures.
Flash point	: Not applicable for gases and gas mixtures.
Flammability	: Non flammable.
Explosive limits	: Non flammable.
Lower explosive limit (LEL)	: Not available
Upper explosive limit (UEL)	: Not available
Vapour pressure [20°C]	: Not applicable.
Vapour pressure [50°C]	: Not applicable.
Density	: Not applicable
Vapour density	: Not applicable for gases and gas mixtures.
Relative density, liquid (water=1)	: Not applicable
Relative density, gas (air=1)	: Lighter or similar to air.
Water solubility	: Not available
Partition coefficient n-octanol/water (Log Kow)	: Not applicable for gas mixtures.
Auto-ignition temperature	: Non flammable.
Decomposition temperature	: Not applicable.
Viscosity, kinematic	: Not applicable for gases and gas mixtures.
Particle characteristics	: Not applicable for gases and gas mixtures.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Oxidising properties	: No oxidising properties.
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9.2.2. Other safety characteristics

Other data	: None.
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SECTION 10: Stability and reactivity

10.1. Reactivity

Data for mixture are not available.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

None.

Reactivity	: This mixture contains components with the following reactivity : Can form explosive mixture with air. May react violently with oxidants. Violently oxidises organic material.
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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	: Classification criteria are not met.
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carbon monoxide (630-08-0)	
LC50 Inhalation - Rat [ppm]	3760 ppm/1h (ADR) 1300 ppm/4h (CLP)
hydrogen sulphide (7783-06-4)	
LC50 Inhalation - Rat [ppm]	356 ppm/4h
Skin corrosion/irritation	: No known effects from this product.
Serious eye damage/irritation	: No known effects from this product.
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	: No known effects from this product.
Toxic for reproduction : unborn child	: Classification criteria are not met.
STOT-single exposure	: Classification criteria are not met.
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.

oxygen (7782-44-7)	
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.

hydrogen sulphide (7783-06-4)	
EC50 48h - Daphnia magna [mg/l]	0.12 mg/l
EC50 72h - Algae [mg/l]	1.87 mg/l
LC50 96 h - Fish [mg/l]	0.007 - 0.019 mg/l

pentane (109-66-0)	
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.

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

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 : No known effects from this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

May be vented to atmosphere in a well ventilated place.
 Do not discharge into any place where its accumulation could be dangerous.
 Return unused product in original container to supplier.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended) : 16 05 05 : Gases in pressure containers other than those mentioned in 16 05 04.

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 (ADR/RID)	: COMPRESSED GAS, N.O.S. (Nitrogen, hydrogen sulphide)
Transport by air (ICAO-TI / IATA-DGR)	: Compressed gas, n.o.s. (Nitrogen, hydrogen sulphide)
Transport by sea (IMDG)	: COMPRESSED GAS, N.O.S. (Nitrogen, hydrogen sulphide)

14.3. Transport hazard class(es)

Labelling



2.2 : Non-flammable, non-toxic gases.

Transport by road/rail (ADR/RID)

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
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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 (ADR/RID)	: Not applicable
Transport by air (ICAO-TI / IATA-DGR)	: Not applicable
Transport by sea (IMDG)	: Not applicable

14.5. Environmental hazards

Transport by road/rail (ADR/RID)	: None.
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 (ADR/RID)	: P200
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.
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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 : Contains no substance on the REACH candidate list
Seveso Directive : 2012/18/EU (Seveso III) : Not covered.

National regulations

Water hazard class (WGK) : 1 - Slightly hazardous to water
ABM category : B(4) - low hazard for aquatic organisms
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 - European 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 : None.

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. 2 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 2
Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3
Aquatic Acute 1	Hazardous to the aquatic environment — Acute Hazard, Category 1
Aquatic Chronic 2	Hazardous to the aquatic environment — Chronic Hazard, Category 2
Asp. Tox. 1	Aspiration hazard, Category 1



Flam. Gas 1A	Flammable gases, Category 1A
Flam. Gas 1B	Flammable gases, Category 1B
Flam. Liq. 2	Flammable liquids, Category 2
H220	Extremely flammable gas.
H221	Flammable gas.
H225	Highly flammable liquid and vapour.
H270	May cause or intensify fire; oxidiser.
H280	Contains gas under pressure; may explode if heated.
H304	May be fatal if swallowed and enters airways.
H330	Fatal if inhaled.
H331	Toxic if inhaled.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H360D	May damage the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.
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
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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