SAFETY DATA SHEET

R-1234ze(E)

Issue: June 2025 Version 2.2 Date: 25.06.2025

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

1.1. Product identifier

Trade name:	**R-1234ze(E)**
Chemical name:	Trans-1,3,3,3-Tetrafluoroprop-1-ene
Nº. CAS:	29118-24-9
REACH registration No:	01-0000019758-54-XXXX
UFI:	5C00-X01K-300K-FX6R

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

Use of the substance/mixture:	Refrigerant
Restrictions on use:	For professional use only.

1.3. Details of the supplier of the safety data sheet

Supplier name:	GAS SERVEI S.A.
Address:	C/ Motors, 151-155 nave nº 9 08038 Barcelona ESPAÑA
Telephone:	+34 (93) 2231377
Fax:	+34 (93) 2231479
	www.gas-servei.com
Email address of the person responsible for the SDS:	gas-servei@gas-servei.com

1.4. Emergency telephone number

National Institute of Toxicology and Forensic Sciences:+ 34 (91) 5620420

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture

Criteria EC Regulation 1272/2008 (Classification, Labeling, and Packaging):

Gases under pressure, Liquefied gas	H280: Contains gas under pressure; danger of explosion if heated.

2.2. Label elements

Danger pictograms: Symbols: GHS04

Word of caution:	Attention
Danger Signs:	H280: Contains pressurized gas; may explode if heated.

Safety tips:	Storage: P410+P403: Protect from sunlight. Store in a well-ventilated place.
Additional labeling:	Contains fluorinated greenhouse gases.

2.3. Other hazards

This substance/mixture does not contain components that are considered to be persistent bioaccumulative and toxic (PBT) or very persistent bioaccumulative and very persistent (vPvB) at levels of 0.1% or higher.

Ecological information: The substance/mixture does not contain components that have endocrine-disrupting properties in accordance with Article 57(f) of REACH or Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components that have endocrine-disrupting properties in accordance with Article 57(f) of REACH or Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Vapors are heavier than air and may cause asphyxia by reducing oxygen in the air breathed.
Incorrect use or intentional inhalation abuse may cause death without warning symptoms due to cardiac effects.
Rapid evaporation of the product may cause frostbite.
May displace oxygen and cause rapid asphyxia.

SECTION 3. Composition/information on ingredients

3.1. Substances

Chemical name	Concentration (%by weight)	CAS No	CE No	REACH registration No	Classification
					Regulations CE nº1272/2008
Trans-1,3,3,3-Tetrafluoroprop-1-ene (HFO 1234ze(E))	100	29118-24-9	471-480-0	01-0000019758-54-XXXX	2.5 Press. Gas H280

3.2. Mixtures

Not applicable

SECTION 4. First aid measures

4.1. Description of first aid measures

General recommendations:	In case of accident or discomfort, seek medical attention immediately. If symptoms persist or in case of doubt, seek medical advice.
Protection of first aiders:	No special precautions are required for first aiders.
In case of inhalation:	If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Consult a doctor immediately.
In case of skin contact:	Thaw frozen parts with warm water. Do not rub the affected area. Consult a doctor immediately.
In case of contact with eyes:	Consult a physician immediately.
If swallowed:	Ingestion is not considered a potential route of exposure.

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

May cause cardiac arrhythmia.

Other symptoms possibly related to misuse or abuse of inhalation are:

Cardiac sensitization	Anesthetic effects
Mild dizziness	Vértigo
Confusion	Lack of coordination
Drowsiness	Unconsciousness

The gas reduces the oxygen available for breathing.

Contact with the liquid or refrigerated gas may cause cold burns and frostbite.

4.3. Indication of any medical attention and special treatment needed

Treatment: Symptomatic treatment and supportive therapy as indicated.
Due to possible cardiac arrhythmias, catecholamines, such as epinephrine, which may be used in emergency life-support situations, should be used with particular caution

SECTION 5. Firefighting measures

5.1. Extinguishing media

Appropriate extinguishing media:
- Sprayed water
- Alcohol-resistant foam
- Carbon dioxide (CO_2)
- Powdered chemical product

Extinguishing media not appropriate: Do not use running water

5.2. Specific hazards arising from the substance or mixture

Specific hazards in firefighting:
Vapors may form a flammable mixture with air.
Exposure to combustion products may be hazardous to health
Do not inhale the gases produced.
Due to high vapor pressure, there is a risk of containers bursting if the temperature rises.

Hazardous combustion products:
- Hydrogen fluoride
- Carbonyl fluoride
- Carbon oxides
- Fluorinated compounds

5.3. Advice for firefighters

Special protective equipment for firefighting personnel:
If necessary, use self-contained breathing apparatus for firefighting.
Use personal protective equipment.

Specific methods of extinction:
Use extinguishing measures that are appropriate for the local circumstances and surroundings.
Fight the fire from a distance due to the risk of explosion..
Use water spray to cool closed containers.
Remove intact containers from the fire area if it is safe to do so.
Evacuate the area.

SECTION 6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate personnel to safe areas.
Use self-contained breathing apparatus and appropriate personal protective equipment during spill cleanup

Avoid skin contact with dripping liquid (risk of frostbite).
Ventilate the area.
Follow the safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

6.2. Environmental precautions

Do not disperse into the environment.
Prevent the product from entering the soil/subsoil.
Prevent from entering surface water or sewage systems.
Prevent further leaks or spills safely.
Retain and remove contaminated water.
In the event of a gas leak or penetration into waterways, soil, or sewer systems, inform the responsible authorities.

6.3. Methods and material for containment and cleaning up

Cleaning methods:	Ventilate the area. Do not direct the water jet at the source of the leak.
Containment and cleaning materials:	Appropriate material for collection: None. Allow to evaporate.

Local or national regulations may apply to the release and disposal of this material and to the materials and equipment used in cleaning up spills. You should determine which regulations apply.
Sections 13 and 15 of this safety data sheet provide information on certain local or national requirements.

6.4. Reference to other sections

See also sections 7, 8, 11, 12 y 13.

SECTION 7. Handling and storage

7.1. Precautions for safe handling

Technical measures:	Use equipment rated for cylinder pressure. Use a backflow prevention device on the pipe. Close the valve after each use and after emptying.
Local/total ventilation:	Use only with good ventilation.
Tips for safe handling:	Avoid contact with skin and eyes. Avoid inhaling vapors and fumes from the fluid. Do not use empty containers that have not been previously cleaned. Handle in accordance with good industrial safety and hygiene practices, based on the results of the workplace exposure assessment. Wear insulated gloves and face/eye protection. The valve protective caps and threaded plugs on the valve outlet must remain in place unless the container is secured with the valve outlet connected to the point of use. Use a check valve or trap (exhaust, siphon trap, interceptor) in the discharge line to prevent dangerous backflow into the cylinder. Before carrying out transfer operations, ensure that there are no incompatible materials and/or residues in the containers. Prevent gas from flowing back into the gas container. Use a pressure regulator when connecting the cylinder to lower pressure systems or pipes. Close the valve after each use and after emptying. DO NOT change or force connections. Prevent water from entering the gas container. Never attempt to lift the cylinder by its cap. Do not drag, slide, or roll cylinders.

Use a suitable hand truck to move the cylinder.
Keep away from heat and sources of ignition.
The transfer of liquid refrigerant from refrigerant containers to systems and from systems may cause the generation of static electricity. Ensure that there is an adequate ground connection.
Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions. Avoid the accumulation of electrostatic charges.
Take care to mitigate the risk of high pressures developing in systems, caused by temperature rise when liquid is trapped between closed valves or when containers have been overfilled.
Avoid spillage and waste. Minimize release to the environment.

Hygiene measures::

If exposure to chemicals is likely during normal use, provide eye wash stations and safety showers near the work area.
Do not eat, drink, or smoke during use.
Wash contaminated clothing before reuse.

7.2. Conditions for safe storage, including any incompatibilities

Technical requirements for warehouses and containers:

Keep cylinders in a well-ventilated place away from fire hazards.
Cylinders should be stored upright and secured to prevent them from falling or being knocked over.
Separate full containers from empty containers.
Do not store near combustible materials.
Avoid areas where salt and other corrosive materials are present.
Store in properly labeled containers.
Keep in a cool, well-ventilated place.
Keep away from direct sunlight.
Store in accordance with specific national regulations.

Instructions for common storage:

Do not store with the following types of products:
Self-reactive substances and mixtures
Organic peroxides
Oxidizers
Flammable liquids
Flammable solids
Pyrophoric liquids
Pyrophoric solids
Substances and mixtures that undergo spontaneous heating.
Substances and mixtures that, in contact with water, release flammable gases.
Explosives
Highly toxic mixtures and substances.
Very toxic mixtures and substances.
Mixtures and substances with chronic toxicity.

Recommended storage temperature: < 50 °C

Storage time: > 10 years

More information about stability during storage: The product has an indefinite shelf life when stored properly.

7.3. Specific end use(s)

Subject to Member States' regulations, the uses to which it may be applied are as follows:
Refrigerant.

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

There is no information indicating any occupational exposure limit.

Level without derivative effect (DNEL) in accordance with Regulation (CE) No. 1907/2006:

Chemical Name	CAS No	Final user	Exposure route	Potential health effects	Value (mg/m^3)
Trans-1,3,3,3-Tetrafluoroprop-1-ene	29118-24-9	Workers	Inhalation	Long term - systemic effects	3.902
		Consumers	Inhalation		830

Planned gathering canceled (PNEC) in accordance with the Regulations (CE) No. 1907/2006:

Chemical Name	CAS No	Environmental Compartment	Value
Trans-1,3,3,3-Tetrafluoroprop-1-ene	29118-24-9	Fresh water	0,1 mg/l

8.2. Exposure controls

Occupational exposure controls

Personal protective equipment must comply with the applicable EN standards: Respiratory protection EN 136, 140, 149; Protective goggles/eye protection EN 166; Protective clothing EN 340, 463, 469, 943-1, 943-2; Protective gloves CEN 374, 511; Safety footwear EN ISO 20345. Do not breathe vapors.

Engineering measures

Ensure adequate ventilation, especially in confined areas.
Minimize exposure concentrations in the workplace.

Personal protection

Respiratory protection: If there is no adequate exhaust ventilation or exposure assessment shows exposure outside recommended limits, use self-contained breathing apparatus or a positive-pressure air line with a mask.
The equipment must comply with UNE EN 14387.

Filter type: Low boiling point organic gas and vapor (AX).

Skin and body protection: Wash skin after all contact with the product.
Protective footwear should be worn when handling containers.

Hand protection:

Material: Low temperature resistant gloves

Remarks: Select chemical protective gloves based on the quantity and concentration of the hazardous substances to be handled at the workplace. It is recommended to check with the manufacturer of the above-mentioned protective gloves whether they have the necessary resistance for applications with special chemicals. Wash hands before breaks and after finishing work.
The break-through time is not determined for the product.

Eye protection Wear the following personal protective equipment:
Chemical-resistant goggles must be worn..
Face shield.
The equipment must comply with UNE EN 166.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance:	Liquefied gas
Color:	Colorless
Smell:	Lightweight, similar to ether
Odor threshold:	No data available
pH:	No data available
Melting/freezing point:	No data available
Boiling point and boiling range:	-19 °C
Flash point:	Not applicable
Evaporation rate:	Not applicable
Flammability (solid, gas):	It will not burn.
Upper explosion limit / Upper flammability limit:	Upper flammability limit Method: ASTM E681 None.
Lower explosion limit / Lower flammability limit:	Upper flammability limit Method: ASTM E681 None.
Vapor pressure:	4.985 hPa (25 °C)
Vapor density:	26,32 kg/m^3 (25 °C)
Relative density:	1,166 (25 °C) (water =1)
Density:	1,163 g/cm^3 (25 °C) (as a liquid)
Solubility:	
Water solubility:	0,373 g/l
Partition coefficient (noctanol/water):	log Pow 1,6
Auto-ignition temperature:	368 °C
Decomposition temperature:	Not applicable
Viscosity:	Not applicable
Explosive properties:	Not explosive
Combustible properties:	The substance or mixture is not classified as an oxidizer.
Particle size:	Not applicable

9.2. Other information

Critical temperature::	109,4 °C
Critical pressure:	36,35 bar

SECTION 10. Stability and reactivity

10.1. Reactivity

Not classified as a reactivity hazard.

10.2. Chemical stability

Stable when used as directed. Follow the precautionary statements and avoid incompatible materials and conditions.

10.3. Possibility of dangerous reactions

Certain mixtures of HFCs and chlorine may be flammable or reactive under certain conditions.
It may react with strong oxidizing agents.

10.4. Conditions to avoid

This substance is not flammable in air at normal temperatures and pressures. However, mixtures of this substance with air at pressures above atmospheric pressure may become combustible in the presence of an ignition source.

This substance may also become combustible in an oxygen-enriched environment (oxygen concentrations higher than those found in air).
Therefore, if a mixture containing air and this substance, or if this substance is in an oxygen-enriched environment, it may become combustible. This will depend on the relationship between 1) temperature, 2) pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be mixed with air at pressures above atmospheric pressure or at high temperatures, or in an oxygen-enriched environment. For example, this substance should NOT be mixed with air under pressure for leak testing or other purposes.
Avoid heat, flames, and sparks.

10.5. Incompatible materials

Strong oxidizing agents (oxygen and peroxides), alkali metals and alkaline earth metals, and other metals and transition metals, powdered aluminum, zinc, etc.

10.6. Hazardous decomposition products

Halogenated compounds, hydrogen fluoride from thermal decomposition and hydrolysis.

SECTION 11. Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No. 1272/2008

Information on possible routes of exposure:	Inhalation Skin contact Eye contact

a. Acute toxicity

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Acute toxicity by inhalation:	CL0 (Rat): > 207.000 ppm Exposure time: 4 h Atmosphere test: gas Method: Test guidelines OECD 403
Acute dermal toxicity	Assessment: The substance or mixture does not exhibit any acute skin toxicity.

b. Skin corrosion/irritation

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Species:	Rabbit
Method:	Test Guideline OECD 404
Result:	No skin irritation.

c. Serious eye damage/irritation

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

No data available	The study is not technically feasible.

d. Respiratory or skin sensitization

Skin sensitization

Not classified according to available information.

Respiratory awareness

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Species:	Humans
Result: Does:	Not cause skin sensitization.

e. Germ cell mutagenicity

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

In vitro genotoxicity:	Test Type: Reverse mutation test in bacteria (Ames test). Method: Test Guideline OECD 471 Result: Negative
	Test Type: In vitro chromosome aberration test Method: Test Guideline OECD 473 Result: Negative
In vivo genotoxicity:	Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay). Species: Mouse Cell type: Micronuclei Route of Administration: Inhalation (gas) Method: Test Guideline 474 del OECD Result: Negative

f. Carcinogenicity

Not classified according to available information.

g. Reproductive toxicity

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Effects on fertility:	Test type: Two-generation reproductive toxicity study Species: Rat Route of application: Inhalation Method: Test Guideline OECD 416 General toxicity in parents:NOEL: > 20.000 ppm General toxicity F1: NOEL: > 20.000 ppm
Effects on fetal development:	Species: Rat Route of application: Inhalation Method: Test Guideline OECD 414 General maternal toxicity: NOEC: 15.000 ppm Toxicity for development: NOAEC: 15.000 ppm

h. STOT - single exposure

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Not classified according to available information.

i. STOT - repeated exposure

Not classified according to available information.

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Not classified according to available information.

j. Aspiration hazard

Not classified according to available information.

11.2. Information relating to other hazards

a. Endocrine-disrupting properties

Assessment:	The mixture does not contain components that have endocrine-disrupting properties in accordance with Article 57(f) of REACH or Commission Delegated

Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 12. Ecological information

12.1. Toxicity

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Toxicity to fish:	CL0 (Cyprinius carpio (Carpa)): > 117 mg/l Exposure time: 96 h Method: Test Guideline OECD 203
Toxicity to daphnia and other aquatic invertebrates:	CE50 (Daphnia magna (Large sea flea)): > 160 mg/l Exposure time: 48 h Method: Test guidelines of the OECD 202
Toxicity to algae/aquatic plants:	ErC50 (Green algae): > 170 mg/l Exposure time:: 72 h Method: Testing Guideline of the OCDE 201 NOEC (Green algae): > 1 mg/l Exposure time:: 72 h Method: Testing Guideline of the OCDE 201

12.2. Persistence and degradability

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Biodegradability:	Result: Not readily biodegradable.

12.3. Bioaccumulation potential

Components:

Trans-1,3,3,3-Tetrafluoroprop-1-ene:

Bioaccumulation:	Remarks: Bioaccumulation is unlikely. Partition coefficient (n-octanol/agua): log Pow: ≤ 4

12.4. Mobility on land

No data available.

12.5. Results of PBT and vPvB assessment

Assessment:	This mixture does not contain components that are considered to be persistent, bioaccumulative, and toxic (PBT) or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6. Endocrine disrupting properties

Assessment:	The mixture does not contain components that have endocrine-disrupting properties according to Article 57(f) of REACH or Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7. Other adverse effects

Global warming potential

Regulation (EU) No. 2024/573 on fluorinated greenhouse gases

Product:

Global warming potential in 100 years:: 1,37

SECTION 13. Disposal considerations

13.1. Waste treatment methods

Product: Dispose of in accordance with local regulations. However, this product should be recycled or regenerated whenever possible.

Contaminated packaging: Empty pressure containers must be returned to the supplier. Operate in accordance with current local and national regulations.

13.2. Other data

Provisions relating to waste:

Directive 2006/12/CE; Directive 2008/98/CE
CE Regulation No. 1013/2006

Personal protective equipment, see section 8.

SECCIÓN 14. Información relativa al transporte

14.1. UN number or ID number

ADN:	3163
ADR:	3163
RID:	3163
IATA:	3163
IMDG:	3163

14.2. UN proper shipping name

ADR/ADN/RID:	REFRIGERANT GAS, N.O.S. (TRANS-1,3,3,3- TETRAFLUOROPROP-1-ENE)
IMDG:	REFRIGERANT GAS, N.O.S. (TRANS-1,3,3,3- TETRAFLUOROPROP-1-ENE)
IATA:	Refrigerant gas, N.O.S. (Trans-1,3,3,3-Tetrafluoroprop-1-ene)

14.3. Transport hazard class(es)

	Class	Subsidiary risks	Classification code	Hazard identification number
ADR:	2	2.2	2A	20
ADN:	2	2.2	2A	20
RID:	2	2.2, (13)	2A	20
IMDG:	2.2			
IATA:	2.2			

14.4. Packing group

Not assigned by regulation.

Tags

ADR/ADN/RID/IMDG: 2.2

IMDG / IATA: Non-flammable. Non-toxic Gas

Packing instructions

IATA (load):	200
IATA (passengers):	200

Restriction code in tunnels
ADR: (C/E)

Code EmS
IMDG: F-C, S-V

14.5. Environmental hazards
Not : (ADR/ADN/RID/IMDG)

14.6. Special precautions for user
The transport classification(s) listed are for informational purposes only and are based solely on the properties of the unpackaged/unpackaged material described in this Safety Data Sheet. Transport classifications may vary depending on the mode of transport, the size of the container/packaging, and variations in regional or country regulations.

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
REACH-Restrictions on the manufacture, placing on the market and use of certain hazardous substances, mixtures and articles (Annex XVII):
Not applicable

REACH-List of candidate substances of very high concern for authorization (Article 59):
This product does not contain substances of very high concern above the corresponding legal concentration limit (≥ 0.1% w/w).

Regulation (EC) 1005/2009 on substances that deplete the ozone layer:
Not applicable

Regulation (EU) 2019/1021 on persistent organic pollutants (consolidated version):
Not applicable

Regulation (EC) 649/2012 of the European Parliament and of the Council concerning the export and import of dangerous chemicals:
Not applicable

REACH-List of substances subject to authorization (Annex XIV):
No aplicable

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances:
Not applicable

Regulation (EC) No. 2024/573 of the European Parliament and of the Council on certain

fluorinated greenhouse gases:

The fluorinated greenhouse gas R-1234ze(E) must be supplied in returnable containers (drums/cylinders). The container contains fluorinated greenhouse gases regulated by the Kyoto Protocol. Fluorinated greenhouse gases in containers or cylinders must not be vented into the atmosphere.

15.2. Chemical safety assessment

A chemical safety assessment has been carried out for this product.

SECTION 16. Other information

This sheet cancels and replaces all previous editions.

Date of issue: June 25, 2025
Version: 2.1

This Safety Data Sheet has been prepared in accordance with:
Regulation (EC) No. 1907/2006 and its subsequent amendments:
Regulation (EU) No. 2015/830 and Regulation (EU) No. 2020/878

Text of the phrases used in section 3:

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

This document has been prepared by a competent person who has received adequate training.
The information provided herein is based on our knowledge as of the date indicated above. It refers exclusively to the product indicated and does not constitute a guarantee of particular qualities.

The user must ensure that this information is suitable and accurate for the specific use of the product.

The information is believed to be correct, but is not exhaustive and should be used only as a guide, based on current knowledge of the chemical substance or mixture and applicable to the appropriate safety precautions for the product. The list of risks, legal, regulatory, and administrative texts is not exhaustive. The recipient or user of the product is solely responsible for referring to the official regulations for the storage, handling, and use of these products.

Glossary of abbreviations

ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.
CMR: Carcinogenic, mutagenic or toxic to reproduction.
DIN: German Institute for Standardization standard.
CEx: Concentration associated with x% response.
EmS: Emergency procedure.
GHS: Globally Harmonized System of Classification and Labelling of Chemicals.
IATA: International Air Transport Association.
IBC: International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk.
IMDG: International Maritime Dangerous Goods Code.
LC: Lower concentration limit.
LC50: Lethal concentration for 50% of a test population.
NOAEL: No observable adverse effect level.
NOEL: No observable effect level.
NOELR: Non-observable effect load rate.
IMO: International Maritime Organization.
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail (COTIF).
UN: United Nations.
VLA: Environmental Limit Values.
UNRTDG: United Nations Recommendations on the Transport of Dangerous Goods.