

## SAFETY DATA SHEET

## R-227ea

Commission Regulation (EU) 2020/878 of 18 June 2020. According to Regulation (EC) No 1907/2006, Annex II, as amended. According to the REACH etc. (Amendment etc.) (EU Exit) Regulations 2020 No. 1577, as amended.

SECTION 1: Identification of the substance/mixture and of the company/undertaking		
1.1. Product identifier		
Product name	R-227ea	
Chemical name	1,1,1,2,3,3,3-heptafluoropropane	
CAS number	431-89-0	
EC number	207-079-2	
Synonyms; trade names	R-227ea/ FM-200	
1.2. Relevant identified uses of th	he substance or mixture and uses advised against	
Identified uses	Fire extinguishing agents.	
Uses advised against	For use in industrial installations or professional treatment only.	
1.3. Details of the supplier of the	-	
Supplier	Cantaş Kimya Sanayi ve Ticaret A.Ş. Çerkeşli Mahallesi, Gebze V (Kimya) İhtisas OSB, Fatma Börü Caddesi No:5/1 41455 Dilovası/ Kocaeli T el: 0212 910 1260 / (Monday - Friday, 8:30 am-17:30 pm) E-posta: info@cantaskimya.com	
1.4. Emergency telephone number	er	
Emergency telephone	Cantaş: +90 212 910 12 60	
SECTION 2: Hazards identification	n	
2.1. Classification of the substand	ce or mixture	
Classification (SI 2019 No. 720) Physical hazards	Press. Gas (Liq.) - H280	
Health hazards	Not Classified	
Environmental hazards	Not Classified	
Additional information	Classification (Regulation (EC) No. 1272/2008).	
2.2. Label elements		
EC number	207-079-2	
Hazard pictograms		
Signal word	Warning	
Signal word Hazard statements	Warning H280 Contains gas under pressure; may explode if heated.	
-		



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#### 2.3. Other hazards

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Misuse 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 suffocation.

SECTION 3: Composition/information on ingredients	
3.1. Substances	
Product name	R-227ea
Chemical name	1,1,1,2,3,3,3-heptafluoropropane
CAS number	431-89-0
EC number	207-079-2
Amount w/w	≥99.5
3.2. Mixtures	
Description	Not applicable.

#### SECTION 4: First aid measures

4.1. Description of first aid measures			
General information	Get medical attention immediately. Show this Safety Data Sheet to the medical personnel.		
Inhalation	Remove affected person from source of contamination. Move affected person to fresh air and keep warm and at rest in a position comfortable for breathing. Maintain an open airway. Loosen tight clothing such as collar, tie or belt. When breathing is difficult, properly trained personnel may assist affected person by administering oxygen. Place unconscious person on their side in the recovery position and ensure breathing can take place.		
Ingestion	Rinse mouth thoroughly with water. Remove any dentures. Stop if the affected person feels sick as vomiting may be dangerous. Do not induce vomiting unless under the direction of medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. Move affected person to fresh air and keep warm and at rest in a position comfortable for breathing. Place unconscious person on their side in the recovery position and ensure breathing can take place. Maintain an open airway. Loosen tight clothing such as collar, tie or belt.		
Skin contact	Rinse with water. Get medical attention if symptoms are severe or persist after washing.		
Eye contact	Rinse immediately with plenty of water. Remove any contact lenses and open eyelids wide apart. Continue to rinse for at least 10 minutes.		
Protection of first aiders	First aid personnel should wear appropriate protective equipment during any rescue.		
4.2. Most important symptoms and effects, both acute and delayed			
General information	The severity of the symptoms described will vary dependent on the concentration and the length of exposure.		
Inhalation	No specific symptoms known.		
Ingestion	Due to the physical nature of this product, it is unlikely that ingestion will occur.		
Skin contact	No specific symptoms known.		
Eye contact	No specific symptoms known. May be slightly irritating to eyes.		



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4.3. Indication of any immediate medical attention and special treatment needed		
Notes for the doctor	Treat symptomatically.	
SECTION 5: Firefighting measure	15	
5.1. Extinguishing media		
Suitable extinguishing media	Not applicable. The product is non-combustible.	
Unsuitable extinguishing media	Not applicable. The product is non-combustible.	
5.2. Special hazards arising from the substance or mixture		
Specific hazards	Exposure to combustion products can be a health hazard. Danger of explosion in containers if temperature rise due to high vapor pressure.	
Hazardous combustion products	No hazardous decomposition products are known.	
5.3. Advice for firefighters		
Protective actions during firefighting	Avoid breathing fire gases or vapours. Evacuate area. Cool containers exposed to heat with water spray and remove them from the fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out. If a leak or spill has not ignited, use water spray to disperse vapours and protect men stopping the leak. Control run-off water by containing and keeping it out of sewers and watercourses. If risk of water pollution occurs, notify appropriate authorities.	
Special protective equipment for firefighters	Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing. Firefighter's clothing will provide a basic level of protection for chemical incidents.	
SECTION 6: Accidental release measures		
6.1. Personal precautions, protect	tive equipment and emergency procedures	
Personal precautions	No action shall be taken without appropriate training or involving any personal risk. Keep unnecessary and unprotected personnel away from the spillage. Provide adequate ventilation. Wear protective clothing as described in Section 8 of this safety data sheet. Follow precautions for safe handling described in this	

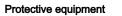
as described in Section 8 of this safety data sheet. Follow precautions for safe handling described in this safety data sheet. Wash thoroughly after dealing with a spillage. Ensure procedures and training for emergency decontamination and disposal are in place. Do not touch or walk into spilled material. 6.2. Environmental precautions **Environmental precautions** Exposure to aquatic environment unlikely. Large Spillages: Inform the relevant authorities if environmental pollution occurs (sewers, waterways, soil or air). 6.3. Methods and material for containment and cleaning up Methods for cleaning up Wear protective clothing as described in Section 8 of this safety data sheet. Clear up spills immediately and dispose of waste safely. Approach the spillage from upwind. Flush contaminated area with plenty of water. Wash thoroughly after dealing with a spillage. Dispose of waste to licensed waste disposal site in accordance with the requirements of the local Waste Disposal Authority. 6.4. Reference to other sections Reference to other sections For personal protection, see Section 8. See Section 11 for additional information on health hazards. See Section 12 for additional information on ecological hazards. For waste disposal, see Section 13.



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SECTION 7: Handling and storag	•
7.1. Precautions for safe handling	
Usage precautions	Read and follow manufacturer's recommendations. Wear protective clothing as described in Section 8 of this safety data sheet. Keep away from food, drink and animal feeding stuffs. Do not handle until all safety precautions have been read and understood. Do not handle broken packages without protective equipment.
Advice on general occupational hygiene	Wash promptly if skin becomes contaminated. Take off contaminated clothing. Do not eat, drink or smoke when using this product. Wash at the end of each work shift and before eating, smoking and using the toilet. Change work clothing daily before leaving workplace.
7.2. Conditions for safe storage, i	ncluding any incompatibilities
Storage precautions	Store away from incompatible materials (see Section 10). Store in accordance with local regulations. Keep only in the original container. Keep container tightly closed, in a cool, well ventilated place. Protect containers from damage. Keep horizontal design tube/drum/tanks horizontal, vertical design tube/drum/tank upright. Protect from sunlight. Bund storage facilities to prevent soil and water pollution in the event of spillage. The storage area floor should be leak-tight, jointless and not absorbent. Store in tightly-closed, original container. Store at temperatures not exceeding 52°C.
Storage class	Compressed gas storage.
7.3. Specific end use(s)	
Specific end use(s)	The identified uses for this product are detailed in Section 1.2.
SECTION 8: Exposure controls/P	ersonal protection
8.1. Control parameters Occupational exposure limits Long-term exposure limit (8-hour WEL = Workplace Exposure Limit	
DNEL	Workers - Inhalation; Long term systemic effects: 61279 mg/m³ General population - Inhalation; Long term systemic effects: 6355 mg/m³
PNEC	- Fresh water; 0,1 mg/l - Water, Intermittent release; 1 mg/l

8.2. Exposure controls







- STP; 1.73 mg/l

- Sediment (Freshwater); 1.3 mg/kg



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Appropriate engineering controls	Provide adequate ventilation. Personal, workplace environment or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Use process enclosures, local exhaust ventilation or other engineering controls as the primary means to minimise worker exposure. Personal protective equipment should only be used if worker exposure cannot be controlled adequately by the engineering control measures. Ensure control measures are regularly inspected and maintained. Ensure operatives are trained to minimise exposure.
Eye/face protection	Eyewear complying with an approved standard should be worn if a risk assessment indicates eye contact is possible. Personal protective equipment that provides appropriate eye and face protection should be worn. Unless the assessment indicates a higher degree of protection is required, the following protection should be worn: Tight-fitting safety glasses.
Hand protection	Chemical-resistant, impervious gloves complying with an approved standard should be worn if a risk assessment indicates skin contact is possible. The most suitable glove should be chosen in consultation with the glove supplier/manufacturer, who can provide information about the breakthrough time of the glove material. To protect hands from chemicals, wear gloves that are proven to be impervious to the chemical and resist degradation. To protect hands against cold burns, gloves must comply with the EN 511 standard. Considering the data specified by the glove manufacturer, check during use that the gloves are retaining their protective properties and change them as soon as any deterioration is detected. Frequent changes are recommended.
Other skin and body protection	Appropriate footwear and additional protective clothing complying with an approved standard should be worn if a risk assessment indicates skin contamination is possible.
Hygiene measures	Provide eyewash station and safety shower. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse. Clean equipment and the work area every day. Good personal hygiene procedures should be implemented. Wash at the end of each work shift and before eating, smoking and using the toilet. When using do not eat, drink or smoke. Preventive industrial medical examinations should be carried out. Warn cleaning personnel of any hazardous properties of the product.
Respiratory protection	Respiratory protection complying with an approved standard should be worn if a risk assessment indicates inhalation of contaminants is possible. Ensure all respiratory protective equipment is suitable for its intended use and is 'UKCA'-marked. Check that the respirator fits tightly and the filter is changed regularly. Gas and combination filter cartridges suitable for intended use should be used. Full face mask respirators with replaceable filter cartridges suitable for intended use should be used. Half mask and quarter mask respirators with replaceable filter cartridges suitable for intended use should be used.

Environmental exposure controls Keep container tightly sealed when not in use.

#### SECTION 9: Physical and chemical properties

# 9.1. Information on basic physical and chemical properties Appearance Liquefied gas Colour Colourless.

oolou	obloandoo.
Odour	Mild ethereal odor.
Odour threshold	No information available.
рН	Neutral
Melting point	-129.5°C
Initial boiling point and range	-17°C



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Flash point	Not applicable.	
Flammability (solid, gas)	Nonflammable.	
	No information available.	
Upper/lower flammability or explosive limits	No information available.	
Vapour pressure	4.547 hPa @ 25°C 540 hPa @ -30°C 29.360 hPa @ 123°C	
Vapour density	6.04	
Relative density	1.46	
Density or relative density	1.4-1.5 g/cm3	
Solubility(ies)	0.23 g/l (25 °C) (Su)	
Partition coefficient	log Pow: 2.289	
Auto-ignition temperature	532°C	
Decomposition Temperature	No information available.	
Viscosity	No information available.	
Explosive properties	Not explosive.	
Oxidising properties	Not oxidizing.	
Particle characteristics	Not applicable.	
0.0. Other information		
9.2. Other information		
9.2. Other information	No information required.	
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Other information	·	
Other information SECTION 10: Stability and reactive	·	
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Other information SECTION 10: Stability and reactive 10.1. Reactivity Reactivity 10.2. Chemical stability	rity Reactions with the following materials may cause explosions: Strong oxidising agents. Alkali metals. Alkaline earth metals. Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions.	
Other information SECTION 10: Stability and reactive 10.1. Reactivity Reactivity 10.2. Chemical stability Stability	rity Reactions with the following materials may cause explosions: Strong oxidising agents. Alkali metals. Alkaline earth metals. Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions. ctions	
Other information          SECTION 10: Stability and reactivity         10.1. Reactivity         Reactivity         10.2. Chemical stability         Stability         10.3. Possibility of hazardous reactivity	rity Reactions with the following materials may cause explosions: Strong oxidising agents. Alkali metals. Alkaline earth metals. Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions. ctions	
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Other information          SECTION 10: Stability and reactivity         10.1. Reactivity         Reactivity         10.2. Chemical stability         Stability         10.3. Possibility of hazardous reactions         10.4. Conditions to avoid	<b>rity</b> Reactions with the following materials may cause explosions: Strong oxidising agents. Alkali metals. Alkaline earth metals. Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions. <b>ctions</b> Will not polymerise.	
Other information          SECTION 10: Stability and reactivity         10.1. Reactivity         Reactivity         10.2. Chemical stability         Stability         10.3. Possibility of hazardous reactions         10.4. Conditions to avoid         Conditions to avoid	<b>rity</b> Reactions with the following materials may cause explosions: Strong oxidising agents. Alkali metals. Alkaline earth metals. Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions. <b>ctions</b> Will not polymerise.	
Other information          SECTION 10: Stability and reactivity         10.1. Reactivity         Reactivity         10.2. Chemical stability         Stability         10.3. Possibility of hazardous reactions         10.4. Conditions to avoid         Conditions to avoid         10.5. Incompatible materials	<ul> <li><i>rity</i></li> <li>Reactions with the following materials may cause explosions: Strong oxidising agents. Alkali metals. Alkaline earth metals.</li> <li>Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions.</li> <li><i>ctions</i></li> <li>Will not polymerise.</li> <li>Heat, sparks, flames. Avoid excessive heat for prolonged periods of time. pressure Oxygen. Chlorine.</li> <li>Oxidising agents. Alkali metals. Alkaline earth metals. Powdered metal. Oxidising agents.</li> </ul>	

length of



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#### SECTION 11: Toxicological information

11.1.Information on hazard classe	s as defined in Regulation (EC) No 1272/2008
Acute toxicity - oral Notes (oral LD∞)	Based on available data the classification criteria are not met.
Acute toxicity - dermal Notes (dermal LD₅₀)	Based on available data the classification criteria are not met.
Acute toxicity - inhalation Notes (inhalation LC∞)	Based on available data the classification criteria are not met.
Skin corrosion/irritation Skin corrosion/irritation	Based on available data the classification criteria are not met.
Serious eye damage/irritation Serious eye damage/irritation	Based on available data the classification criteria are not met.
Respiratory sensitisation Respiratory sensitisation	Based on available data the classification criteria are not met.
Skin sensitisation Skin sensitisation	Based on available data the classification criteria are not met.
Germ cell mutagenicity Genotoxicity - in vitro	Based on available data the classification criteria are not met.
Carcinogenicity Carcinogenicity	Based on available data the classification criteria are not met.
IARC carcinogenicity	None of the ingredients are listed or exempt.
Reproductive toxicity Reproductive toxicity - fertility	Based on available data the classification criteria are not met.
Reproductive toxicity - development	Based on available data the classification criteria are not met.
Specific target organ toxicity - sing STOT - single exposure	<b>le exposure</b> Not classified as a specific target organ toxicant after a single exposure.
Specific target organ toxicity - report STOT - repeated exposure	eated exposure Not classified as a specific target organ toxicant after repeated exposure.
Aspiration hazard Aspiration hazard	Not relevant. Gas.
General information	The severity of the symptoms described will vary dependent on the concentration and the exposure.



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Inhalation	No specific symptoms known.	
Ingestion	Due to the physical nature of this product, it is unlikely that ingestion will occur.	
Skin contact	No specific symptoms known.	
Eye contact	No specific symptoms known.	
Route of exposure	Inhalation Skin and/or eye contact	
Target organs	No specific target organs known.	
11.2. Information on other hazard	ls	
Information on other hazards	This product does not contain any known or suspected endocrine disruptors.	
SECTION 12: Ecological informat	tion	
Ecotoxicity	Not regarded as dangerous for the environment. However, large or frequent spills may have hazardous effects on the environment.	
12.1. Toxicity		
Toxicity	Based on available data the classification criteria are not met.	
Acute aquatic toxicity		
Acute toxicity - aquatic invertebrates	EC₅₀, 48 hour: >200 mg/l, Daphnia magna	

Acute toxicity - aquatic plants EC<sub>50</sub>, 72 hour: >114 mg/l, Pseudokirchneriella subcapitata

No data available.

12.2. Persistence	e and	degradability	

Persistence and degradability	Not inherently biodegradable.
12.3. Bioaccumulative potential	
Bioaccumulative potential	No data available on bioaccumulation.
Partition coefficient	log Pow: 2.289

12.5. Results of PBT and vPvB assessment

Results of PBT and vPvB This product does not contain any substances classified as PBT or vPvB. assessment

12.6. Endocrine disrupting properties

12.4. Mobility in soil

Mobility

**Endocrine disrupting properties** The product does not contain any endocrine disrupting substance.



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12.7. Other adverse effects	
Other adverse effects	None known.
SECTION 13: Disposal considera	tions
13.1. Waste treatment methods	
General information	The generation of waste should be minimised or avoided wherever possible. Disposal of this product, process solutions, residues and by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any local authority requirements. When handling waste, the safety precautions applying to handling of the product should be considered. Empty containers or liners may retain some product residues and hence be potentially hazardous.
Disposal methods	Do not empty into drains. Dispose of surplus products and those that cannot be recycled via a licensed waste disposal contractor. Waste, residues, empty containers, discarded work clothes and contaminated cleaning materials should be collected in designated containers, labelled with their contents. Waste packaging should be collected for reuse or recycling.

SECTION 14: Transport information		
14.1. UN number or ID number		
UN No. (ADR/RID)	3296	
UN No. (IMDG)	3296	
UN No. (ICAO)	3296	
UN No. (ADN)	3296	
14.2. UN proper shipping name		
Proper shipping name (ADR/RID)	HEPTAFLUOROPROPANE (REFRIGERANT GAS R227)	
Proper shipping name (IMDG)	HEPTAFLUOROPROPANE (REFRIGERANT GAS R227)	
Proper shipping name (ICAO)	HEPTAFLUOROPROPANE (REFRIGERANT GAS R227)	
Proper shipping name (ADN)	HEPTAFLUOROPROPANE (REFRIGERANT GAS R227)	
14.3. Transport hazard class(es)		
ADR/RID class	2.2	
ADR/RID classification code	2A	
ADR/RID label	2.2	
IMDG class	2.2	
ICAO class/division	2.2	
ADN class	2.2	



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#### **Transport labels**



#### 14.4. Packing group

Not applicable.

#### 14.5. Environmental hazards

Environmentally hazardous substance/marine pollutant No.

14.6. Special precautions for user		
EmS	F-C, S-V	
ADR transport category	3	
Emergency Action Code	2T	
Hazard Identification Number (ADR/RID)	20	
Tunnel restriction code	(C/E)	
Limited quantities (ADR)	120 ml	
14.7. Maritime transport in bulk according to IMO instruments		
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

National regulations	<ul> <li>Health and Safety at Work etc. Act 1974 (as amended).</li> <li>The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (SI 2009 No. 1348) (as amended) ["CDG 2009"].</li> <li>EH40/2005 Workplace exposure limits.</li> <li>Commission Regulation (EU) 2020/878 of 18 June 2020.</li> <li>Commission Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)</li> <li>Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures (as amended).</li> </ul>
Authorisations (SI 2020 No. 1577 Annex XIV) and REACH 1907/2006, Annex XIV	No specific authorisations are known for this product.
Restrictions (SI 2020 No. 1577 Annex XVII) and REACH 1907/2006, Annex XVII	No specific restrictions on use are known for this product.



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Seveso Directive - Control of Not relevant. major accident hazards

#### 15.2. Chemical safety assessment

No chemical safety assessment has been carried out.

#### **SECTION 16: Other information**

Abbreviations and acronyms used	ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.
in the safety data sheet	ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland
	Waterways.
	RID: European Agreement concerning the International Carriage of Dangerous Goods by Rail.
	IATA: International Air Transport Association.
	ICAO: Technical Instructions for the Safe Transport of Dangerous Goods by Air.
	IMDG: International Maritime Dangerous Goods.
	CAS: Chemical Abstracts Service.
	ATE: Acute Toxicity Estimate.
	LC50: Lethal Concentration to 50 % of a test population.
	LD50: Lethal Dose to 50% of a test population (Median Lethal Dose).
	EC₅₀: 50% of maximal Effective Concentration.
	PBT: Persistent, Bioaccumulative and Toxic substance.
	vPvB: Very Persistent and Very Bioaccumulative.
Classification abbreviations and acronyms	Press. Gas (Liq.) = Gas under pressure: Liquefied gas
Key literature references and	This SDS is prepared based on the information received from the product owner.
sources for data	Source: European Chemicals Agency, http://echa.europa.eu/
Classification procedures according to SI 2019 No. 720	Press. Gas (Liq.) - H280: : Expert judgement.
according to SI 2019 No. 720	
Revision comments	SDS has been revised under the current regulations.
Issued by	Büşra Tarakci / CRAD
	gbf@crad.com.tr Tel.:+90 216 3354600
Revision date	31/05/2023
Revision	0.1
Supersedes date	24/01/2020
SDS number	9860
Hazard statements in full	H280 Contains gas under pressure; may explode if heated.

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty, guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such information for his own particular use.