411 **(AEROSOL)**

Safety Data Sheet

Section 1: Product and Company Identification

Product Identifier and Other Means of Identification

Product Identifier: HFE Electronics Cleaner

Other Means of Identification: HFE Nettoyant Pour Électronique

Related Part # 411-300G

Recommended Use and Restriction on Use

Use: Precision electronic cleaner

Uses Advised Against: For industrial use only; Not for use as a medical device or drug

Details of Manufacturer or Importer

Manufacturer
MG Chemicals
1210 Corporate Drive
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CANADA

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FAX +1-800-340-0773
E-MAIL support@mgchemicals.com
WEB www.mgchemicals.com

MG Chemicals (Head Office)
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Surrey, British Columbia V4N 4E7
CANADA

☎ +1-905-331-1396
FAX +1-905-331-2682
E-MAIL info@mgchemicals.com

E-MAIL (Competent Person): sds@mgchemicals.com

Emergency Phone Number

For hazardous material incidents ONLY (leaks, spills, fires, exposures or accidents)
USA or CANADA—Call Verisk 3E at ***+1-866-519-4752*** or ***+1-760-476-3962***
(Service access code: 335388)

For emergencies involving the transport of dangerous goods; 24/7 service
CANADA—Call CANUTEC collect at ***+1-613-996-6666*** or ****666*** on cellular phones

Section 2: Hazards Identification

Classification of Hazardous Chemical

GHS Categories

Criteria		Category	Signal Word	Pictograms
Aerosol		3	Warning	None
Gas under pressure	Liquefied gas	1	Warning	Gas cylinder
Hazardous to the Aquatic Environment	Chronic	4	none	None

Note: The degree of severity is ranked within each hazard class from 1 (Highest Severity) to up to 5 (Lowest Severity), which is opposite to HMIS and NFPA conventions. Severity category rankings do not allow comparisons between classes.

Label Elements

Signal Word	**WARNING**
Pictograms	**Hazard Statements**
	H280: Contains gas under pressure; may explode if heated
No Symbol Mandated	H413: May cause long lasting harmful effects to aquatic life
Prevention	**Precautionary Statements**
P102	Keep out of reach of children.
P210	Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking.
P251	Do not pierce or burn, even after use.
P273	Avoid release to the environment.
Storage	**Precautionary Statements**
P410 + P412, P403	Protect from sunlight. Do not expose to temperatures exceeding 50 °C [122 °F]. Store in a well-ventilated place.
Disposal	**Precautionary Statements**
P501	Dispose of contents in accordance to local, regional, national, and international regulations.

Section continued on the next page

Hazards Not Otherwise Classified

Other Criteria	Hazard Statements/Precautionary Statement	Signal Word	Pictograms
Simple Asphyxiant	May displace oxygen and cause rapid suffocation.	Warning	None

Section 3: Hazardous Ingredients

CAS #	Chemical Name	%(weight)
163702-08-7	methyl nonafluoroisobutyl ether	35–40%
163702-07-6	methyl nonafluorobutyl ether	35–40%
811-97-2	1,1,1,2-tetrafluoroethane	30%

Note: The solvent belongs to the hydrofluoroether (HFE) solvent family. The propellant is commonly referred to as HFC-134a.

Section 4: First-Aid Measures

Exposure Condition	*GHS Code: Precautionary Statement*
IF INHALED	P304 + P340, P312
Immediate Symptoms	In case of severe overexposure: *dizziness, drowsiness, heart thumping, light headedness*
Response	Remove person to fresh air (out of the contaminated zone) and keep comfortable for breathing. If feeling unwell: Call a POISON CENTRE or doctor.
IF IN EYES	P305 + P351 + P338
Immediate Symptoms	*low toxicity: no symptoms known or expected*
Response	Rinse cautiously with water for 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

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IF ON SKIN	P302, P332 + P313
Immediate Symptoms	*low toxicity: no symptoms known or expected*
Response	Wash with soap and water. If skin irritation occurs: Get medical advice.
IF SWALLOWED	P301 + P330
Immediate Symptoms	*low toxicity: no symptoms known or expected*
Response	Rinse mouth.

Advice to Doctors

Avoid giving catecholamine drugs (such as adrenaline) because of possible heart problems. Treat symptomatically.

Section 5: Fire-Fighting Measures

Extinguishing Media	In case of fire: Use extinguishing media suitable for surrounding material. Use water spray to cool container.
Specific Hazards	Aerosol container may erupt with force at temperatures above 50 °C [122 °F]. Produces toxic smoke in fires or in contact with hot surfaces. Thermal decomposition may start above 150 °C. Prevent fire-fighting wash from entering waterway or sewer system.
Combustion Products	Produces carbon oxides (CO, CO_2), fluorinated compounds, hydrogen fluoride, perfluoroisiobutylene (PFIB), and toxic smoke. Under excessive heat, the hydrogen fluoride formation is one thousand times more likely than for PFIB. In sealed vessels above 300 °C, the PFIB may accumulate to dangerous levels. Hydrogen fluoride has the following exposure limits: ACGIH TWA 3 ppm; OSHA PEL 3 ppm; and OSHA STEL 6 ppm. Its odor threshold is 0.04 ppm, providing an early warning.
Fire-Fighter	Wear self-contained breathing apparatus and full fire-fighting turn-out gear.

Section 6: Accidental Release Measures

Personal Protection	See personal protection recommendations in Section 8. For very large spills, wear self-contained breathing apparatus before approaching the spill.
Precautions for Response	For aerosol can spills in confined or low lying space, leave the immediate spill area. If it can safely be done, extinguish open flames or remove high temperature sources to avoid producing toxic decomposition products.
Environmental Precautions	Avoid releasing to the environment.
Containment Methods	Not applicable
Cleaning Methods	Collect liquid in a sealable, solvent-resistant container. Sprinkle inert absorbent compound onto spill, then sweep into the container. Wipe up further residue with paper towels or rags and place dirty materials in container.
Disposal Methods	Dispose of spill waste according to Section 13.

Section 7: Handling and Storage

Prevention	Keep out of reach of children. Avoid breathing gas, mist or spray. In cases of inadequate ventilation wear respiratory protection. Use only outdoors or in a well-ventilated area. Do not pierce or burn, even after use. Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking. Avoid heated surfaces exceeding 50 watts/inch^2. Avoid release to the environment.
Handling	Wear protective gloves, protective clothing, and eye protection.
Storage	Protect from sunlight. Do not expose to temperatures exceeding 50 °C [122 °F]. Do not store below -26 °C [-15 °F], which can crush the can due to the propellant liquefaction.

Section 8: Exposure Controls/Personal Protection

Substances with Occupational Exposure Limit Values

Chemical Name	Country	Long Term Exposure Limits (PEL)	Short Term Exposure Limits (STEL)
methyl nonafluoroisobutyl ether	AIHA WEEL (TWA) ACGIH U.S.A. OSHA PEL Canada	750 ppm Not established Not established Not established	Not established Not established Not established Not established
methyl nonafluorobutyl ether	AIHA WEEL (TWA) ACGIH U.S.A. OSHA PEL Canada	750 ppm Not established Not established Not established	Not established Not established Not established Not established
1,1,1,2-tetrafluoroethane	*MG Chemicals* a) ACGIH U.S.A. OSHA PEL Canada	1 000 ppm Not established Not established Not established	Not established Not established Not established Not established

Note: Ingredients are listed in descending weight contribution order (from greatest to least). The ACGIH[1], OSHA (Table Z-1), and Canadian provinces exposure limits were consulted. Limits from the RTECS database[2] and from suppliers' SDSs were also consulted. Short term exposure limits (STEL) are usually for 15 min and long term permissible exposure limits (PEL) for 8 h.

a) MG Chemicals recommended limit corresponding to prevalent international threshold values

Engineering Controls

Ventilation Keep airborne concentrations below the occupational exposure limits (OEL).

Personal Protective Equipment

Eye protection Wear appropriate protective eyeglasses or chemical safety goggles.

RECOMMENDATION: Use safety glasses with lateral protection (side shields).

Skin Protection Wear appropriate protective clothing to prevent skin contact.

RECOMMENDATION: Use of protective gloves in butyl rubber, nitrile rubber, or other chemically resistant gloves.

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Respiratory Protection	Not required under normal use conditions. In high exposure scenarios, use a full-face respirator with multipurpose combination of (US) or type AXBEK (EN 13387) to supplement engineering control. For extreme exposures and for exposures where thermal decomposition is possible (>150 °C), use full-face, self-contained breathing apparatus or supplied by air. **RECOMMENDATION:** Consult your local safety supply store to ensure that your respirator has a NIOSH (U.S.) approved filter cartridges appropriate for the ingredients listed in Section 3. The respirator should be fitted to the employee by a professional. Ensure vapor cartridges are stored in sealed plastic bags when not being used.

General Hygiene Considerations

Wash hands thoroughly with water and soap after handling.

Section 9: Physical and Chemical Properties

Physical State	Liquefied gas, in aerosol format	**Lower Flammability Limit**	Not applicable
Appearance	Colorless	**Upper Flammability Limit**	Not applicable
Odor	Slight, ether-like	**Vapor Pressure @20 °C**	27 kPa [202 mmHg]
Odor Threshold	Not available	**Vapor Density**	8.6 (Air =1)
pH	Not available	**Relative Density @20 °C**	1.5
Freezing/Melting Point	-135 °C [-221 °F]	**Solubility in Water**	<12 ppm
Initial Boiling Point	60 °C [140 °F]	**Partition Coefficient n-octanol/water**	3.9
Flash Point	Not applicable	**Auto-ignition Temperature**	405 °C [761 °F]
Evaporation Rate	49 (ButAc = 1)	**Decomposition Temperature**	Not available
Flammability	Non Flammable	**Viscosity @23 °C**	0.6 cP

Note: Values are based mostly on the HFE solvent properties.

Section 10: Stability and Reactivity

Reactivity	Not applicable
Stabilities	Chemically stable at normal temperatures and pressures
Conditions to Avoid	Ignition sources, temperatures well above 50 °C [122 °F] and incompatible substances.
Incompatibilities	Strong oxidizing agents, strong acids, strong bases, alkali earth metals, powdered aluminum, zinc, magnesium, and beryllium.
Polymerization	Will not occur
Decomposition	Will not decompose under normal conditions. For thermal decomposition, see combustion products in Section 5.

Section 11: Toxicological Information

Summary of Effects and Symptoms by Routes of Exposure

Eyes	Low toxicity: no symptoms known or expected
Skin	Low toxicity: no symptoms known or expected
Inhalation	In case of severe overexposure: dizziness, drowsiness, heart thumping, and light headedness.
Ingestion	Low toxicity: no symptoms known or expected
Chronic	Not applicable

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Acute Toxicity (Lethal Exposure Concentrations)

Chemical Name	LD50 oral	LD50 dermal	LC50 inhalation
methyl nonafluoroisobutyl ether	>5 g/kg Rat [a)]	Not available [b)]	>100 000 ppm 4 h Rat [a)]
methyl nonafluorobutyl ether	>5 g/kg Rat [a)]	Not available [b)]	>100 000 ppm 4 h Rat [a)]
1,1,1,2-tetrafluoroethane	Not available	Not available	1 500 g/m^3 4 h Rat

Note: Toxicity data from the RTECS[2] and ECHA databases were consulted. The data from supplier SDSs were also consulted.

a) Data from supplier SDS

b) Dermal absorption not signification route of exposure (5 daily applications in rabbits).

Other Toxicological Effects

Skin corrosion/irritation	Based on available data, the classification criteria are not met.
Serious eye damage/irritation	Based on available data, the classification criteria are not met.
Sensitization (allergic reactions)	Based on available data, the classification criteria are not met. No signs of cardiac sensitization at up to 100 000 ppm.
Carcinogenicity (risk of cancer)	Not classified or listed as a carcinogen by IARC, ACGIH, CA Prop 65, or NTP.
Mutagenicity (risk of heritable genetic effects)	Based on available data, the classification criteria are not met.
Reproductive Toxicity (risk to sex functions)	Based on available data, the classification criteria are not met.
Teratogenicity (risk of fetus malformation)	Based on available data, the classification criteria are not met.
STOT-single exposure	The HFC propellant can affect the central nervous system and cardiovascular systems by inhalation at extreme doses that do not give rise to classification
STOT-repeated exposure	Based on available data, the classification criteria are not met.
Aspiration hazard	The liquid content does not meet the aspiration hazard criteria. The mixture doesn't contain category 1 substances.

Section 12: Ecological Information

Ecological classifications are based on the IMDG/GHS criteria in conjunction with ecotoxicological data from our suppliers, the European Chemical Agency database (http://echa.europa.eu), and other reliable sources.

The HFE mixture has a LC50 of >7.9 mg/L for flathead minnow (Pimpehales promelas) 96 h, >8.9 mg/L for green algae (Selenastrum capricornutum) 96 h, and >10 mg/L water flea (Daphnia magna). It is unlikely bioconcentrate in water or soil due to volatility.

The 1,1,1,2-tetrafluoroethane substance is not classifiable as an environmental toxicant.

Acute Ecotoxicity

See chronic ecotoxicity.

Chronic Ecotoxicity

Category 4

May cause long lasting harmful effects to aquatic life

Avoid release to the environment.

Biodegradability

Partially biodegradable

Biological Oxygen Demand—28 days, OECD 310D Close bottle test= 22% (w/w)

Bioaccumulative Potential

Not available

Mobility in Soil

Not available

Other Effects

Not available

Commercial Products—Regulated Volatile Organic Content

Canadian WHMIS and US EPA-VOC = VOC-exempted

Section 13: Disposal Information

Dispose of contents in accordance with all local, regional, national, and international regulations.

Section 14: Transport Information

Ground

Refer to TDG (Canadian Transportation of Dangerous Goods regulations) **and** USA DOT 49 CFR (Parts 100 to 185) Regulations.	
Sizes 1 L and under *411-300G* **Limited Quantity** 	

Air

Refer to ICAO-IATA Dangerous Goods Regulations.	
Sizes 1 L and under *411-300G* **Limited Quantity** Max Net Qty/Pkg 30 kg Gross 	*FOR REFERENCE ONLY* **UN number**: UN1950 **Shipping Name:** Aerosols, non-flammable **Class:** 2.2 **Packing Group**: Not applicable **Marine Pollutant**: No

Section continued on the next page

Sea

Refer to IMDG Regulation.	
Sizes 1 L and under *411-300G* **Limited Quantity** 	*FOR REFERENCE ONLY* **UN number**: UN1950 **Shipping Name**: Aerosols, non-flammable **Class**: 2.2 **Packing Group**: Not applicable **Marine Pollutant**: No

Note: **Shipper must be appropriately <u>trained and certified</u> before involvement with the transport of dangerous goods.**

Section 15: Regulatory Information

Canada

Domestic Substance List (DSL) / Non-Domestic Substance Lists (NDSL)

All hazardous ingredients are listed on the DSL/NDSL.

Hazardous Products Act (R.S.C., 1985, c. H-3)

The safety data sheet and label comply with the Hazardous Product Act and WHMIS 2015.

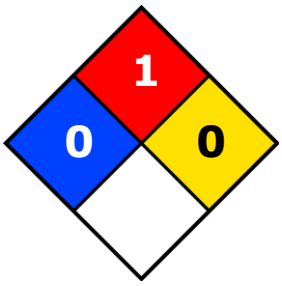
USA

Other Classifications

HMIS® RATING

HEALTH:	* 0
FLAMMABILITY:	1
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	

NFPA® 704 CODES



Approximate HMIS and NFPA Risk Ratings Legend:
0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

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CAA (Clean Air Act, USA)

This product does not contain any class 1 ozone depleting substances.

This product does not contain any class 2 ozone depleting substances.

This product does not contain substances that are listed as hazardous air pollutants.

EPCRA (Emergency Planning and Right to Know Act, USA, 40 CFR 372.45)

This product does not contain ingredients that are subject to the reporting requirements of section 313 Title III of the SARA of 1986 and 40 CFR part 372.

TSCA (Toxic Substances Control Act of 1976, USA)

All substances are TSCA listed.

California Proposition 65 (Chemicals known to cause cancer or reproductive toxicity, USA).

This product does not contain any of the listed substances.

Europe

RoHS (Restriction of Hazardous Substance Directive)

This product does not contain any lead, cadmium, mercury, hexavalent chromium, PBB's, PBDE's, DEHP, BBP, DBP, or DIBP and complies with European RoHS regulations.

WEEE (Waste Electrical and Electronic Equipment Directive)

This product is not a piece of electrical or electronic equipment and is therefore not governed by this regulation.

Section 16: Other Information

SDS Prepared by	MG Chemicals' Regulatory Department
Date of Issue	26 February 2020
Supersedes	25 July 2019

Reason for Changes: Update to the emergency phone number.

References

1) ACGIH *2017 TLVs and BEIs: Based on the documentation of the threshold limit values for chemical substances and physical agents & biological exposure indices*, American Conference of Governmental of Industrial Hygienist Cincinnati, OH (2017).

2) All toxicological data were checked against the RTECS (Registry of Toxic Effects of Chemical Substances®)

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Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists (USA)
ECHA	European Chemicals Agency
EU	European Union
EC50	Half maximal effective concentration
EL50	Half maximal effective loading
IARC	International Agency for Research on Cancer
NOELR	No observable effect loading ratio
NTP	National Toxicology Program
GHS	Globally Harmonized System of Classification of Labeling of Chemicals
LC50	Lethal Concentration 50%
LCLo	Lowest published lethal concentration
LD50	Lethal Dose 50%
OEL	Occupational Exposure Limit
PEL	Permissible Exposure Limit
SDS	Safety Data Sheet
STEL	Short-Term Exposure Limit
TCLo	Lowest published toxic concentration
TWA	Time Weighted Average
VOC	Volatile Organic Content

Technical Queries Contact us regarding any questions, improvement suggestions, or problems with this product. Application notes, instructions, and FAQs are located at www.mgchemicals.com.

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