Safety Data Sheet

Section 1: Product and Company Identification

Product Identifier and Other Means of Identification

Product Name: HFE Solvent

SDS Code: 411-Aerosol

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
Burlington, Ontario L7L 5R6
CANADA

☎ +1-800-340-0772
FAX +1-800-340-0773
E-MAIL support@mgchemicals.com
WEB www.mgchemicals.com

MG Chemicals (Head Office)
9347-193 Street
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 CHEMTREC ☎: ***1-800-424-9300***

For emergencies involving dangerous goods; Collect 24/7
CANADA: Call CANUTEC ☎: ***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

Label Elements

Signal Word	WARNING
Pictograms	**Hazard Statements**
	H280: Contains gas under pressure; may explode if heated
No Symbol Mandated	H401: Toxic to Aquatic Life
Prevention	**Precautionary Statements**
P410 + P412	Protect from sunlight. Do not expose to temperatures exceeding 50 °C [122 °F].
P11	Do not spray on an open flame or other ignition source.
P251	Do not pierce or burn, even after use.
Storage	**Precautionary Statements**
P403 + P235	Store in well ventilated place. Keep cool.
Disposal	**Precautionary Statements**
P501	Dispose of contents/container in accordance to local/regional/international regulations.

Section continued on the next page

Hazards Not Otherwise Classified

Other Criteria	Hazard Statements/Precautionary Statement	Signal Word	Pictograms
Inhalation overexposure	Inhalation overexposure following an intentional abuse or use in confined space may cause cardiac or central nervous systems effects.	*none*	*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 IN EYES	P305 + P351 + P338
Immediate Symptoms	*none expected*
Response	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF ON SKIN	P302, P332 + P313
Immediate Symptoms	*none expected*
Response	Wash with soap and water. If skin irritation occurs: Get medical advice.
IF INHALED	P304 + P340, P312
Immediate Symptoms	In case of severe overexposure: *dizziness, drowsiness, heart thumping, lightheadedness*
Response	Remove person to fresh air (out of the contaminated zone) and keep comfortable for breathing. If feeling unwell: Call a POISON CENTRE/doctor.

Section continued on the next page

IF SWALLOWED	P301
Immediate Symptoms	*none expected*
Response	Treat according to symptoms.

Section 5: Fire-Fighting Measures

Extinguishing Media	In case of fire: Material will not burn. 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	Not required under normal use.
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/spray. In cases of inadequate ventilation wear respiratory protection. Use only outdoors or in well ventilated area. Do not pierce or burn, even after use. Keep away from heat/sparks/open flames/hot surfaces. No smoking. Avoid heated surfaces exceeding 50 watts/inch^2.
Handling	Wear protective gloves/protective clothing.
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)
1,1,1,2-tetrafluoroethane	*MG Chemicals* [a)]	1,000 ppm	Not established
methyl nonafluoroisobutyl ether	AIHA WEEL (TWA)	750 ppm	Not established
methyl nonafluorobutyl ether	AIHA WEEL (TWA)	750 ppm	Not established

Note: Ingredients are listed in descending weight contribution order (from greatest to least). The ACGIH[1], OSHA, and Canadian provinces exposure limits were consulted. Limits from by RTECS[2] database and data from suppliers' SDS 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 exposure limits.

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.

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 your respirator has filter cartridges appropriate for the ingredients listed in section 3 of this MSDS, and that the respirator is fitted to the employee by a professional.

Section continued on the next page

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**	None detected
Appearance	Colorless	**Upper Flammability Limit**	None detected
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	**Specific Gravity @20 °C**	1.5
Freezing/Melting Point	-135 °C [-221 °F]	**Solubility in Water**	<12 ppm
Boiling Point	60 °C [140 °F]	**Partition Coefficient** [a)]	3.9
Flash Point	None detected	**Auto-ignition Temperature**	405 °C [761 °F]
Evaporation Rate	49 (ButAc = 1)	**Decomposition Temperature**	Not available
Flammability (solid, gas)	Not available	**Viscosity @23 °C**	0.6 cP

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

Section 10: Stability and Reactivity

Stabilities	Chemically stable at normal temperatures and pressures
Conditions to Avoid	Ignition sources, temperatures well above 150 °C [302 °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

Routes of Exposure

Eyes, ingestion, inhalation

Symptoms Summary

Eyes None known

Skin None known

Inhalation None known

Ingestion None known

Chronic Not applicable.

Acute Toxicity (Lethal Exposure Concentrations)

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

Note: Representative toxicity data from by RTECS[2] database and data from supplier (M)SDS were also consulted.

a) Data from supplier SDS

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

Continued on the next page

Other Toxicological Effects

Skin corrosion/irritation	Minimally irritant
Serious eye damage/irritation	Practically non-irritant
Sensitization (allergic reactions)	None known or expected. No signs of cardiac sensitization at up to 100 000 ppm. No skin sensitization effects known.
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)	Not a mutagen according to reverse mutation or chromosomal aberration assay
Reproductive Toxicity (risk to sex functions)	No data available
Teratogenicity (risk of fetus malformation)	No abnormal effect observed
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	No data available
Aspiration hazard	Mixture is does not contain aspiration hazard components.

Section 12: Ecological Information

The IMDG Code criteria and the raw-material MSDS along with supporting data for the classification of registered substances from the European Chemical Agency database (http://echa.europa.eu) were used.

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

Category 2

Toxic to aquatic life

Avoid release to the environment

Collect spillage.

Chronic Ecotoxicity

Data insufficient for classification

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 regulations (Canadian Transportation of Dangerous Goods regulations

Sizes 1 L and under **Limited Quantity** 	REFERENCE INFORMATION ONLY **UN number**: UN1950 **Shipping Name:** Aerosols, non-flammable **Class:** 2.2 **Packing Group**: Not applicable **Marine Pollutant:** No

Air

Refer to ICAO-IATA Dangerous Goods Regulations.

Sizes 1 L and under **Limited Quantity** Max Net Qty/Pkg 30 kg Gross 	**UN number**: UN1950 **Shipping Name:** Aerosols, non-flammable **Class:** 2.2 **Packing Group**: Not applicable **Marine Pollutant:** No

Sea

Refer to IMDG Dangerous Goods Regulations.

Sizes 1 L and under **Limited Quantity** 	REFERENCE INFORMATION 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.

Industry and Science Canada

MG Labels products intended for the workplace to conform to WHMIS labeling regulations. Product identification, net quantity declaration, minimum printing type size heights, and packaging of this product are in compliance.

Health Canada

Products produced by MG Chemicals intended for retail display conform to the Canadian Consumer Labeling Regulations.

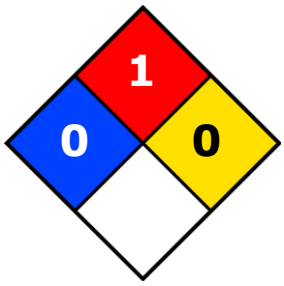
USA

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)

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.

Section continued on the next page

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

This product does not contain ingredients that have a reporting quantity requirements in 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, Sept 2, 2011 revision, USA).

This product does not contain any of the listed substances.

Europe

RoHS

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

WEEE

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

Section 16: Other Information

SDS Prepared by	Michel Hachey
Date of Issue	04 March 2016
Supersedes	16 May 2013

Reason for Changes: Revision according to HCS 2012 and WHMIS 2015 latest requirements.

References

1) ACGIH *2011 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 (2011).

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

Section continued on the next page

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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