



Description

The 411 *HFE Electronics Cleaner* is a hydrofluoroether, zero residue, plastic safe, non-flammable, and non-conductive cleaner degreaser that can be used on live circuits. The cleaner provides a high degree of safety for the equipment, workers, and the environment without sacrificing performance. It is approved by the EPA under the SNAP program as a low toxicity replacement of ozone-depleting substances. It offers a similar cleaning performance to similar CFC type cleaners but without the accompanying safety concerns.

Due to its high density, low surface tension, and low viscosity, the 411 cleaner will easily drip off even the most complex geometries without becoming trapped in small spaces.

Applications & Usages

The 411 is used to clean live circuits, contacts, motors, and other electronic equipment. It is a light duty cleaner that cleans light oils, release agents, fluoro compounds, light flux residues, and particulates.

Benefits and Features

- **Suitable for Use in Food Facilities as a Non-Food Chemical**—Canadian and NFS recognition letters available on request
- **Energized circuit safe**—maintenance cleaning can be done without cutting the power
- **Equipment safe**—Highly compatible with plastics and metals; electrically non-conductive
- **Workplace safe**—low toxicity, non-flammable, and chemically stable
- **Environmentally safe**—non-VOC, low global warming, short atmospheric life, non-ozone-depleting substance
- **Approved by US EPA SNAP program, without restrictions**
- **Replaces Freon TF solvent**
- **Zero residue**
- **Low surface tension and viscosity**—will not cling to surface or get trapped in small spaces

NOTE

Safe for use on live circuits.
NON-FLAMMABLE AEROSOL

Usage Parameters

<i>Properties</i>	<i>Value</i>
Shelf Life	5 y

Temperature Ranges

<i>Properties</i>	<i>Value</i>
Storage Temperature Limits ^{a)}	-20 to 40 °C [-4 to 104 °F]

a) Storage below zero is not necessary. Cool, dry, and well ventilated area recommended.

Properties

<i>Physical Property</i>	<i>Method</i>	<i>Value</i>
Non-Volatile Residue Color Odor Density Viscosity @25 °C [77 °F] Freezing Point Boiling Point Vapor Pressure @20 °C [68 °F] Relative Evaporation Rate	— Brookfield SP1	<2 ppm maximum Clear, colorless Low-odor, slightly ethereal 1.5 g/mL 0.6 cP [0.0006 Pa·s] -135 °C [-221 °F] 60 °C [140 °F] 27 kPa [202 mmHg] 8.6 (Air = 1)
<i>Safety Properties</i>	<i>Method</i>	<i>Value</i>
Flammability Flash Point	Flame extension test Closed Cup	Non-flammable aerosol None detected
Volatile Organic Compound (VOC) Ozone Depletion Potential (ODP) Global Warming Potential (GWP) ^{a)} HFE 134a Propellant		VOC-exempted 0 320 1 430

a) GWP for 100 year integration time horizon for cleaner content.

<i>Solvation Parameters</i>	<i>Values</i>	
Solubility in water Solubility for water	Insoluble, <12 ppm Insoluble, <95 ppm	
Surface tension (dynes/cm)	13.6	
Hansen Solubility Parameters ^{a)}	[MPa] ^{1/2}	(cal/cm ³) ^{1/2}
Total	13.9	6.8
Non-Polar	13.7	6.7
Polar	2.2	1.1
Hydrogen Bonding	1.0	0.5

a) Hansen parameters calculate using component literature values and volume fraction composition.

Compatibility

It is compatible with many plastics, seals, PCB components, paints, rubbers, and plant fibers.

ATTENTION! Always perform a compatibility test on a non-critical area or a representative test substrate prior to use. Test even if the compatibility chart predicts a high compatibility: modern parts may incorporate undeclared sensitive materials (such as custom plastic blends, custom additives, protective coatings, or decorative coatings).

Health, Safety, and Environmental Awareness

Please see the 411-Aerosol **Safety Data Sheet** (SDS) for more details on transportation, storage, handling and other security guidelines.

Environmental Impact: This product has a low environmental impact. It is RoHS compliant. The HFC-134a is subject to EU F-gas Regulations.

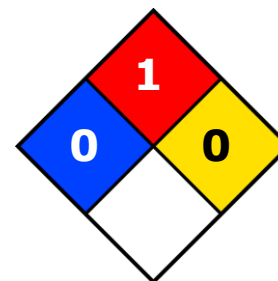
This product meets the European Directive 2011/65/EU Annex II (ROHS); recasting 2002/95/EC.

Health and Safety: This liquid cleaner is of low toxicity. Inhalation of the propellant can lead to dizziness and drowsiness.

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)

Application Instructions

To clean residues in aerosol format

1. Spray dirty area.
2. Ensure that wash runs off the circuit board along the shortest unencumbered path to prevent redeposit of solvated residues.

Packaging and Supporting Products

<i>Cat. No.</i>	<i>Packaging</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Packaging Weight</i>	
411-300G	Aerosol	250 mL	8.48 fl oz	300 g	10.5 oz	4.2 kg ^{a)}	9.3 lb ^{a)}

a) Pack of ten bottles

Supporting Products

- *Hog Hair Cleaning Brush*: Cat. No. 852
- *Large Hog Hair Cleaning Brush*: Cat. No. 853

Technical Support

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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Warranty

M.G. Chemicals Ltd. warrants this product for 12 months from the date of purchase by the end user. *M.G. Chemicals Ltd.* makes no claims as to shelf life of this product for the warranty. The liability of *M.G. Chemicals Ltd.* whether based on its warranty, contracts, or otherwise shall in no case include incidental or consequential damage.

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