

Honeywell HFO-1234ze Blowing Agent

trans – 1,3,3,3-tetrafluoropropene

Honeywell HFO-1234ze blowing agent is the Honeywell trade name for trans – 1,3,3,3-tetrafluoropropene, Honeywell's new low global warming potential (GWP), fourth generation blowing agent and propellant. The low GWP molecule is the first hydrofluoroolefin (HFO) to be commercialised into these industries. This molecule has low environmental impact, as measured by its ultra-low global warming potential and zero ozone depletion potential (ODP). Honeywell HFO-1234ze blowing agent is fully compliant with the EU F-Gas regulation. As a gas material at room temperature, this molecule has diverse applications including as a blowing agent for polyurethanes, polystyrene and other polymers; as well as an aerosol propellant.

Honeywell HFO-1234ze blowing agent has received Notification VIII, Level 1 by the EU Competent Authority for quantities to 1000 tonnes/annum, allowing commercialisation in the EU, as of October 2008.

Honeywell remains committed to developing new innovative low environmental impact technology to meet ever exacting market needs for products that have low GWP and zero ODP properties, plus are safe to use and impart energy saving benefits due to thermal conductivity performance in insulation foams. Honeywell HFO-1234ze blowing agent is non-flammable by ASTM E-681 and EU A11 test methods. However, the material does exhibit flame limits at elevated temperatures.

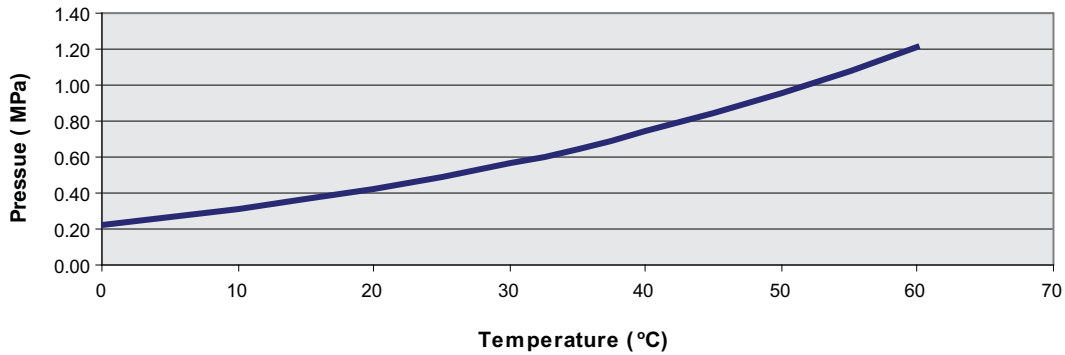
HONEYWELL HFO-1234ZE BLOWING AGENT SALES SPECIFICATION

Parameter	Limit
Assay as trans – 1,3,3,3-tetrafluoropropene	99.5 wt. % min.
Moisture	0.0050 wt.% max.
Acidity	
as HCl	0.0001 wt.% max.
as mg KOH/gm.	0.0015, max.
Non-volatile residue	0.0050 wt.% max

GENERAL PROPERTIES

Molecule	Honeywell HFO-1234ze Blowing Agent trans – 1,3,3,3-tetrafluoropropene
CAS #	1645 – 83 – 6
ELINCS # (EU)	471 – 480 – 0
Formula	trans – CHF=CHCF ₃
Molecular Weight	114
Boiling Point	- 19° C
Vapor Pressure @ 25° C	490 kPa
Vapor Pressure @ 55° C	1080 kPa
Liquid Density @ 25° C	1.18 gm/cm ³
Vapour Thermal Conductivity	13.0 mW / m• °K (@ 25°C)
Flame Limits	None to 30° C
Ozone Depletion Potential	Zero (non-ODS)
Global Warming Potential	6 (100 yr time horizon)

TRANS-1,3,3,3-TETRAFLUOROPROPENE VAPOUR PRESSURE



MATERIALS COMPATIBILITY WITH HONEYWELL HFO-1234ZE BLOWING AGENT

Substrate	Hardness	Avg Percentage Change Weight	Volume
Plastics			
HDPE		+0.82	-3.74
Polypropylene		+0.83	0.0
PVC – Type 1		+0.01	-0.44
PET		-0.01	0.0
Polyetherimide		-0.04	0.0
Nylon 6,6		-0.26	0.0
PVDF		+0.21	0.0
PTFE		+2.03	-2.43
Elastomers			
Fluoroelastomer	-11.29	+4.43	+5.71
Nitrile Rubber	+8.91	-4.95	-7.18
EPDM	-1.50	-2.00	-2.49
Butyl Rubber	-1.13	+1.27	+0.88
Neoprene	+7.32	-7.70	-11.47

HEALTH, SAFETY AND ENVIRONMENTAL

Honeywell HFO-1234ze blowing agent has progressed through a battery of toxicity testing for human health effects (data for which EU Competent Authority uses for Notification Status). The Honeywell material safety data sheet (MSDS) for HFO-1234ze(E) contains comprehensive and the most current detail for the health, safety and environmental aspects and considerations.

EU ELINCS Number: 471 – 480 – 0

Flammability Characteristics

Honeywell HFO-1234ze blowing agent is a non-flammable gas by test methods ASTM E-681, and by EU Test method A-11. Flammability characterization of Honeywell HFO-1234ze blowing agent was performed by Chilworth Technologies Ltd – UK, with the finding, “It has been concluded beyond reasonable doubt that the material (Honeywell HFO-1234ze blowing agent) will not possess oxidizing or explosive properties.”

It should be noted that flammability characterization and flammability regulations for gaseous materials are evaluated at room temperature ~21°C. Honeywell HFO-1234ze blowing agent exhibits narrow vapour flame limits at elevated temperatures (>28°C). At 30°C, Honeywell HFO-1234ze blowing agent exhibits flame limits LEL/UEL at 7.0/9.5 volume percent in air.

Further investigation into the flammability characterization of Honeywell HFO-1234ze blowing agent has yielded evidence that (at elevated temperatures, 60°C) the minimum ignition energy is significantly high – 61,000 mJ. This is several orders of

magnitude higher than other commonly used low GWP blowing agents, such as hydrocarbons, meaning HFO-1234ze is more difficult to ignite.

Safe handling and use in processes utilizing Honeywell HFO-1234ze blowing agent, as well as any other halogenated materials, include avoidance of fire, open flame, smoking, and hot surfaces in the vicinity of these materials.

STORAGE AND HANDLING

Honeywell HFO-1234ze blowing agent should be handled in a manner consistent with materials categorized as 'liquefied gases under pressure.' As illustrated by the vapour pressure data, Honeywell HFO-1234ze blowing agent is a moderate pressure gas, and containers (bulk storage tanks or packages) should be pressure rated to Honeywell HFO-1234ze blowing agent vapour pressure at the ambient temperature, or nominally (minimally) at 1000 kPa (10 Bar).

Honeywell HFO-1234ze blowing agent, in approved packages (containers), should be stored in a cool, well-ventilated area. Honeywell HFO-1234ze blowing agent packages (containers) should neither be punctured or dropped, nor exposed to open flames, excessive heat or direct sunlight. The package (container) valves should be tightly closed after use and when the container is empty.

Based on industry experience, Honeywell HFO-1234ze blowing agent should not be mixed with oxygen or air at elevated pressures. Applications necessitating pressurization – exceeding the vapour pressure of Honeywell HFO-1234ze blowing agent– should use dry nitrogen.

Honeywell Fluorine Products

Europe B.V.
Laaderhoogtweg 18
1101 EA Amsterdam
The Netherlands

Honeywell Belgium N.V.
Haasrode Research Park
Grauwmeer 1
B-3001 Heverlee
Belgium
Tel: +32 16-391 278
Fax: +32 16-391 277

DISCLAIMER

Although all statements and information contained herein are believed to be accurate and reliable, they are presented without guarantee or warranty of any kind, expressed or implied. Information provided herein does not relieve the user from the responsibility of carrying out its own tests and experiments, and the user assumes all risks and liability for use of the information and results obtained. Statements or suggestions concerning the use of materials and processes are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe on any patents. The user should not assume that all toxicity data and safety measures are indicated herein or that other measures may not be required.

© October 2008 Honeywell International Inc.
All rights reserved

The Honeywell logo is displayed in a bold, red, sans-serif font.