Material Safety Data Sheet

R – ٤٠٧c (٢٣٪ HFC-٣٢ / ٢٥٪ HFC-١٢٥ / ٥٢٪ HFC-١٣٤a)

١. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: R-٤٠٧c
PRODUCT USE: Refrigerant
Enterprise name: Weiss und Mehr GmbH
Address: Wolfsburg, Germany

٢. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Difluoromethane (HFC-٣٢)	٧٥-١٠-٥	٢٣
Pentafluoroethane (HFC-١٢٥)	٣٥٤-٣٣-٦	٢٥
١,١,١,٢-Tetrafluoroethane (HFC-١٣٤a)	٨١١-٩٧-٢	٥٢

Trace impurities and additional material names not listed above may also appear in Section ١٥ toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

٣. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>٢٥٠..°°°C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides such as phosgene.

POTENTIAL HEALTH HAZARDS

SKIN: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION: R-٠٧c is low in acute toxicity in animals. When oxygen levels in air are reduced to ١٢–١٤٪ by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

INGESTION: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

DELAYED EFFECTS: None known

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section			

٤. FIRST AID MEASURES

SKIN: Promptly flush skin with water until all chemical is removed. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Get medical attention if symptoms persist.

EYES: Immediately flush eyes with large amounts of water for at least ١٥ minutes (in case of frostbite water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical attention if symptoms persist.

INHALATION: Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention. Do not give epinephrine (adrenaline).

INGESTION: Ingestion is unlikely because of the physical properties and is not expected to be hazardous. Do not induce vomiting unless instructed to do so by a physician.

ADVICE TO PHYSICIAN: Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

٥. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Gas, not applicable per DOT regulations
FLASH POINT METHOD:	Not applicable
AUTOIGNITION TEMPERATURE:	Unknown for mixture
UPPER FLAME LIMIT (volume % in air):	None. *Based on ASHRAE Standard ٣٤ with match ignition.
LOWER FLAME LIMIT (volume % in air):	None. *Based on ASHRAE Standard ٣٤ with match ignition
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Not applicable

EXTINGUISHING MEDIA:

Use any standard agent – choose the one most appropriate for type of surrounding fire (material itself is not flammable)

UNUSUAL FIRE AND EXPLOSION HAZARDS:

R-٤٠٧c is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources.

Contact with certain reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool.

٦. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)

Evacuate unprotected personnel. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Unprotected personnel should not return until air has been tested and determined safe, including low-lying areas.

Spills and releases may have to be reported to Federal and/or local authorities. See Section ١٥ regarding reporting requirements.

٧. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.

R-٤٠٧c should not be mixed with air above atmospheric pressure for leak testing or any other purpose.

STORAGE RECOMMENDATIONS:

Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty.

٨. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Provide local ventilation at filling zones and areas where leakage is probable. Mechanical (general) ventilation may be adequate for other operating and storage areas.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:

Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.

EYE PROTECTION:

For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

RESPIRATORY PROTECTION:

None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into confined space, where the concentration may be above the PEL of ١,٠٠٠ ppm, use a self-contained, NIOSH -approved breathing apparatus or supplied air respirator. For escape: use the former or a NIOSH-approved gas mask with organic vapor canister.

ADDITIONAL RECOMMENDATIONS:

Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick-drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, ٢٩ CFR ١٩١٠,١٣٢ and ٢٩ CFR ١٩١٠,١٣٣.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Difluoromethane	None	None	**١٠٠٠ ppm TWA (٨hr)
Pentafluoroethane	None	None	**١٠٠٠ ppm TWA (٨hr)
١,١,١,٢- Tetrafluoroethane	None	None	**١٠٠٠ ppm TWA (٨hr)

* = Limit established by Zhejiang Chem-Tech Group Co. Ltd..
** = Workplace Environmental Exposure Level (AIHA).
*** = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

Hydrogen Fluoride: ACGIH TLV: ٣ ppm ceiling

٩. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, colorless liquid and vapor
PHYSICAL STATE:	Gas at ambient temperatures
MOLECULAR WEIGHT:	٨٦,٢
CHEMICAL FORMULA:	CH_2F_2 CF_3CHF_2 CH_2FCF_3
ODOR:	Faint ethereal odor
SPECIFIC GRAVITY (water = ١,٠):	١,١٦ @ ٢١,١ C° (٧٠ F°)
SOLUBILITY IN WATER (weight %):	Unknown
pH:	Neutral
BOILING POINT:	-٤٣ C° (-٤٥,٤ F°)
FREEZING POINT:	Not Determined
VAPOR PRESSURE:	١٥٦,٢ psia @ ٧٠ F° ; ٣٥٦,٧ psia @ ١٣٠ F° ;
VAPOR DENSITY (air = ١,٠):	٣,٠
EVAPORATION RATE:	>١ **COMPARED TO:** CCl_4 = ١
% VOLATILES:	١٠٠

FLASH POINT: Not applicable

(Flash point method and additional flammability data are found in Section ٥.)

١٠. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

The product is stable.

Do not mix with oxygen or air above atmospheric pressure. Any source of high temperature, such as lighted cigarettes, flames, hot spots or welding may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:

(Under specific conditions: e.g. very high temperatures and/or appropriate pressures) – Freshly abraded aluminum surfaces (may cause strong exothermic reaction). Chemically active metals: potassium, calcium, powdered aluminum, magnesium and zinc.

HAZARDOUS DECOMPOSITION PRODUCTS:

Halogens, halogen acids and possibly carbonyl halides.

HAZARDOUS POLYMERIZATION:

Will not occur.

١١. TOXICOLOGICAL INFORMATION IMMEDIATE

(ACUTE) EFFECTS:

HFC-٣٢:	LC_{50} : ٤ hr. (rat)	٥٢٠,٠٠٠ ppm.
	Cardiac Sensitization threshold (dog)	٣٥٠,٠٠٠ ppm.

HFC-١٢٥:	LC_{50} : ٤ hr. (rat)	> ٨٠٠,٠٠٠ ppm.
	Cardiac Sensitization threshold (dog)	٧٥,٠٠٠ ppm.
HFC-١٣٤a: :	LC_{50} : ٤ hr. (rat)	> ٥٠٠,٠٠٠ ppm.
	Cardiac Sensitization threshold (dog)	> ٨٠,٠٠٠ ppm.

D :LAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

HFC-٣٢:	Teratogenic NOEL (rat and rabbit)	٥٠,٠٠٠
	ppm. Subchronic inhalation (rat) NOEL	٥٠,٠٠٠
	ppm.	
HFC-١٢٥:	Teratogenic NOEL (rat and rabbit)	٥٠,٠٠٠ ppm.
	Subchronic inhalation (rat) NOEL	=٥٠,٠٠٠
	ppm. Chronic NOEL	١٠,٠٠٠ ppm.
HFC-١٣٤a: :	Teratogenic NOEL (rat and rabbit)	٤٠,٠٠٠
	ppm. Subchronic inhalation (rat) NOEL	٥٠,٠٠٠

OTHER DATA:

HFC-٣٢, HFC-١٢٥, HFC-١٣٤a: Not active in four genetic studies

١٢. ECOLOGICAL INFORMATION

Degradability (BOD): R-٤٠٧c is a gas at room temperature; therefore, it is unlikely to remain in water.
Octanol Water Partition Coefficient: Unknown for mixture

١٣. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Not a hazardous waste
If yes, the RCRA ID number is: Not applicable

OTHER DISPOSAL CONSIDERATIONS:

Disposal must comply with federal, state, and local disposal or discharge laws. R-٠٧c is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section ٦٠٨ in ٤٠ CFR Part ٨٢ regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

١٤. TRANSPORT INFORMATION

IMO CLASS: PROPER SHIPPING NAME: Refrigerant gas R-٤٠٧c
CLASS: ٢,٢
PACKING GROUP: Not applicable

UN NUMBER: UN٣٣٤٠

For additional information on shipping regulations affecting this material, contact the information number found in Section ١.

١٥. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Components listed on the TSCA inventory
OTHER TSCA ISSUES: None

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb.)	SARA EHS TPQ (lb.)
No ingredients listed in this section		

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(٨٠٠) ٤٢٤-٨٨٠٢] and to your Local Emergency Planning Committee.

SECTION ٣١١ HAZARD CLASS: IMMEDIATE
PRESSURE

SARA ٣١٣ TOXIC CHEMICALS:

The following ingredients are SARA ٣١٣ "Toxic Chemicals". CAS numbers and weight percents are found in Section ٢.

INGREDIENT NAME	COMMENT
No ingridients listed in this section.	

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section ٢, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION:

R-٤٠٧c is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at ٤٠ CFR Part ٨٢.

WARNING: Contains pentafluoroethane (HFC-١٢٥), difluoromethane, tetrafluoroethane, greenhouse gases which may contribute to global warming

Do Not vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered.

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:

EU – EINECS # ٢٠٦٥٥٧٨ (HFC-١٢٥) # ٢٠٠٨٣٩٤ (HFC-٣٢) # ٢٢٣٧٧٠ (HFC١٣٤a)

١٦. OTHER INFORMATION

CURRENT ISSUE DATE: December, ٢٠٠٢

OTHER INFORMATION:

HMIS Classification: Health – ١, Flammability – ١, Reactivity – ٠
NFPA Classification: Health – ٢, Flammability – ١, Reactivity – ٠
ANSI/ASHRAE ٣٤ Safety Group – A١

Regulatory Standards:

١. OSHA regulations for compressed gases: ٢٩ CFR ١٩١٠,١٠١
٢. DOT classification per ٤٩ CFR ١٧٢,١٠١ Toxicity information per PAFT Testing

MSDS Number: FLTCO٠١٢١٠٣
Current Issue Date: December, ٢٠٠٢