

MATERIAL SAFETY DATA SHEET

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01 - IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

PRODUCT NAME	HARP® 365mfc/227ea T (87%:13%)
RECOMMENDED USES	Blowing agent (plastic foams)
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02 - HAZARDS IDENTIFICATION

MOST IMPORTANT HAZARDS

ENVIRONMENTAL EFFECTS	Not readily biodegradable
PHYSICAL & CHEMICAL HAZARDS	Can become highly flammable during use. Thermal decomposition giving toxic and corrosive products
SPECIFIC HAZARDS/EC	Can become highly flammable in use

03 - COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NATURE OF THE PREPARATION	1,1,1,3,3-PENTAFLUOROBUTANE: 87% (by weight) CAS: 406-58-6 F R_11 1,1,1,2,3,3,3-HEPTAFLUOROPROPANE: 13% (by weight) CAS: 431-89-0 EINECS: 207-079-2
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04 - FIRST AID MEASURES

Inhalation:	Remove patient from exposure, keep warm and at rest. Administer oxygen if necessary. Apply artificial respiration if breathing has ceased or shows signs of failing. In case of persistent problems consult medical advice.
Skin Contact:	After contact with skin, wash immediately and abundantly with water. Frostbite – treat as thermal burns.
Eye Contact:	Immediately irrigate with eye wash solution or clean water, holding the eyelids apart, for at least 10 minutes. Obtain immediate medical attention.
Protection of First-Aiders:	In case of insufficient ventilation, wear suitable respiratory equipment.

Further Medical Treatment/Information to Doctors

DO NOT ADMINISTER CATECHOLAMINES (because of the cardiac effect caused by the product)

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05 - FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:	Water spray, carbon dioxide (CO ₂), dry powder, foam
Specific Hazards	Thermal decomposition into toxic products containing fluorine Hydrogen fluoride Carbon oxides
Specific Methods	Cool containers/tanks with water spray Prohibit all sources of sparks and ignition – do not smoke Ensure a system for the rapid emptying of containers In case of fire, remove exposed containers
Fire Fighting Protective Equipment:	A self-contained breathing apparatus and full protective clothing must be worn in fire conditions. Wear personal protective equipment.

06 - ACCIDENTAL RELEASE MEASURES

PERSONAL PROTECTION	Avoid contact with skin and eyes and inhalation of vapours Wear personal protective equipment In enclosed areas: ventilate or wear a self-contained breathing apparatus (risk of anoxia)
ENVIRONMENTAL PROTECTION	Remove all sources of ignition. Do not smoke Do not release into the environment Do not let the product enter the drains Contain by damming
METHODS FOR CLEAN-UP	
Recovery	Pump into an inert labelled emergency container
Disposal	Destroy the product by incineration at an approved waste disposal site Provide a system to neutralize the fumes Recycle if possible

07 - HANDLING AND STORAGE

Handling

Technical measures/precautions	LIQUID – SLIGHTLY IRRITATING Ensure appropriate exhaust and ventilation at machinery. Provide showers/eye-baths Provide sufficient air exchange and/or exhaust in work areas Provide water point nearby. Provide self-contained breathing apparatus nearby. Well ventilate empty vats and tanks before entering
Safe handling advice	Prohibit ignition sources and contact with hot surfaces – DO NOT SMOKE Open drums carefully as contents may be under pressure. Keep well away from naked flames. Only use safety equipment

Storage

Technical measures/storage conditions	Keep away from naked flames, hot surfaces and sources of ignition Keep in a cool, well-ventilated place Store in specially reinforced drums, hermetically sealed with bungs Protect full containers from sources of heat to avoid over pressurization Keep at temperatures below 30°C Provide earthing and safe electrical equipment. Provide a catch-tank in a bunded area
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Packaging Materials

Recommended	Ordinary steel
To be avoided	Alloys containing more than 2% of magnesium. Plastic materials. Light metals and alloys in the presence of humidity, including parts of the installation in contact with the product.

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08 – EXPOSURE CONTROLS/PERSONAL PROTECTION

PROTECTIVE PROVISIONS	Ensure sufficient air exchange and/or exhaust in work areas
CONTROL PARAMETERS	
Exposure limits	HFC 365mfc, HFC 227ea: No limit value F-USA
PERSONAL PROTECTION EQUIPMENT	
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment
Hand protection	Gloves
Eye protection	Safety glasses
Skin and body protection	Protective clothing
Specific hygiene measures	Avoid contact with skin and eyes and inhalation of vapours

09 - PHYSICAL AND CHEMICAL PROPERTIES

Form:	liquid
Colour	colourless
Odour	ether-like (slightly)
Boiling Point	23.3°C
Flash Point	No flash point (in test conditions – Standard: ASTM D 3828)
Vapour Pressure	0.92 bar at 20°C 1.09 bar at 25°C 2.35 bar at 50°C 4.00 bar at 70°C
Vapour density	7.27 kg/m ³ at 25°C 14.7 kg/m ³ at 50°C
Solubility (Other)	Soluble in most organic solvents
Liquid density	1263 kg/m ³ at 25°C 1204 kg/m ³ at 50°C 1153 kg/m ³ at 70°C
PARTITION COEFFICIENT (n-octanol/water)	HFC 365mfc: logPow = 1.61 HFC 227ea: logPow = 2.51
OTHER DATA	Critical temperature: Tc = 179.7°C, critical pressure: Pc = 3.07Mpa (30.7 bar) Critical volume = 0.319 m ³ /kmol, Henry's constant: 365mfc = 3800 Pa m ³ /mol

10 - STABILITY AND REACTIVITY

CONDITIONS TO AVOID	Avoid contact with flames and red-hot metallic surfaces. Keep at temperatures below 30°C
MATERIALS TO AVOID	Metallic powders (exothermic reaction – risk of explosion)
HAZARDOUS DECOMPOSITION PRODS	Thermal decomposition giving toxic and corrosive products: hydrogen fluoride (hydrofluoric acid). Carbon oxides.
FURTHER INFORMATION	The product is stable under normal handling and storage conditions

11 - TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Inhalation	Vapour at high concentration. Risk of: headache, sleepiness, dizziness, and nausea. As with other volatile aliphatic halogenated compounds, through vapour accumulation and/or inhalation of large quantities, the product can cause loss of consciousness and cardiac disorders aggravated by stress and lack of oxygen – risk of mortality. In animals (studies on the constituents of the product): Practically not harmful by inhalation – LC50/inhalation/4h/rat > 100000 ppm (10%) Depression of the central nervous system. Narcosis
Ingestion	Practically not harmful if swallowed – LD50/oral/rat > 2000 mg/kg

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LOCAL EFFECTS

Skin-contact

Rapid evaporation of the liquid may cause frostbite
In animals: (rabbit) slightly or not irritating to skin

Eye-contact

Rapid evaporation of the liquid may cause frostbite
In animals: (rabbit) slightly irritating to eyes

SENSITIZATION

Skin-contact

(studies on the constituents of the product) – not a skin sensitizer (guinea-pig)

CHRONIC TOXICITY

(studies on the constituents of the product)

Studies of prolonged inhalation in animals have not shown sub-chronic toxic effects. No specific toxic effects to rats. No effect concentration (rat / 28 days): 25000 ppm

SPECIFIC EFFECTS

GENOTOXICITY:

(studies on the constituents of the product)

according to available experimental data – not genotoxic

12 - ECOLOGICAL INFORMATION

According to its composition:

Slightly harmful to fish

Slightly harmful to daphnia

Slightly harmful to algae

Not readily biodegradable

Not bioaccumulable

SUBSTANCE CONCERNED

HFC 365mfc

MOBILITY

Highly volatile substance

In soil and sediments – slight adsorption: log Koc = 1.8 (calculated)

PERSISTENCE/DEGRADABILITY

In water

Not readily biodegradable: 13% after 28 days (OECD guideline 301 D)

In air

Degradation by OH radicals: t1/2 life = 7 years

Global warming potential (relative to CO₂ – 100 year time horizon): 840

practically not bioaccumulable: log Pow = 1.61 (measured)

BIOACCUMULATION

ECOTOXICITY

AQUATIC TOXICITY

Acute toxicity

Slightly harmful to fish: LC50, 96 h (Brachydanio rerio) > 200 mg/l

Slightly harmful to daphnia: EC 0, 48 h > 200 mg/l

Slightly harmful to algae: IC 0, 72 h (Selenastrum capricornutum) = 113 mg/l

SUBSTANCE CONCERNED

HFC 227ea

PERSISTENCE/DEGRADABILITY

In air

t1/2 life in atmosphere = 25 years

Global warming potential (relative to CO₂ – 100 year time horizon): 2900

BIOACCUMULATION

Slightly bioaccumulable: log Pow = 2.51 (calculated)

13 - DISPOSAL CONSIDERATIONS

DISPOSAL OF PRODUCT

If recycling is not possible; dispose of in compliance with local regulations. Can be incinerated, at an approved waste disposal site. Provide a system to neutralise the fumes.

DISPOSAL OF PACKAGING

drain off the drums and recover as much product as possible. Purging of residual gases in empty packaging is obligatory before recovery

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14 - TRANSPORT INFORMATION

Technical consignment name:	see section 2
ADR/RID	Not regulated
AND/ADNR	Not regulated
IMDG	Not regulated
IATA	Not regulated

15 - REGULATORY INFORMATION

UK REGULATION SAFETY DATA SHEET
SUPPLY

CHIP 3: Chemical (Hazard Information and Packaging for Supply) Regulations 2002

EEC DIRECTIVE
SAFETY DATA SHEETS

D.91/155/EEC amended by D.93/112/EEC and D.2001/58/CE: Dangerous substances and preparations

EC CLASSIFICATION/LABELLING
DANGEROUS PREPARATIONS

D.1999/45/EC amended by D.2001/60/CE
Can become highly flammable in use

INVENTORIES

EINECS (EU): conforms
(ELINCS dossier in preparation)
TSCA (USA): conforms

16 - OTHER INFORMATION

LIST OF RELEVANT R PHRASES

R11_highly flammable

This information contained within this safety data sheet applies only to the Harp International Limited product to which it relates. The information provided is based upon our best knowledge at the time that this safety data sheet was published.

The information is believed to be accurate and is given in all good faith.

When used in other preparations, in formulations or in mixtures, it is necessary to ascertain if the classification of the hazards have changed. The attention of users is drawn to the possibility of creating other hazards when the product is used for purposes other than that for which it is recommended. In such cases user should make a complete reassessment.

This safety data sheet should only be used and reproduced in order that the necessary measures may be taken relating to the protection of health and safety at work and relating to the protection of environment.

The reference to the legislative, regulatory and codes of practice documents must not be considered as exhaustive.

It is the responsibility of handlers of the product to pass on the totality of the information contained within this document to any subsequent persons who will come into contact with, handle or use the product in any way.

They should check the adequacy of the information contained in the safety data sheet received before passing it onto their customers.

End of document