

Issued by, department, telephone Maria Lennemar, HSE, 83829	Date of revision 2016-06-09	Edition number 3	This edition replace 2015-10-05 ed. 2
Product denomination Propellant LMP-103S			

**1 PRODUCT IDENTIFICATION AND NAME OF THE COMPANY**

- 1.1 Product name LMP-103S
- 1.2 Recommended use of the chemicals and restriction on use Liquid mono-propellant for rocket engines.
- 1.3 Supplier EURENCO Bofors AB  
SE-691 86 KARLSKOGA  
Tel: +46-586-83050 Int. +46-568-83050  
Fax: +46-586-83310 Int. +46-586-83310  
m.lennemar@eurenco.com
- 1.4 Emergency phone number 0586-832 00, +46-586-832 00, ERC 020-99 60 00 +46-8-33 70 43, www.giftinformation.se

**2 HAZARD IDENTIFICATION EG-CLASSIFICATION**

2.1 Classification of the substance or mixture

Classification according to CLP (regulation 1272/2008/EC)

- Inhalation -
- Skin contact -
- Eye contact -
- Ingestion -
- Fire and explosion hazard Fire or projection hazard.
- Environmental hazards -

Classification according to CLP (regulation 1272/2008/EC)

Fire or projection hazard, Division 1.4: H 204

For H-phrases full text, see Section 16

2.2 Labeling information

Labeling information

Hazard GHS 01



Contains LMP-103S

Signal word WARNING

Hazard statement codes H 204, Fire or projection hazards.

Precautionary statement - preventive P 210, Keep away from heat / sparks / open flames / hot surfaces. - No smoking.  
P 240, Ground / bond container and receiving equipment.  
P 250, Do not subject to grinding / shock / friction.

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Precautionary Statement action P 370+ P 380, In case of fire: Evacuate area.  
P 373, DO NOT fight fire when it reaches explosives.

Precautionary Statement waste P501, Dispose of contents/container in accordance with local / regional / national / international regulations.

2.3 Other hazards

Product information

Hazard GHS 01



Contains LMP-103S

Signal word WARNING

Hazard statement codes H 204, Fire or projection hazards.  
H 302, Harmful if swallowed.  
H 312, Harmful in contact with skin.  
H 332, Harmful if inhaled.

Precautionary statement - Preventive P 210, Keep away from heat / sparks / open flames / hot surfaces. - No smoking.  
P 240, Ground / bond container and receiving equipment.  
P 250, Do not subject to grinding / shock / friction.  
P 261, Avoid breathing dust/fume/gas/mist/vapours/ spray.  
P 264, Wash ... thoroughly after handling.  
P 270, Do no eat, drink or smoke when using this product.  
P 271, Use only outdoors or in a well-ventilated area.  
P 280, Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary Statement - Action P 301+P312, IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.  
P 330, Rinse mouth.

P 302 + P352, IF ON SKIN: Wash with plenty of soap and water.  
P 312, Call a POISON CENTER or doctor/physician if you feel unwell

P 304+P 340, IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing  
P 312, Call a POISON CENTER or doctor/physician if you feel unwell.

P 322, Specific measures (no specific measures).  
P 363, Wash contaminated clothing before reuse.

P 370 + P 380, In case of fire: Evacuate area.  
P 372, Explosion risk in case of fire.  
P 373, DO NOT fight fire when it reaches explosives.

Precautionary Statement - Storing P 401, Store in accordance with local / regional / national / international regulations.

Precautionary Statement – Waste P 501, Dispose of contents/container in accordance with local / regional / national / international regulations.

Hazardous components which must be listed on the label: Not required according paragraph 1.3.5 of Annex I to CLP Regulation with explosive substances, mixtures and articles.

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### 3 COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances	%	Signal Word	Classification according to regulation (EG) 1272/2008	Type
Ammonium dinitramide CAS-no: 140456-786 EINECS-no: 453-090-2 EC-no: 604-184-9	63	Danger	GHS 01, GHS 02, GHS 07, GHS 08  Expl. 1.1, H 201 Flam Sol. Category 1, H228 Acute Tox. Category 4, H 302	(1) SevK04
Methanol CAS-no: 67-56-1 EINECS-no: 200-659-6 INDEX-no: -	18	Danger	GHS 02, GHS 06, GHS 08  Flam. Liq. Category 2, H 225 Acute Tox. Category 3, H 301 Acute Tox. Category 3, H 311 Acute Tox. Category 3, H 331 STOT SE 1, H 370	(1)
Ammonia, monohydrate CAS-no: 1336-21-6 EINECS-no: 215-647-6 INDEX-no: 007-001-01-2	5	Danger	GHS 05, GHS 07  Skin Corr. Category 1B, H314 Acute Tox. Category 3, H 335 Cronic Tox. Category 3, H 412	
Water CAS-no: - EINECS-no: - EC-no: -	14	-	-	-

Occupational exposure limits, if available, are listed in section 8.  
type

- (1) Substance classified with a health or environmental hazard
- (2) Substance with a workplace exposure limit
- (3) The substance meets the criteria for PBT according to Regulation (EC) No 1907/2006, Annex XIII
- (4) The substance meets the criteria for vPvB according to Regulation (EC) No 1907/2006, Annex XIII
- (5) Substance of equal concern
- (6) Hazardous substances that pose an environmental hazard management that will permit reviewed under Chapter 9.  
§ 6 Environmental Code
- (7) The product is in phase out or at Prio list
- (8) The product is a C, M, R product ( ( C ) carcinogen, ( M ) mutagenic, ( R ) toxic for reproduction.)

### 4 FIRST-AID MEASURES

#### 4.1 Description of necessary first-aid measures

Inhalation	Fresh air.
Skin contact	Wash with soap and water.
Eye contact	Rinse carefully with water.
Ingestion	Rinse the mouth with water. Give a few glasses of milk or water if the person is fully conscious and try to cause vomiting.

4.2 Most important symptoms and effects, both acute and delayed  
Symptoms: No data.

4.3 Indication of immediate medical attention and special treatment needed  
No data

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## 5 FIRE-FIGHTING MEASURES

### 5.1 Extinguishing

Suitable extinguishing media Water, Foam, Dry Powder

Unsuitable extinguishing media -

### 5.2 Special hazards arising from the substance or mixture

Fire and Explosion Hazards Fumes are toxic by inhalation. In the event of fire, nitrous oxides (NOx) can be released.

Others In case of fire, evacuate area. Fire may transform to detonation. Do not attempt to extinguish.

5.3 Advice for firefighters See also Section 5.2

## 6 ACCIDENTAL RELEASED MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Avoid contact with skin and eyes. Use personnel protective equipment to prevent contact with accidental released product. Respirator for ammonia and light hydrocarbons shall be available.

### 6.2 Environmental

Prevent the product from entering drains.

### 6.3 Methods and materials for containment and cleaning up

Collect liquid using inert absorbent (e.g. vermiculite or paper towel). Residues can be dissolved with water before collection. Should be destroyed by authorized personnel in an approved location. NOTE! Explosives can detonate.

### 6.4 Reference to other sections

## 7 HANDLING AND STORAGE

7.1 Precautions for safe handling Equipment must be adapted to work with explosives. Avoid spillage.

7.1.2 General advice on hygiene in the workplace Normal hygiene. Wash hands in connection to breaks and before eating.

### 7.2 Conditions for safe storage, including any incompatibilities

Store in dark with the container tightly closed.. Keep away from sources of ignition – refrain from smoking. Testing has shown LMP-103S to be insensitive to electrostatic discharge according to EN 13631-13:2003. Impact, static electricity and accumulation of dust should however generally be avoided. Store only in places approved for explosives. Recommended long-term storage temperature: 0-10°C. Short-term storage (on the order of a few months) at temperatures up to 21°C is also acceptable. Avoid contact with copper, copper alloys, brass and silver.

### 7.3 Specific end uses

It is recommended to cool to 5°C before opening storage containers to minimise loss of volatile components (ammonia, methanol) and thereby preserve composition (i.e. the performance of the propellant). Protect the product from direct light (decomposes if exposed to UV light).

## 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameter

	Methanol	Ammonia
Sweden	NGV: 250 mg/m <sup>3</sup> (200 ppm) KGV: 350 mg/ m <sup>3</sup> (250 ppm)	14 mg/m <sup>3</sup> (20 ppm) 36 mg/m <sup>3</sup> (50 ppm)
UK:	Long term: 266 mg/m <sup>3</sup> (200 ppm) Short term: 333 mg/m <sup>3</sup> (250 ppm)	18 mg/m <sup>3</sup> (25 ppm) 25 mg/m <sup>3</sup> (35 ppm)

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## 8.2 Exposure

Technical measures	Workplace and methods should be developed to prevent contact with the product.
Respiratory protection	The user is responsible to determine the proper need for respiratory protection (national and local regulations apply). The choice of protection depends on the concentrations of the contaminants, the working environment, the limitations of the chosen respiratory protective equipment, etc. If anticipated or actual exposure levels exceed the threshold limit values, or exposure to decomposition gases is anticipated, it is recommended to use an approved respirator with multi-contaminant cartridges for organic and ammonia vapors (ex: 3M™ Versaflo™ Ammonia/Methylamine/HE cartridge). If the exposure levels exceed the protective capability of a cartridge-type respirator, then a positive-pressure airline or self-contained breathing apparatus is recommended.
Hand protection	Chemical resistant gloves (ex: Viton, Polychloroprene etc.) should be worn when handling to prevent direct contact with the skin.
Eye protection	Safety glasses or face screen should be used when product can irritate eyes or risk of splash exists.
Other protection	Flame retardant clothing is recommended when working with the product. Use of other protective clothing is the responsibility of user.
Hygiene measures	Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes.

## 9 PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

Appearance	Liquid
Colours	Transparent or yellowish
Odour	Ammonia
Solubility	Freely soluble in water, soluble in acetone, methanol, IPA and acetone.
Partition coefficient n-octanol/water	Log P <sub>ow</sub> <-2.8
Density	Approx. 1240 kg/m <sup>3</sup> at 20 °C
Thermal stability	Approved
Decomposition temperature	120 °C
Boiling temperature	Since the product is an ionic liquid (a salt dissolved in a liquid solvent) the boiling point increases gradually as the solvent evaporates until decomposition starts at approximately 120 °C. In a closed container, the vapour pressure reaches 1 bar at approximately 73 °C.
Flammable	No reaction was observed at 5 J energy level (electrostatic) acc. to EN 13631-13:2003. Explosion point 18.5 C acc. to SN EN 15794 (closed vessel).
Explosive properties	Yes
Oxidizing properties	The product contains an oxidizing component (ADN).

### 9.2 Other information

Resistance to electrostatic energy	>5 J
Sensitivity to impact	25 J

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Determination of deflagration to detonation transition	Tested propellant did not ignite, neither deflagration nor detonation according to EN 13631-13:2003
Determination of burning rate under ambient conditions	The flame did not move towards the other end of a through and went out during the measurement according to EN 13938-4:2003.
Vapor pressure	0.1 bar at 20 °C
pH-value	9.5

## 10 STABILITY AND REACTIVITY

<u>10.1 Reactivity</u>	This product is not reactive
<u>10.2 Chemical stability</u>	This product is chemically stable
<u>10.3 Possibility of hazardous reactions</u>	
<u>10.4 Conditions to avoid</u>	Impact , friction, fire, heating, direct light
<u>10.5 Incompatible materials</u>	Strong oxidizers and strong bases
<u>10.6 Hazardous decomposition products</u>	-

## 11 TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

LD <sub>50</sub> (acut, oral)	The product has been classifies according to the CLP by following Acute To assesment  ATE mix (oral): 326.80 mg/kg ATE mix (dermal) : 1666.67 mg/kg ATE mix (inhalation): 16.67 mg/kg  LD <sub>50</sub> oral rat < 1000 mg/kg ADN LD <sub>50</sub> oral rat 5628 mg/kg Methanol, LD <sub>LO</sub> = 143 mg/kg human LD <sub>50</sub> oral rat 408 mg/kg Ammonium hydroxide solution 25%w
Inhalation	The product releases vapours containing methanol and ammonia, which can cause irritation (severe after prolonged exposure) symptoms in the respiratory tract.
Skin	Rabbit test: non-irritant. ADN The propellant contains a mixture of water-soluble substances, which can penetrate the skin and cause irritation.
Eye	Rabbit test: non-irritant. ADN The propellant contains a mixture of water-soluble substances, which can penetrate the skin and cause irritation.
Ingestion	The product contents of methanol, ammonia and ADN, can cause blindness mucosal irritation, gastric pain, nausea, vomiting, headache, impaired vision (blindness after ingestion of larger quantities, due to the methanol content). Ingestion of large quantities may be lethal.
Cancer/mutation/ unborn child damage/reproduction	Toxicity study: Salmonella typhimurium: positive ADN In vitro mammalian cell gene mutation test: negative. ADN

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## 12 ECOLOGICAL INFORMATION

<u>12.1 Toxicity</u>	Unknown
<u>12.2 Persistence and degradability</u>	Unknown
<u>12.3 Bioaccumulative</u>	This product is not considered to be bio accumulative.
<u>12.4 Mobility in soil</u>	Unknown
<u>12.5 Results of PBT and vPvB assessment</u>	Unknown
<u>12.6 Other adverse effects</u>	Unknown

## 13 DISPOSAL CONSIDERATION

### 13.1 Waste treatment

Handling of contaminated packaging	Contaminated packaging should be handled as dangerous goods.
Generally	Disposal must be carried out at an intended place and by trained personnel. When heated, there is risk of explosion. Waste and contaminated packaging should be disposed of as waste explosive.
Hazardous waste, EWC-code	Yes, 160403: Waste explosives

## 14 TRANSPORT INFORMATION

<u>14.1 UN number</u>	0481
<u>14.2 UN Proper shipping name</u>	Substances, Explosive, N.O.S (Ammonium dinitramide (ADN-solution LMP-103S))
<u>14.3 Transport hazard class</u>	1.4S
<u>14.4 Packing group</u>	II
<u>14.5 Marine Pollutant</u>	No
<u>14.6 Special precautions</u>	-
<u>14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code</u>	-
<u>14.8 Other information</u>	EX2011031882

## 15 REGULATORY INFORMATION EG/CLP-CLASSIFICATION

### 15.1 Regulations / legislation specific for the substance or mixture in terms of safety, health and environment code

European Council Regulation (EC) No 1272/2008 on classification, labeling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006. EU Regulation (EC) No 1907/2006 REACH.

The product belongs to Category SevK04

<u>15.2 Chemical Safety Judgment</u>	-
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**16 OTHER INFORMATION**

Hazard Statement codes CLP  
classification

H 201, Explosive; mass explosion hazard. Expl. 1.1  
H 225, Highly flammable liquid and vapour. Flam. Liq. Category 2  
H 228, Flammable solid. Flam Solid Category 1  
H 301, Toxic if swallowed, Acute Toxic, Category 3  
H 311, Toxic if contact with skin, Acute Toxic, Category 3  
H 314, Causes severe skin burns and eye damage, Skin Corr. Category 1B  
H 331, Toxic if inhaled, Acute Toxic., Category 3  
H 335, May cause respiratory irritation,  
H 370, Causes damage to organs. STOT SE 1  
H 412, Harmful to aquatic life with long lasting effects, Chronic Toxic, Category 3

Revision

2016-06-09 ed.3, updated  
2015-10-05 ed.2 updated for CLP  
2012-11-26 Ed 1  
Changed in paragraphs 1-16