

**CAPROLACTAM**



**CAPROLACTAM**

Product portfolio

**NYLON 6**

# CAPROLACTAM

## CORPORATE STANDARD

CAS 105-60-2 (caprolactam)

Number ES 203-313-2

**The first effective date: 1998-05-01**

### CONTENT

CHAPTER NO.	CHAPTER TITLE	PAGE	REVISION NO.	EFFECTIVE AS OF:
	Table of Contents	1	7	2017-01-01
I	General Information	2	7	2017-01-01
II	Technical Requirements	2	7	2017-01-01
III	Sampling	2	7	2017-01-01
IV	Testing	3	7	2017-01-01
V	Packaging, Labelling, Transport and Storage	3	7	2017-01-01
VI	Instructions for the Safe Use of the Product Occupational Health and Safety	4	7	2017-01-01
VII	Related Documents	5	7	2017-01-01

### ANNEX M 1

CAPROLACTAM MATERIAL SHEET	1	7	1
----------------------------	---	---	---

### ANNEX S 1

CAPROLACTAM SAFETY DATA SHEET			
-------------------------------	--	--	--

The text of the Safety Data Sheet is contained in the SHEET in-house database

### I GENERAL DATA

1. Caprolactam (HEXAHYDRO-2H-AZEPIN-2-ONE; 2-OXOHEXAMETHYL-ENEIMIN), hereinafter referred to as caprolactam, is produced from cyclohexanone through the Beckmann transposition of cyclohexanone oxime.  
Structural formula:  
  
Molecular formula: C<sub>6</sub>H<sub>11</sub>NO  
Relative molecular mass: 113.159
2. Caprolactam is supplied as flakes or a melted product. Caprolactam flakes are a white hygroscopic substance, freely soluble in water and most organic solvents. Melted caprolactam is a clear, viscous hygroscopic liquid.
3. Caprolactam is used to manufacture polyamide 6 and aminocaproic acid.
4. Caprolactam classification is in accordance with Act No. 350/2011 Coll. (the Chemical Act), Regulation 1907/2006 (REACH) and Regulation 1272/2008 (CLP), including implementing regulations, as amended, and any future legislation that may replace it, and is stated in the relevant safety data sheet. Caprolactam is classified as harmful to health and an irritant.
5. Caprolactam is manufactured in accordance with the valid technological, fire safety and occupational safety documentation.

### II TECHNICAL REQUIREMENTS

6. The quality specifications of caprolactam are stated in the material sheet – Annex M 1.

### III SAMPLING

7. Sampling of Caprolactam flakes is carried out according to ČSN 65 0511 (Czech State Standard). From the product's liquid flow, which is continuously poured into weighing equipment, the operator collects a sample of approx. 0.25 kg every two hours. From these partial production batch samples, an average sample of approx. 1 kg is prepared after homogenisation for final production inspection. A production batch means a batch produced over a maximum period of 24 hours.
8. Sampling melted Caprolactam: the entire sampling system is connected to steam heating equipment (fittings, pressure gauge, filling valve, discharge valve, valves for supplying and discharging nitrogen). If the content is not liquid, it must be heated before sampling using the heating pipes within the tank, up to a maximum of 110 °C.  
Sampling procedure for melted Caprolactam from a rail tanker: remove the valve plug, install the sampling device, and discharge approximately 5 litres of the melted substance into a vessel. Then rinse the sample containers with the sample and subsequently collect representative samples into a PE sample container (2 x 1 litre) and a glass sample container (1 x 0.5 litre).  
Sampling procedure for melted Caprolactam from a road tanker: Sampling is performed from the transport tanks.  
The sampling valve is situated on the side of a transport tank. Using the sampling valve, collect the sample in a PE sample container (2 x 1 litre) and a glass sample container (1 x 0.5 litre).
9. The complaint unit is the relevant filled container. The arbitration decision concerning complaints is carried out at SPOLANA a.s. in the presence of both parties, unless the parties have agreed otherwise in a contract. For the purposes of a complaint procedure, samples are collected, as a rule, into a glass container.

## IV TESTING

- Caprolactam is tested according to internal procedures.  
The numbers of individual standard operation procedures (SOP) are stated in the Material Sheet.
- The provisions of ČSN 01 8003 (Czech State Standard) must be complied with when performing tests.

## V PACKAGING, LABELLING, TRANSPORT AND STORAGE

### Packaging

Flake caprolactam is filled into 25 kg PE single-layer bags.

A single pallet (if purchased on pallets) or a single bag (if purchased in individual bags) with an indication of the net weight is decisive for any complaints concerning weight.

Melted Caprolactam is filled into rail containers or road tankers and then into rail tankers. These tankers must be equipped with heating tubes and a thermometer. When heated, the temperature of melted Caprolactam must not exceed 110 °C. A protective nitrogen atmosphere is maintained above melted Caprolactam to prevent oxidisation of the product with atmospheric oxygen. The atmosphere may contain a maximum of 50 ppm of oxygen. To keep the oxygen content in the inert atmosphere below 50 ppm, both the supplier and the customer are obliged to ensure a constant nitrogen overpressure in the tanker of at least 0.02 MPa and to replenish the inert atmosphere in the tanker, or to use solely nitrogen which does not contain more than 10 ppm of oxygen to empty the tanker. For rail tankers and road tankers, the terms and conditions for filling and protecting the goods in transit are defined by agreement with the customer, with the carrier responsible for the technical suitability of the means of transport.

The manufacturer is not liable for any deterioration in quality resulting from mishandling.

### Labelling

Melted Caprolactam, filled into rail containers or road tankers, or possibly into rail tankers, must be labelled in accordance with the transport regulations.

Flake Caprolactam, packaged in the appropriate packaging, must be labelled in accordance with the transport regulations.

In this case, the following information must be stated:

- The chemical or trade name of the substance
- The name and registered office of the manufacturer
- Packaging number
- Identification according to ADR/RID

The first delivery must also contain the relevant safety data sheet.

### Transport

Melted Caprolactam is filled into rail containers, road tankers or rail tankers. Caprolactam flakes are transported by rail in enclosed railroad cars, ISO containers or other enclosed means of transport.

The product is not hazardous goods according to ADR/RID.

### Storage

Caprolactam flakes are stored in their original packaging on pallets in areas with a maximum relative humidity of 65 % (if this humidity level is exceeded, caprolactam becomes moist) and a maximum temperature of 30 °C, protected from direct sunlight. If the storage conditions are complied with, the warranty period is three months from the date of shipment from the Caprolactam facility's warehouse.

## VI INSTRUCTIONS FOR SAFE USE OF THE PRODUCT, OCCUPATIONAL HEALTH AND SAFETY

For safe use of the product, it is necessary to follow the instructions stated in the relevant safety data sheet.

Caprolactam is subject to the obligation to classify and label it exactly according to Act No. 350/2011 Coll. (the Chemical Act), Regulation 1907/2006 (REACH) and Regulation 1272/2008 (CLP), including their implementing regulations, as amended, and any future legislation that may replace it.

The applicable labelling concerning special risks and instructions for safe handling (H-Phrases and P-Phrases) is defined in the relevant safety data sheet.

At permanent worksites, technical measures must be ensured to achieve the conditions so that dust concentration, vapour and aerosol levels in the air are maintained as low as possible through suitably designed technical equipment (ventilation, local extraction). In addition, direct contact with Caprolactam must be prevented. Personal protective work equipment (work clothes, protective goggles, protective gloves) must be available to employees. Wherever NPK-P cannot be complied with, respiratory protection (such as anti-dust respirators) must also be provided. All pieces of personal protective work equipment must be continuously maintained in a usable condition and damaged items must be replaced immediately.

When working with Caprolactam in a laboratory, the principles of ČSN 01 8003 (Czech State Standard) must be complied with.

Eating, drinking and smoking is prohibited when working with Caprolactam. After work and during a work break, it is necessary to wash the skin with warm water and soap and treat the skin with a repair cream.

### First Aid

First aid instructions are stated in the relevant safety data sheet.

In the event of any problems concerning damage to health by Caprolactam, consultation may be requested at the Toxicological Information Centre (TIC): Occupational Disease Clinic, Na Bojišti 1, 128 08 Praha 2, telephone number: 224 91 92 93, 224 915 402, fax 224 914 570.

### Disposal of the Chemical

When disposing of Caprolactam, it is necessary to comply with Act No. 185/2001 Coll., on waste, including its implementing regulations. Wastewater containing Caprolactam residues can be disposed of at the biological wastewater treatment plant; it is necessary to consider that Caprolactam degrades poorly and a suitable dosage for disposal in a biological wastewater treatment plant must be selected accordingly. Wastewater containing Caprolactam must not be discharged into surface water or groundwater. Caprolactam residues, including used packaging, can be disposed of in waste incineration plants. The tankers used to transport Caprolactam may be rinsed at a rinsing station, with subsequent additional final cleaning at a biological wastewater treatment plant.

## VII RELATED DOCUMENTS

ČSN 01 8003 (Czech State Standard) Principles for Safe Work in Chemical Laboratories

ČSN 65 0511 (Czech State Standard) Sampling Granular Materials

Government Regulation No. 1/2000 Coll., on the transportation rules for public railroad freight transport, as amended

Government Regulation No. 361/2007 Coll., defining the terms and conditions for the protection of employees' health at work

Ordinance No. 478/2000 Coll., implementing the Road Transport Act, as amended

Act No. 111/1994 Coll., on road transport, as amended

Act No. 350/2011 Coll., on chemical substances and chemical mixtures and on amendments to certain acts, as amended, including implementing regulations

Regulation (EC) No 1907/2006 (REACH), as amended, including implementing regulations

Regulation (EC) No 1272/2008 (CLP), as amended, including implementing regulations

European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)

Regulation Concerning the International Carriage of Dangerous Goods by Rail (RID)

### International Abbreviations Used

CAS = registration number which uniquely identifies a chemical substance.

EC number = numerical identifier which uniquely identifies a chemical substance or mixture for the REACH Regulation.

REACH = registration, evaluation (assessment), authorisation (permission) and control of chemical substances.

CLP = classification, labelling and packaging of chemical substances.