Guidelines for Transport and Storage of Expandable Polystyrene Raw Beads

This technical document has been developed by the members of the Expandable Polystyrene (EPS) Transport Group of PlasticsEurope*

February 2007

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*PlasticsEurope represents the plastics manufacturers in Europe. The association has more than 60 member companies, producing over 90% of polymers across the EU’s 25 member states plus Norway, Switzerland and Turkey. The plastics chain in Europe - including converters and machinery manufacturers - employs 1.5 million people. The combined turnover of our industry is approximately 160 billion euro per annum. PlasticsEurope operates from six decentralised offices: one in Brussels and five regional centres located in France, Germany, Italy, Spain and the UK.
CONTENT

1. Introduction .......................................................................................................... 3
2. Product Information about Expandable Polystyrene (EPS)................................. 4
   2.1 Characteristics .................................................................................................. 4
   2.2 Physical Properties of the Blowing Agent ....................................................... 4
   2.3 Implications for the Transport and Storage of EPS ........................................ 4
3. EPS Related Hazards .......................................................................................... 5
4. Recommendations .............................................................................................. 5
   4.1 Transport by Road or Rail ............................................................................... 5
   4.2 Transport by Sea ............................................................................................. 6
   4.3 Labelling of Packaging .................................................................................... 7
5. Specific Recommendations for Transport in Closed Spaces .............................. 7
   5.1 Stowage of Drums ........................................................................................... 7
   5.2 Load Securing of Octabins ............................................................................. 7
   5.3 Safety Information Required in Shipping Documents ....................................... 7
   5.4 Supplementary Label ...................................................................................... 8
6. Storage ................................................................................................................. 8
7. Chain of Information .......................................................................................... 10
8. Delivery in Bulk .................................................................................................. 10
Appendix 1: Responsible Care ............................................................................. 12
Appendix 2: International Transport Regulations .................................................... 13
Appendix 3: Criteria for the Selection of Ventilated Containers ............................. 14
Appendix 4: IMDG Labelling Requirements for Freight Containers ....................... 15
Appendix 5: Supplementary Labelling for Closed Containers ............................... 16
Appendix 6: Labelling of Packaging ..................................................................... 17
Appendix 7: Best Practises for Load Securing of Octabins in Curtainside Trucks / Containers ........................................................................................................... 18
   Example 1: Use of Standard Straps and Wood ..................................................... 18
   Example 2: Use of Tarpaulins / Nets .................................................................. 20
Appendix 8: Cefic Tremcard ................................................................................. 26
Appendix 9: Abbreviations .................................................................................... 28
Appendix 10: List of Authors ................................................................................. 29

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February 2007
1. **Introduction**

The CEFIC (European Chemical Industry Council) Responsible Care Programme requires that chemical companies demonstrate their commitment to continuously improve all aspects of Performance which relate to protection of health, safety and the environment. An overview of the key elements of CEFIC’s Distribution Responsible Care Programme is contained in Appendix 1.

The EPS TRANSPORT GROUP and the EPS Health Safety and Environment Working Group have reviewed these updated guidelines, under the direction of the PlasticsEurope Expandable Polystyrene (EPS) Committee as their execution programme with regard to the application of Responsible Care in the distribution of EPS. They are consistent with the CEFIC Recommendations on Safe Management Practices in Distribution to promote high standards of safety for the distribution of EPS. The key elements of these management practices have been taken into consideration in compiling this document.

Although EPS is classified as dangerous goods during transport, it can be distributed and handled safely provided that appropriate precautions are observed. The distribution of EPS is already subject to regulations within most countries in Europe. In addition, the international movement of EPS by road, rail, sea or inland waterway is subject to international agreements which lay down specific requirements concerning distribution which must be observed by all parties involved. National regulations, however, may differ from international regulations.

These guidelines take into account the distribution of EPS packed in drums, octabins, bags and in bulk, transported in railcars, lorries or containers. They cover all aspects of the transport activity from loading to delivery point. The PlasticsEurope EPS Committee recommends that these guidelines are adopted by all parties who are involved in the distribution of EPS. This includes Commercial Transactions, Swap, Toll or Trade agreements and Customer Collection Arrangements.
2. Product Information about Expandable Polystyrene (EPS)

2.1 Characteristics
Developed in 1952, EPS is a moulding material in bead or granular form consisting of polystyrene containing up to 7% by weight of a volatile hydrocarbon which is predominantly pentane. Small quantities of pentane are emitted from the raw beads. Pentane when incorporated in EPS bead is a flammable gas and may form explosive mixtures with air.

2.2 Physical Properties of the Blowing Agent
Some pentane will naturally evolve from the beads as a gas into atmosphere. Pentane is a mixture of isomers (n/iso).

<table>
<thead>
<tr>
<th>Physical properties</th>
<th>n</th>
<th>iso</th>
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<tbody>
<tr>
<td>Boiling point (101.3 kPa) °C</td>
<td>35-38</td>
<td>24-30</td>
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<tr>
<td>Flash point (TCC method) °C</td>
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<td>-50</td>
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<tr>
<td>Explosive limits in air/lower Vol.-%</td>
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<td>1.3</td>
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<tr>
<td>Explosive limits in air/upper Vol.-%</td>
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<td>7.6</td>
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<tr>
<td>Relative vapour density (air=1)</td>
<td>&gt;2.00</td>
<td>&gt;2.00</td>
</tr>
<tr>
<td>Ignition temperature °C</td>
<td>&gt;200</td>
<td>&gt;400</td>
</tr>
</tbody>
</table>

2.3 Implications for the Transport and Storage of EPS
a) Pentane gas can ignite at a relatively low concentration of 1.3% volume in air. Ventilation will help to limit pentane concentration in all enclosed spaces. Any source of ignition must be avoided with special attention paid to sources of static electricity.

b) Pentane vapours are heavier than air so pentane concentrations are likely to be higher at ground level.

c) UN classification: according to the recommendations of the Committee of Experts on the Transport of Dangerous Goods (UN Orange Book) EPS is described under UN 2211 polymeric beads, expandable, Class 9, packaging group 3 (Appendix 2)

d) During storage a small proportion of the blowing agent will be released to the atmosphere with the rate of release increasing with temperature. EPS is therefore given a limited shelf life since the slow release of the blowing agent will result in product deterioration. The pentane loss may be reduced by using pentane-barrier film in all appropriate packaging.
3. **EPS Related Hazards**

Fire incidents involving EPS have resulted from the ignition of the flammable blowing agent/air mixture.

In analysing these incidents common factors become apparent:

- Staff working near or within enclosed spaces were not sufficiently aware of the potential danger, eg. enclosed spaces should be labelled with appropriate safety information and staff are trained accordingly.

Within the EPS- manufacturing industry, it is common knowledge that due to the release of small amounts of blowing agent, no welding, smoking, open fire, sparks and static discharge should be allowed near any enclosed spaces containing EPS (including the transport equipment) since an ignitable blowing agent/air mixture may be present inside. This risk may be minimised through proper ventilation and by the elimination of ignition sources in the vicinity of such spaces.

The conclusion is that it is essential that all people involved in the transport and handling of EPS are informed of the hazards and potential risks in their own language.

4. **Recommendations**

These recommendations have been established taking into account the above information and the learning experiences of suppliers since 1952. The safety record of suppliers who have adopted these precautions indicate that their general implementation should minimise the potential risk associated with the transport, handling and storage of EPS.

The basic precaution for safe handling, transport and storage of EPS is the avoidance of an ignitable blowing agent/air mixture by proper ventilation or where this is not possible, by avoiding any ignition source including that resulting from static electricity.

All the recommendations and regulations are based on these two principles. An overview of existing regulations for each transport mode is given in Appendix 2.

4.1 **Transport by Road or Rail**

In Europe there are regulations for transport of products by road (ADR) and by rail (RID). EPS is classified in RID as Class 9 of the regulations for transport of dangerous goods: “Polymeric beads expandable, evolving flammable vapours”.

For domestic movements and journeys covered by ADR it is recommended that closed containers of boxes are avoided.
Tilt trailers and curtain side trailers are recommended since ventilation is good. The sideboards of a tilt trailer may provide some extra protection in the event of a road traffic incident. However, the strength and specification of tilt trailers is very variable, with an increasing trend towards light weight equipment. Therefore it is necessary to secure the cargo internally within the trailer using securing straps of an appropriate strength. Tautliner equipment is also generally acceptable preferably meeting the requirements of EN 12642 XL and the equipment specification (Road Transport Equipment Specifications: Guidelines for Standardisation of Equipment. Issue 2 August 2003. ECTA, EPCA and Cefic). Proper load securement must be used to secure the cargo within trailer (Appendix 7).

For rail any type of wagon with side doors can be used. Checks to ensure adequate ventilation are recommended. Special attention should be paid to secure the goods inside the wagons and to avoid damage to the packaging. Fixed sections are helpful since the forces (eg. shunting) in rail transport can be much greater than those in road transport.

4.2 Transport by Sea

EPS is classified in Class 9 of the IMDG code, where it is noted that the product can evolve flammable gases and that good ventilation must be guaranteed if it is stowed under deck. This is essential to ensure that ignitable concentrations of pentane are not formed within the ship.

IMDG requires a cautious approach when entering or opening the doors of a freight container (cf. IMDG code chapter 12.7.2). This regulation was introduced because a number of products may give rise to unsafe concentrations of toxic or flammable vapours or an oxygen depleted atmosphere.

The same applies for the transport of EPS in closed box vans (IMDG code chapter 17.8.2). Appendix 2 gives more information.

Ventilated Containers: Some shipping lines may be able to offer ventilated containers for certain destinations. However, it has been found that there are wide variations in the effectiveness of such ventilation and it is advised that such containers are tested as outlined in Appendix 3. If the ventilation is found to be acceptable then it may not be necessary to use the supplementary label (Appendix 5). Additionally the labelling requirements of the IMDG code (Appendix 4) must be met. If ventilated containers are used, it is also recommended that particular checks are made with the shipping line with regard to the adequacy of the mechanical ventilation provided on the vessels used on the relevant route. It may also be appropriate to question operating practices during bad weather.

Closed (Non Ventilated) Containers are provided as a general standard by most shipping lines. These containers are acceptable since any significant concentration of pentane gas should be retained within the container and proper training of people at receiving locations can minimise any risk from potential ignition of pentane vapours. In this case it is strongly recommended that the supplementary wagering labels detailed in
Appendix 5 are attached to the container in addition to those required by the IMDG code (Appendix 4).

### 4.3 Labelling of Packaging

Packaging requires labelling to meet the appropriate regulations (see Appendix 6).

### 5. Specific Recommendations for Transport in Closed Spaces

In all cases where proper ventilation cannot be guaranteed (e.g. in closed containers or closed vans) the measures hereinafter described should be taken to avoid the ignition of the gas mixture.

#### 5.1 Stowage of Drums

Friction can generate sparks during transport of loosely stowed metal drums. To prevent this the load should be stowed in such a way that during normal transport operations movement is eliminated as far as possible. Stowage should be such that drums from the upper layer cannot fall down and cause any sparks, either in transit, or when the freight container or closed box doors are opened. Adequate dunnage should also be used to eliminate metal to metal contact.

#### 5.2 Load Securing of Octabins

Packages should be secured in such a way that movement in transit is prevented. Best Practises for load securing of octabins in curtainside trucks / containers are given in Appendix 7.

#### 5.3 Safety Information Required in Shipping Documents

To ensure that all parties who come in contact with EPS are aware of the properties of the product, all suppliers should ensure that shipping documents include a written warning, with appropriate signage, as follows:

- Polymeric beads, expandable, evolving flammable vapours;
- Keep away from sources of ignition:
  - No fire or naked lights
  - No smoking, no welding
  - Do not produce sparks by using tools (e.g. metal hammers)
  - No hot surfaces above 250°C
  - Stow away from sources of heat
- Before unloading, ventilate transport equipment by allowing it to stand for at least one hour with the doors open.

5.4 **Supplementary Label**

To ensure that all those involved in the physical transport, storage and devanning of freight containers or closed box vans are aware of the potential hazards, all such transport equipment should be labelled with the supplementary label shown in Appendix 5. It is important to avoid an ignitable pentane/air mixture coming into contact with an ignition source whenever the doors of such transport equipment are opened.

The recommended minimum ventilation time before devanning is one hour.

6. **Storage**

The main risks associated with EPS are related to the flammable blowing agent and the combustible nature of the polymeric material. Explosion and/or fire are thus significant risks that must be prevented when storing EPS beads. The pentane blowing agent is liberated very slowly during storage. It is a highly flammable gas and can form explosive mixtures with air at concentrations between 1.4 % and 7.8 % volume. It is also heavier than air and sinks to ground level.

EPS beads are not easily ignited but once ignited burn readily. The major products of combustion are carbon dioxide, carbon monoxide, and soot (dense black smoke). Fire retardant grades can release small amount of hydrogen bromide.

EPS beads should always be stored in the original labelled, sealed container. If all beads are not used at once, octabins should be tightly closed (minimise the free space) and marked properly. Note that the inner plastic liner is specially designed for packing of EPS, it is strong and acts as a barrier to pentane loss.

Each European country may have legislation on the requirements for storage of Dangerous Goods. These should be checked to ensure compliance. It is good practise to ensure that EPS bead is stored in an environment that protects the product, ensures it is away from sources of ignition, and is stored in a safe environment that has fire extinguishing systems. There are some simple inexpensive precautions that can be taken, to reduce the risk of fire when storing bead. A PlasticsEurope and EUMEPS DVD is available on “EPS Fire Safety”. Please Email info@plasticseurope.org for a copy.

- **Control Ignition Sources**

The main sources of ignition are smoking and electrical sparks. A no smoking policy should be enforced in all warehouse and production facilities. Using a naked flame is obviously the single most dangerous act in a flammable environment. Electrical equipment should be grounded and checked for state of repair. It is also
recommended to check pentane levels with a meter before starting any work. Static electricity should be controlled by earthing. To limit the risk of electrostatic discharge from octabin protective covers, they should be removed before entering the pre-foam area of the factory.

The warehouse used for storing EPS bead should be to separate away from the factory. Additionally, Automatic fire detection systems, which will raise the alarm and activate a fire suppression system such as water sprinklers are considered best practise. Realistically, however, to implement best practice could be prohibitively expensive for many companies. Fortunately there are some simple inexpensive precautions which can be taken, to reduce the risk of fire, in any factory that handles expandable polystyrene and these should be considered as recommended or GOOD practice!

- Throughout the factory there must be adequate fire fighting equipment.
- Extinguishers and fire call points should be strategically placed in the warehouse and at high risk areas.
- All factory personnel should be trained in their use.
- Each company should appoint a responsible person to manage safety – he or she should check that the fire protection equipment works properly.

- **Ventilation & Isolation From Heat Sources**
  Octobins should ideally be stored indoors to protect them from environmental conditions such as rain and direct sunlight. However, two precautions are important with indoor storage: adequate floor level ventilation and isolation from sources of direct heat eg hot machinery and direct sunlight. This may accelerate the loss of blowing agent. The warehouse is required to have floor level ventilation to prevent the accumulation of blowing agent vapour. Ventilation either by air flow or fans to avoid is recommended. Particular attention should be given to the formation of pockets of pentane in areas below ground level.

- **Housekeeping**
  EPS beads are small spheres that are hard and mobile. Any product spillage must be cleaned up immediately either with a brush & pan or vacuum to prevent accidents due to slipping.

  EPS beads must be prevented entering drains and the water system. EPS will sink in fresh water but may float or sink in seawater depending on the salt content.

- **Personnel Protection Equipment**
  The use of eye-protection is recommended when handling EPS to prevent small beads entering the eye.
- **Damage to Octabins**
  If an octabin is accidentally punctured it should immediately be re-sealed with strong adhesive tape to avoid bead spillage. The product should be handled carefully and repackaged or used immediately.

- **Stacking**
  It is not recommended to stack octabins more than one layer high. But if octabins are stacked in two layers always have a strong plywood sheet between octabins stacked on top of each other. Avoid direct contact with excess moisture as this may weaken the octabin. If there is a risk of moisture contact, the octabins should be protected by a waterproof plastic cover and never be double stacked.

- **Silos**
  When EPS beads are stored in silos, an inert gas blanket should be applied. Silos should be designed to have strong walls and weak roofs, so that should an explosion occur the destructive forces are directed upwards. All storage silos should be properly earthed. Floor of the storage room should not consist of (or covered by) materials that may accumulate static electricity.

### 7. Chain of Information

Before delivery of EPS to any customer/processor, the supplier should inform the customer in writing of the proper precautions to be taken and emphasise the risks assessed in this document particularly when freight containers may be used.

Documents dealing with the safety of EPS in general and with transport and storage, particularly the Safety Data Sheet, should be provided to the customer.

The producer should take every care that all the means of information, like the package label, the safety data sheet for the transport or the Cefic Tremcard (see Appendix 8) are available/visible and properly updated.

### 8. Delivery in Bulk

The measures described in this document concentrate on packed EPS. It is however possible to deliver EPS in bulk to customers. This allows the transport of EPS with transfer at high flow rate from silo truck to customer's silo.
Both the truck and product silo must be fully ventilated or blanketed with nitrogen at all times during operation in order to avoid ignition. The oxygen content of this atmosphere should not exceed 6% and there should be no possibility of air entry. The common practice is to use a slight overpressure of 0.2 bars or above.

The truck and product silo must be properly earthed to prevent build up of electrostatic charges during operation.

The truck driver qualifications and truck labelling must fulfil all the ADR regulations. Delivery must be to a silo which meets all the appropriate regulations and blanketed with nitrogen as above.

The unloading procedures must be clear and well understood by both the carrier and the customer with clearly defined division of responsibilities.

The truck driver and washing station must be aware of the nitrogen atmosphere within the empty vehicle and the risk that this poses.
Appendix 1: Responsible Care

As part of its commitment to Responsible Care, the chemical industry makes every effort to transport and handle its goods in a safe way and in full accordance with the relevant regulations. The chemical industry’s efforts to deliver a continuous improvement in its safety standards are showing good results. Numerous initiatives have been taken by Cefic to drive this improvement:

- Cefic has developed a number of Guidelines to promote Best Practices in the supply chain, in co-operation with EPCA (European Petrochemical Association) and ECTA (European Chemical Transport Association).

- To help prevent chemical transport accidents, Cefic has developed Safety and Quality Assessment Systems (SQAS). SQAS are systems to evaluate the safety and quality performance of transport companies and other logistics service providers by standardised assessments carried out by independent inspectors.

- In order to minimize the adverse effects of accidents that may happen during the transport of chemicals, Cefic has set up a European-wide Transport Emergency Response Scheme (ICE) that provides information, practical advice and, if necessary and possible, intervention equipment to the public emergency services.

- The ICE Emergency Scheme is also supported by:
  - Tremcards (Transport Emergency Response Cards): a set of multilingual written instructions for the drivers that have been developed by Cefic to assist the chemical companies in fulfilling their legal requirements under ADR.
  - ERICards (Emergency Response Intervention Cards): a set of emergency instructions that provide guidance on initial actions to be taken by fire brigades when they first arrive at the scene of a chemical accident.

- Cefic has developed detailed Guidelines for the transport and distribution of certain chemicals or groups of chemicals.

Further information on these initiatives can be found on the Transport & Logistics Section of the Cefic website (www.cefic.org).
Appendix 2: International Transport Regulations

ADR, RID, ADNR, IMDG, IATA-DGR

Check actual requirements by consulting the particular regulations

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<thead>
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<th>UN Number</th>
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<td>Proper shipping name (PSN)</td>
<td>POLYMERIC BEADS, EXPANDABLE evolving flammable vapour</td>
</tr>
<tr>
<td>DG Class</td>
<td>9</td>
</tr>
<tr>
<td>Packaging group</td>
<td>III</td>
</tr>
</tbody>
</table>
Appendix 3: Criteria for the Selection of Ventilated Containers

To avoid potential risk whenever the doors of closed transport equipment are opened, the labeling and supplementary label (Appendix 5) should be used. Many shipping companies also offer ventilated containers but in many cases ventilation of these types are inadequate. Therefore the PlasticsEurope EPS Transport Group recommends testing before usage.

Criteria for good ventilation

The following illustration shows the principle:

- Ventilation air flow should enter at the top of the container
- The outlet of the ventilation air flow should exit at the bottom of the container
- The inlets and outlets for the ventilation should extend along the full length of the container.
- The ventilation area at the bottom or roof of the container should cover a minimum of:
  - 500 cm$^2$ or 80 inch$^2$ for a 20 foot container
  - 1000 cm$^2$ or 160 inch$^2$ for a 40 foot container

Open top containers have good ventilation and can be regarded as ventilated containers.

NB If the adequacy of the ventilation cannot be established the container should be labelled as a closed container.
Appendix 4: IMDG Labelling Requirements for Freight Containers

The IMDG code requires (section 5.3) that a cargo transport unit is placarded and marked and that the information should be identifiable on transport units surviving at least three months’ immersion at sea.

A freight container containing >4t of EPS is required to display a class 9 placard and a UN infront of the number, one on each side and one on each end of the unit.

Class 9 placards are: 250 x 250 mm

This can be achieved in two ways:

Alternative 1:

UN number displayed in black digits not less than 65 mm high on an orange rectangular panel not less than 120 mm high and 300 mm wide with a 10 mm black border.

Alternative 2:

UN number displayed in digits not less than 65 mm high against a white background in then lower half of the class placard.
Appendix 5: Supplementary Labelling for Closed Containers

Fix label to the outside of the container next to the door handle. Recommended size of the label is A3 and colour should be red.

**CAUTION:**

IMDG code class 9

UN 2211

Polymeric beads, expandable, cont.: Pentane evolving flammable vapours

READ CAREFULLY AND

OBSERVE BEFORE OPENING, DURING VENTILATION AND DURING CARGO DEVANNING.

**NO SMOKING**

**NO FIRE / NAKED LIGHT**

**NO WELDING**

**NO SPARKS FROM TOOLS**

BEFORE UNLOADING KEEP DOORS OPEN AND VENTILATE FOR 1 HOUR
Appendix 6: Labelling of Packaging

- Technical name of EPS should be mentioned in English.
  “Polymeric beads, Expandable, evolving flammable vapour”

- UN 2211

- Packages must be marked with the wording “keep away from all sources of ignition”.
  ADR requires the marking to be in the official language of the country of departure and also, if that language is not English, French or German, in English, French or German.

Class 9 Label (not required by ADR)

- Add:
  Emergency telephone number
  Your EPS Trademark
  Company Name
  Manufactured in EU
  Address of Production Site (voluntary)
Appendix 7: Best Practises for Load Securing of Octabins in Curtainside Trucks / Containers

Example 1: Use of Standard Straps and Wood

Octabins in a certified curtain sider (EN 12642 XL) or in an open sided trailer (cover/stake body types or tilt).

A full load of octabins (according to weight limit restrictions) is divided in three groups with wooden racks. The wooden racks assure that the slope lashing stays in position. The top-over lashing is strapped over a pallet on top of the octabin to prevent damage. The last eight octabins are grouped together with a horizontal lashing. The gaps necessary to fulfil weight restrictions can be filled with pallets.

* Footnote: This type of cargo securing can only be used in vehicles with a side protection that can withstand 30% of the maximum cargo weight.
Head or rear Lashing:

This head/rear lashing technique can be used as an alternative to spring lashing as an efficient way of securing the load to the front or the back.

It consists of one or two standard lashing straps and for example two pallets (or an equivalent construction).

The straps are pulled through the upper openings of the pallets and on both sides attached to lashing eyes on the load platform. The height of the pallets should be ideally 2/3 of the height of the octabins.

Octabins in combination with top-over lashing in a curtain sider or in an open sided trailer (cover/stake body types or tilt).

One top-over lash for every row of two bags is applied. Pallet, other rigid means or edge protectors are used to prevent damage of the octabins. Extra friction material should be used in case friction between load and floor is low and cannot be compensated by top-over lashing.
Example 2: Use of Tarpaulins / Nets

Tarpaulins and nets are considered to be an alternative load securing method. The current availability on the market is limited.

picture 2: tarpaulin covering the whole truck load

picture 3: tarpaulin, covering 4 pallets (4 octabins each);
measure ≥ 2.65 x 2.65 m

An additional use of turnable side bars should be considered, as it allows to reduce the number of tarpaulins / nets applied (picture 4)
Guidelines for Transport and Storage of Expandable Polystyrene Raw Beads

February 2007

picture 4: Additional use of turnable side bars allow to reduce the number of tarpaulins/nets applied, and compartments stabilize the load against tilting.

picture 5: Typical turnable side bars and a typical octabin load; turnable side bars may be used to avoid airbags and other materials to fill up empty space on the loading platform.
Since tarpaulins/nets make some kind of an investment necessary, this method may be particularly interesting if the tarpaulins/nets are used also for other packaged goods (tarpaulins/nets should be compatible with all common pallet sizes, covering four of them each). It is fact, that direct securing is much more effective than top-over lashing (picture 6).

**picture 6:** Direct load securing (ca. 2000 daN per strap longitudinal) in comparison to the commonly used lashing down (160 daN per strap; dynamic friction coefficient of octabins = 0.4)
Appendix 8 : Cefic Tremcard

One of the specific requirements of ADR not applicable to other modes of transport for the consignor is to provide "instructions in writing" to truck drivers. These instructions, for which the format and required content have been established, should enable the truck driver to be aware of the dangers of the products transported and to take the necessary actions in case of an accident or emergency. They must be provided in a language that the driver is able to read and understand, as well as in the languages of all the countries of origin, transit and destination. The standard written instructions developed by Cefic are known as Transport Emergency Cards or Tremcards.

Instructions on how to obtain the Tremcard for EPS beads (Polymeric beads, expandable) in various languages are found on the Cefic website at:

http://www.cefic.org/Templates/shwStory.asp?NID=27&HID=382&PHID=381

A specimen of Cefic's Tremcard for EPS beads (Polymeric beads, expandable) is provided below.
Guidelines for Transport and Storage of Expandable Polystyrene Raw Beads

February 2007

Substances evolving flammable vapour

Name of substance(s): Polymeric beads, expandable

- Usually white or coloured solid.
- Perceptible odour.
- Immiscible with water. Lighter than water.

Nature of Danger

- Danger of explosive vapour-air mixture after heating.
- Flammable.
- Decomposition in a fire; production of toxic fumes. Symptoms may develop after several hours.
- May have irritant effect on eyes, on air passages.

Personal Protection

- Goggles or face shield.
- Light protective clothing.
- Protective gloves.
- Protective footwear.
- Eyewash bottle with clean water.

Intervention Equipment

- Broom.
- Alternatively, appropriate spill kit.

General Actions by the Driver

- Stop the engine.
- No naked lights. No smoking.
- Mask roads with self-standing warning signs and warn other road users or passers-by.
- Keep public away from danger area. Keep upwind.
- Notify police and fire brigade as soon as possible.

Additional and/or Special Actions by the Driver

- Any action only if without personal risk.
- Stop leaks if without risk.
- Sweep up spilled substance.
- Avoid direct contact with substance.
- If substance has entered a water course or sewer or been spilt on soil or vegetation, inform police.

FIRE (information for the driver in case of fire)

- Do not attempt to deal with any fire involving the load.

First Aid

- If substance has got into the eyes, immediately wash out with plenty of water. Continue treatment until medical assistance is provided.
- Remove contaminated clothing immediately and wash affected skin with soap and water.
- In case of burns immediately cool affected skin as long as possible with cold water.
- Persons who have inhaled the fumes produced in a fire may not show immediate symptoms. They should be taken to a doctor with this in mind. Patient must be kept under supervision for at least 24 hours.

Supplementary Information for Emergency Services

- Extinguish with water spray, foam or dry chemical.
- Do not use water jet.
- Keep container(s) cool by spraying with water if exposed to fire.
- Use low-sparking handtools and explosion-proof electronic equipment.

Additional Information

Emergency Telephone: ..............................................................
## Appendix 9: Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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| ADR          | Accord européen relatif au transport des marchandises dangereuses par route  
European regulation concerning the international carriage of dangerous goods by road |
| ADN          | Accord européen relatif au transport des marchandises dangereuses par voie de navigation intérieure  
European regulations concerning the transport of dangerous substances in barges on inland waterways |
| ADNR         | See ADN: R for Rhine |
| CEFIC        | Conseil Européen de l’Industrie Chimique European Chemical Industry Council |
| DG           | Dangerous Goods |
| EMS          | Emergency Schedule |
| IATA DGR     | International Air Transport Association - Dangerous Goods Regulations |
| IMDG Code    | International Maritime Dangerous Goods Code |
| IMO          | International Maritime Organization |
| LEL          | Lower explosive limit |
| RID          | Règlement International concernant le transport de marchandises |
| SQAS         | Safety and Quality Assessment System (CEFIC) |
| Tremcard     | Transport Emergency Card (ADR) |
| UN           | United Nations (number for dangerous goods) |
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