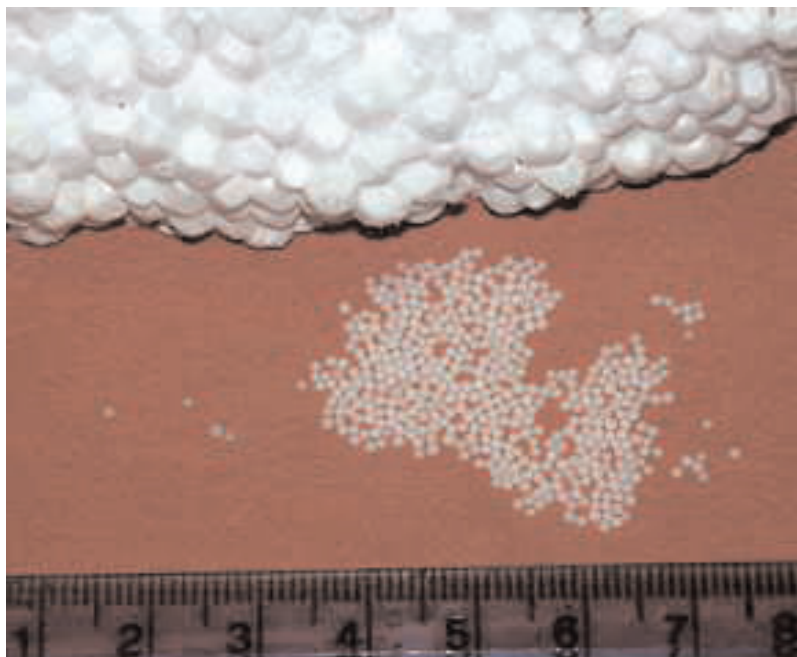




Carefully to Carry

Expandable polymeric beads

Expandable polymeric beads are a moulding material in the form of granules or beads, approximately 3mm in diameter. The beads or granules may contain between 5% and 8% of a volatile hydrocarbon, chiefly pentane. During the moulding process, the beads are heated causing expansion and fusion, forming the familiar polymeric packaging material. During storage or transport, the material will release a portion of the pentane. The rate of this release is increased with a rise in temperature. The beads have been found to generate flammable concentrations of gas in enclosed spaces, and have been involved in several major explosions - in one incident causing severe damage to a container ship.



Expandable beads are included in the IMO Dangerous Goods Code, under Class 9 (Miscellaneous dangerous substances and articles). Various packaging is recommended in the IMO Code, including outer drums and inner plastic packages. Intermediate bulk containers include composite fireboard or plastic materials.

The Code of Federal Regulations 49 CFR - Chapter 1 - Part 173 describes various packaging materials but states that, except for transportation by highway and rail, the packaging must be capable of containing any evolving gases from the contents during normal conditions of transport.

The IMO Code states that storage and segregation is category 'A', on deck or under deck, but mechanical ventilation should be provided for under-deck stowage to prevent the formation of a flammable atmosphere. The Code advises



"The carrier shall properly and carefully load, handle, stow, carry, keep, care for and discharge the goods carried."

Hague Rules,
Articles iii, Rule 2

Carefully to Carry Advisory Committee

This report was produced by the Carefully to Carry Committee – the UK P&I Club's advisory committee on cargo matters. The aim of the Carefully to Carry Committee is to reduce claims through contemporaneous advice to the Club's Members through the most efficient means available.

The committee was established in 1961 and has produced many articles on cargoes that cause claims and other cargo related issues such as hold washing, cargo securing, and ventilation.

The quality of advice given has established Carefully to Carry as a key source of guidance for shipowners and ships' officers. In addition, the articles have frequently been the source of expertise in negotiations over the settlement of claims and have also been relied on in court hearings.

In 2002 all articles were revised and published in book form as well as on disk. All articles are also available to Members on the Club website. Visit the Carefully to Carry section in the Loss Prevention area of the Club website www.ukpandi.com for more information, or contact the Loss Prevention Department.

that, during storage, a small proportion of the pentane may be released to the atmosphere and this proportion is increased at elevated temperatures. There is also a cautionary note relating to the opening of the doors if the material is carried in containers.

Reputable manufacturers of polymeric beads are well aware of the hazards of storage and transport of the beads and provide detailed lists of precautions to be observed. They provide detailed warning labels to be fixed to drums and freight containers, labels in several different languages and graphic symbols.

The recommended storage should be in a well-ventilated space and preferably below 20°C. Warehouse storage below 20°C may be a relatively simple operation. However, stowage in the holds of an ocean vessel may not be as simple. Stowage should, at least, be away from heated bunker tanks or engine room bulkheads. Research has indicated that temperatures in ships' holds might be of the order of 65°C+ in some tropical areas. Obviously adequate hold ventilation with 'suitable equipment' should be stressed because the arcing of an electric fan motor may readily ignite a flammable concentration of pentane in air.

Deck temperatures in tropical climates can also exceed the recommended limits for safe stowage of the beads. However if the cargo is containerised, the containers can be placed in a central area of the stow and thus be insulated from the effects of direct sunlight. This arrangement will

obviously create extra movement during loading and discharge, but can nevertheless assist toward safe carriage. Pentane released from containers in deck stowage will be dispersed by wind and movement of the vessel, and should not create flammable or explosive conditions outside the containers.

Manufacturers are well aware of the problems of release of pentane into freight containers. Recommended ventilation periods are suggested prior to entry and unpacking the container. The pentane hazard is real, it emphasises that if opened in a container yard, the containers should not be sited near drains, because pentane released when the doors are opened could enter the drains creating a potential fire hazard at some nearby location.

