

(This Notice supersedes Notice No. M.592)

POLYURETHANE FOAM AND OTHER ORGANIC FOAM MATERIALS

Notice to Shipowners, Shipbuilders, Ship Repairers and Shipbuilding Contractors

1. Serious fires have occurred recently on three British ships fitting out in foreign shipyards. These resulted from ignition of polyurethane foam which lined the inside of the cargo hold. Similar serious fires arising from this material have also occurred in United Kingdom coal mines.

2. Consequent upon information derived from tests carried out by the Safety in Mines Research Establishment of the Ministry of Technology and by the owner of two of the ships referred to above, the Department wishes to draw the attention of shipowners, shipbuilders and ship repairers to the dangers which can exist when any type of polyurethane foam (including those which are classified as self-extinguishing) on any kind of ship is exposed to fire or even intense heat. These dangers can be summarised as follows:

- (i) extremely rapid spread of flame across the surface of the material, the speed often being in excess of 100 feet per minute;
- (ii) very high temperatures in the order of 1,000°C can be generated during the initial stage of burning;
- (iii) the emission of large quantities of highly toxic gases and smoke.

3. The risk of rapid conflagration is greatest when foam is ignited in conditions where the heat generated cannot escape, where an air supply for combustion exists or could be induced by the starting of a fire, or with some types of foam when the vapours produced by heating cannot be readily dispersed. Typical examples could occur in an insulated cargo space or a ventilation duct. The risks entailed at sub-paragraph 2 (iii) are such as to render fire-fighting operations extremely hazardous.

4. Furthermore although the foregoing statements are made as a direct result of investigations concerning polyurethane foams, the Department has been advised that some or all of these dangers can exist when almost any organic foam material (e.g. polystyrene or expanded ebonite) is subjected to fire or intense heat.

5. Whilst emphasising that dangers can exist and that great care should always be exercised when using organic foam materials, the Department is nevertheless of the opinion that such dangers can be greatly reduced by the introduction of a suitable protective facing over the exposed surface of the foam.

Recommendations as to use of organic foam in certain spaces

6. (a) *Accommodation and service spaces*

These spaces are the subject of statutory regulations and are therefore not covered by this Notice or the test procedures developing for the purpose of this Notice.

(b) *Cold provision storerooms*

If these materials are to be used as the insulant they should be covered with a suitable incombustible protective facing. Such storerooms should be sited as remotely as possible from sleeping accommodation, and places of high fire risk. Details of the construction and location of the storerooms will require to be submitted for the approval of the Department's surveyors.

(c) *Machinery spaces*

In general these materials should not be used. Limited use might be considered, however, in small machinery spaces where little real fire hazard exists, or for insulating small tanks, provided the foam is sandwiched and sealed within incombustible material, preferably steel sheeting.

(d) *Cargo spaces*

Where such foams are to be used as an insulant they should be completely covered by a suitable protective facing. This facing should preferably be incombustible and able to withstand wear and tear and the flexing of the ship's structure without fracture.

(e) *Fish holds in fishing vessels*

As the possibility of a fire originating in a fish hold is considered to be extremely remote, such foams could continue to be used as the insulant provided the normal practice of lining the hold with stout wooden boards or metal sheeting in a near watertight manner is undertaken.

(f) *Electrical equipment and wiring*

Electrical equipment and wiring should be effectively isolated from organic foam materials by steel sheet or conduit as appropriate, and there should be an adequate space between the foam and the protective sheet or conduit.

General recommendations when organic foams are to be installed

7. It is recommended that the following measures be adopted when organic foams are to be installed:

(a) Fire and general precautions

Whilst organic foam materials are being fitted;

- (i) a competent fireman should be in attendance;
- (ii) efficient fire fighting equipment including a primed water hose with jet nozzle, and rescue equipment consisting of breathing apparatus, lifelines and stretchers, should be readily available;
- (iii) effective and adequate means of escape from the compartment concerned should be arranged;
- (iv) where fire protective facings are required they should be applied to the foam surface as soon as possible having regard to the curing time of the foam;
- (v) a person should be delegated to collect and remove all organic foam waste material at frequent intervals. Clouds of foam dust are potentially very dangerous.

(b) Application

As the application of most organic foam materials can give rise to both toxic and fire risk, it is recommended that the guidance of HM Factory Inspectorate and the suppliers of the basic materials should always be sought prior to spraying or the use of other methods of application.

(c) Warning notices

As particular danger could exist whilst a ship is under construction or repair it is considered essential to display warning notices prominently in permanent positions inside any compartment insulated with organic foam material and also on the external surfaces of such a compartment, stressing the need to exercise great caution whenever welding or burning operations are contemplated in the vicinity. The organic foam material should be removed locally from the repair area before heat is applied.

(d) Regular inspection

Once organic foam materials and their associated protective facings have been installed in a ship they should become items of regular inspection.

Organic foam materials and fire protective facings acceptable to the Department

8. In conjunction with the Building Research Establishment Fire Research Station, Borehamwood, Herts WD6 2BL, a procedure has been developed enabling:

- (a) organic foam materials which are claimed by their manufacturers not to constitute a hazard; and
- (b) combinations of organic foam material and their intended protective facings,

to be evaluated.

Manufacturers wishing to have their products evaluated in such a manner should in the first instance make written application to the Chief Ship Surveyor of the Department of Trade.

Department of Trade
Marine Division
London WC1V 6LP

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