

Polyurethane Foam Sealants, Foam Fillers and One Component Foams – Economical and Safe to Handle

Polyurethane (PU) foam sealants, foam fillers and one component foams (OCF) are self-adhesive, self-hardening foam filler materials which are both cost-effective and simple to use. These foams are sold in pressurised containers fitted with a dispensing device. When the device is operated, a foam is discharged which has an initial consistency similar to shaving foam. This foam hardens on contact with the air and expands to fill all hollow spaces. The expansion capacity of foam makes it ideal for use as a sealant and cavity filler.

One component foams are the preferred material for installing door and window frames. These foams are also used in a number of other applications, for example to seal gaps in roof constructions. Due to its excellent adhesion, one component foam may be used instead of screws, in specific cases, to prevent thermal bridges.

The use of a foam sealant can reduce construction air-tightness by up to 40%. A study has shown that the use of foam sealants can reduce European CO₂ emissions by as much as 80 million tonnes annually!

For over 30 years, products containing MDI (methylene diphenyl diisocyanate) have been sold in Germany to both professionals and the DIY market. So-called one component foam systems, with around 25 million cans sold per year in Germany, constitute the largest share by far. An estimated third of cans sold are used in the home. Other products containing MDI, such as special adhesives and fillers, play a much less important role in the consumer segment; however, they are essential for specific applications.

At present there are no reported cases of end user sensitisation to these products.

Safe handling

The extremely low vapour pressure of MDI makes handling products containing MDI comparatively safe. Even under conditions more akin to professional usage, where larger quantities of foam sealant, foam filler and one component foam are handled over a short period, the concentrations of MDI in the ambient air of the respective application area are one to two orders of magnitude below the current occupational exposure limit for MDI of 50 µg/m³ in Germany, as confirmed by exposure analyses performed under corresponding conditions.

As a result of the risk assessment of consumer products containing MDI performed by the EU, a decision was made to apply certain conditions to the sale of these types of products in order to further improve consumer protection. This decision forms part of Annex XVII of the REACH regulation and came into force at the end of 2010. For this reason, consumer products containing MDI are now sold with additional information on safe handling and protective gloves will be included in the packaging, making it even easier for consumers to protect their skin from coming into contact with the product. Skin protection is necessary not just because the material is difficult to remove from the skin, but also because sensitisation as a result of skin contact cannot be ruled out.

The decision by the EU to classify MDI as “R40”, i.e. as a potential carcinogen, was made following lengthy discussions on the interpretation of two long-term studies performed on rats. To comply with the requirements of this type of study, MDI was sprayed as a fine aerosol at an extremely high concentration which was greater than a factor of 100 above the MDI occupational exposure limit applicable at the time. Such conditions do not occur in practice.

The difference between danger and risk:

The classification of a material provides basic information on the potential dangers posed by a material. However, classification does not allow for a direct conclusion to be drawn on the risks of a particular material. To evaluate the risk to health, data on exposure is required (level and duration of exposure). Investigations have shown that the use of single-component systems typically exposes the consumer to MDI concentrations far below the MDI occupational exposure limit.

MDI-based foam sealants, foam fillers and one component foams have been thoroughly tested, can be handled safely by consumers and are available at economically attractive conditions.

Foam sealants, foam fillers and one component foams should not be confused with insulating materials made of polyurethane rigid foam. Insulation made of polyurethane rigid foam (PUR/PIR) is manufactured industrially and is sold as off-the-shelf insulating material. It does not contain MDI and is not subject to legislation on chemicals.

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