MMA construction products – safety relevant aspects

Expect more from your floor.

General

Solid transparent polymethyl methacrylate (PMMA) products are diverse and present in everyday life. Shaping takes place via injection moulding of molten PMMA-granulates, e.g. for car tail lights or polymerisation (“chaining”) of liquid methyl methacrylate (MMA) to rigid PMMA in-between two plates, as done for “Plexiglas”. For some applications, the adhesion respectively shaping by polymerization of MMA to PMMA at the final site is exploited, e.g. 2-component adhesives, bone cements, road markings or floor coatings, which may also contain pigments and fillers. For curing by the end user, typically easy to use starters like benzoyl peroxide (BPO) are added. This starter is well investigated dermatologically as it is the active ingredient for acne ointments (up to 10 %).

Notes about application of Silikal MMA resins

Hard Silikal reactive resins contain the liquid hazard-determining compound methyl methacrylate. During application of MMA-products, MMA-vapors will occur due the high MMA-vapour-pressure.

MMA-vapours
Odour threshold: 0.05 ppm (≈ 0.2 mg/m³)
Workplace exposure limit: 50 ppm (≈ 210 mg/m³)

While handling MMA-products, the low MMA odour threshold in connection with its pungent smell leads to an effect of warning way below the workplace exposure limit (WEL).

According to the German Ordinance on Hazardous Substances, the WEL is defined as the threshold of a concentration in air at the workplace with respect to a reference period. It specifies till which concentration, acute or chronic harmful effects to the health are not expected. Workplace exposure limits are time weighted average values for complete shifts, assuming 8 hours working per day, 5 working days a week, for the whole working life.

Easy possibilities to determine the MMA concentration in air are electronic hand held devices (“miniRAE 3000”) or devices with indicator glass pipes (company “Dräger”). These devices suck in a defined air amount and display the MMA concentration directly respectively after few minutes.

The risk of exceedance of the air limit value occurs especially when processing MMA products in enclosed spaces. Here, suitable extraction or ventilation measures must be taken care of. We recommend using at least one incoming and one outgoing fan, whereby the occurring emissions are to be led into the open air. If the air limit value is nevertheless exceeded, suitable respiratory protection must be worn. Recommended are the “Airstream” helmets of the company 3M which ensure a resistance-free breathing.

Only if the air limit value is exceeded without wearing respiratory protective masks it is possible to expect possible health risks. Further safety instructions are listed in our safety data sheets, which we print or provide electronically to our customers.

It is not known to exceed the air limit value for outdoor coatings, as this generally provides sufficient fresh air.

Soft Silikal reactive resins (flexible main layers) contain, in addition to MMA, 2-ethylhexyl acrylate, which is considerably less volatile, but has a more sensitizing effect on the skin and makes wearing gloves even more important.

The overall result is the following classification according to GHS (Globally Harmonized System of Classification and Labelling of Chemicals), Hazard statements:
H225 Highly flammable liquid and vapour.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H335 May cause respiratory irritation.

This classification applies to more than 90 % of Silikal MMA products. However, special formulas may differ from this classification. Decisive is always the safety data sheet of the respective product.

With proper processing of all Silikal reactive resins in combination with the protective measures mentioned above, a health hazard can be excluded.

Comparable conclusions and recommendations can be found in the state of the art report “Methacrylate Resins in the Construction Industry and the Environment” - Chapter 4 of “Deutsche Bauchemie”, freely available at (English version): https://deutsche-bauchemie.de/fileadmin/sites/public/dbc/publikationen/DBC_169-SB-E-2012.pdf

Generic safety instructions for MMA coatings are also deposited at the professional associations of the construction industry, e.g. BG Bau, Germany (only German): https://www.wingisonline.de/giscodes.aspx

If you have further questions, we are always at your disposal.

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