Underestimated dangers in plastics processing ng

Hazardous to health fumes when welding/cutting plastic

For some time we have noticed that the T is becoming more and more common. She finds her application and theatrical workshops. The employees who do not know them are exposed. These hazards are assessed by the Ordinance on Hazardous Substances and corresponding technology of plastic welding often in building yards and arts often hazards n need under the new protective measures set

In plastic welding, plastic sheets or parts are melted and then joined together using the liquid break edges or surfaces. When cutting plastic, the plastic parts are cut using a hot wire. At the hot breaking edge, vapors are generated that consist of the decomposition products of the plastic.

With hot wire cutting, the metal of the wire can have a catalytic effect, so that the plastics decompose even at temperatures above 200°C. The decomposition process can be recognized by the discoloration (yellow-brown coloration of the cut edge up to charring). Products such as: formic acid (corrosive or highly irritating vapors to the mucous membranes), acetone (irritant, highly flammable), acetic acid (flammable, corrosive or highly irritating vapors to the mucous membranes), methanol (toxic fumes), methane gas (extremely flammable vapors), Ethylene (extremely flammable vapor), hydrogen (extremely flammable vapor) and carbon dioxide. Employees often notice that small explosions occur. The toxic effect of the vapors that irritate the mucous membranes are primarily dangerous.

In the case of chlorinated products such as PVC, vapors of hydrochloric acid or dioxins escape. When polyformaldehyde is melted in granular form or sheets are bonded together, formaldehyde is released.

If PU foams are cut, ether (extremely flammable, diethyl ether), glycol ether (harmful to health), diisocyanates, hydrogen cyanide (hydrocyanic acid) (toxic, extremely flammable), aromatic amines, flame retardants and the blowing agents can be released.

During such work, a multi-component mixture is created that, depending on the temperature and composition of the plastic, has an acute but also chronic toxic effect after inhalation. The hazard depends on the vapor concentration.

The hazards are to be classified according to the toxicity of the products in protection levels 2, 3 and 4.

protective measures

When cutting and welding plastic, it is absolutely necessary to extract the resulting vapors with an effective point extraction according to "DIN 1946 part 7 point extraction". Large-scale work should only be carried out with an effective room air extraction according to "DIN 1946 part 4 room air technology". A filter mask with a universal filter is required when cutting works of art or exhibits for the theater area that are too bulky for turbulence-free room air extraction.

plastic	Volatile substances emitted	Danger	Protection - step
polyoxymethylene (POM)	formaldehyde	harmful, carcinogenic category 3	3
Epoxy resins (based on Bisphenol A Component)	phenol, ammonia	toxic, corrosive	3
chloroprene rubber (CR)	chloroprene (2-chloro-1,3-butadiene), hydrochloric fumes	highly flammable, corrosive	2
Polystyrene (PS)	Styrene (80%), Benzene, Toluene	flammable, harmful to health; carcinogenic category 1, highly flammable;	4
acrylonitrile butadiene styrene copolymer (SECTION)	Styrene, acrylonitrile, 1,3-butyl nitrile, hydrocyanic acid, benzene, styrene	flammable, harmful to health; carcinogenic category 2, highly flammable;	4
styrene-acrylonitrile copolymer (SAN)	Acrylonitrile, styrene, benzene, toluene, hydrocyanic acid	carcinogenic category 2, highly flammable; flammable, harmful to health; carcinogenic category 1, highly flammable; flammable, harmful to health; toxic, highly flammable	4
Polyvinyl chloride (PVC)	Hydrochloric acid; plasticizer (e.g. diotyl phthalate [phthalic acid-bis-2-ethylhexyl ester DEHP])	corrosive; impairment of fertility	4
Polycarbonates (PC)	phenol, carbon dioxide	poisonous	3
Polyamide 6 (Perlon, nylon, PA)	ε-caprolactam, ammonia, carbon dioxide	harmful to health; corrosive	2
Polyamide 66 (Nylon)	cyclopentanone, hexamethylenediamine, ammonia	flammable; harmful to health; corrosive	2
polyethylene (HDPE, LDPE)	saturated aldehydes	harmful, sensitizing	2
polytetrafluoroethylene (PTFE)	perfluorinated hydrocarbons, hydrofluoric acid	; very poisonus	3
polymethyl methacrylate (PMMA)	methyl methacrylate	highly flammable, irritating	2
Polyurethane (PUR)	ether, glycol ether, dicyanates, hydrocyanic acid, aromatic. amines, ammonia, flame retardants, Blowing agent in foams	highly flammable; ; harmful to health; toxic, highly flammable; ; corrosive	3
Polypropylene (PP)	saturated hydrocarbons, carbon dioxide	harmful, flammable	2
polybutylene terephthalat (PBTP)	benzene	carcinogenic category 1, highly flammable	4

plastic	Volatile substances emitted	Danger	Protection - step
Polyacrylonitrile (PAN)	acrylonitrile, hydrocyanic acid	carcinogenic category 2, highly flammable; toxic, highly flammable	4
cellulose acetate (CA)	acetic acid, formic acid	flammable, irritant; corrosive	2

Literature/legal information:

BIA work folder 0516, 22nd delivery III/ 1999, "Volatile decomposition products of plastics", N. Lichtenstein, K. Quellmalz

RW May, EF Pearson, D Scothern, "Pyrolysis - Gas Chromatography", The Chemical Society, London 1977

DIN 1946 part 7 local extraction DIN
1946 part 4 ventilation technology

TRGS 900 air limit values

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