

## 7.25 Adhesive coating (including footwear manufacture)

### 7.25.1 Coverage

Sectors using adhesives are very diverse. Production processes and application techniques are also very different. Relevant sectors are: the production of adhesive tapes, composite foils, the transportation sector (passenger cars, commercial vehicles, mobile homes, rail vehicles, aircrafts), the manufacture of shoes and leather goods and the wood material and furniture industry. The non-industrial use of adhesives is a large sector but it is studied separately.

### 7.25.2 Emission sources

Application techniques and types of adhesives used differ widely from one sector to another. Adhesives can be applied manually, by spraying, or roller coating. The application efficiency depends on the type of technique used. Solvent contents in the adhesives depend highly on the type of material consumed. Solvent content in solvent-based adhesives can be as high as 80%. Dispersion glues contain some 2 - 6 % solvents; and melting glues are solvent-free. Each type of adhesive has different physical and chemical properties.

### 7.25.3 BAT, Associated Emission Levels (AEL)

BAT AEL and techniques are based on STS BREF [1] for the manufacture of adhesive tapes and on EGTEI data [2] for the other sectors.

Reduction techniques are general but are suitable among sectors using adhesives.

Solvent-based adhesive coating processes generate significant amounts of VOC emissions, which can be reduced either by primary measures (substitution by zero or low organic solvent containing adhesives) or by secondary measures for larger installations (adsorption, thermal or catalytic oxidation). A selection of such measures applied to selected base processes is given in table 1.

**Table 1: Emission sources and selected VOC control measures with associated emission levels for adhesive coating and shoe manufacturing**

Type of installation	Combination of control measures	Associated emission levels for VOC [Defined for the following averaging period: yearly for total AEL]
Manufacturing of adhesive tape	Use of condensation, adsorption, oxidation or a combination of these techniques	Total emission of 5 wt-% or less of the solvent input [1]
Manufacturing of adhesive tape Adhesive coating in other sectors	Use of non-solvent based adhesives	0 g/kg adhesive [2]
	Use of condensation, adsorption, oxidation or a combination of these techniques	< 150 g/kg adhesive [5]
	Use of water-based adhesives	20 g/kg adhesive [2]
Shoe industry	Use of water-based adhesives	20 – 30 g / pair [3]
	Use of biofiltration	

#### **7.25.4 Cost data for emission reduction techniques**

Costs vary between about 0.1 and 0.7 k€/t VOC abated according to the type of measure applied (i.e. treatment or solvent consumption reduction): abatement costs are even less expensive with 100% solid content adhesives compared to solvent-based products but these systems are not always technically applicable. These costs are representative for large installations.

For the particular sector of shoe manufacturing, the implementation of thermal oxidation will lead to abatement costs around 8 to 11 k€/t VOC and the use of water-based products around 0.7 k€/t VOC but this last technique does not seem to be applicable to all types of productions.

The detailed methodologies used to estimate these costs are defined in EGTEI documents concerning “adhesive application” [2] and “manufacture of shoes” [3].

**Caution:** these documents are susceptible to evolve if new updated data are available.

#### **7.25.5 Emerging techniques**

No data is available.

#### **7.25.6 References used for chapter 7.25**

[1] STS BREF – August 2007

[2] EGTEI background document/synopsis sheet: Adhesive application – 2003/2005

[3] EGTEI background document/synopsis sheet: Manufacture of shoes – 2003/2005

[4] Directive 1999/13/EC of 11 March 1999 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations

[5] Comments from Birgit Mahrwald – UBA