

Case study

Shoe manufacture

Legal Requirements

Installation of Annex VII , part 2, No 14 of IE Directive

Annex VII part 1, No 6:

Footwear manufacture:

Any activity of producing **complete** footwear or parts

Solvent Consumption Threshold: > 5 tons/year

Remark:

Cleaning of equipment is considered to the activity in each case, here No. 14 footwear manufacture

Overview

VOC Directive (IE Directive):

Annex VII Part 2 No 14:

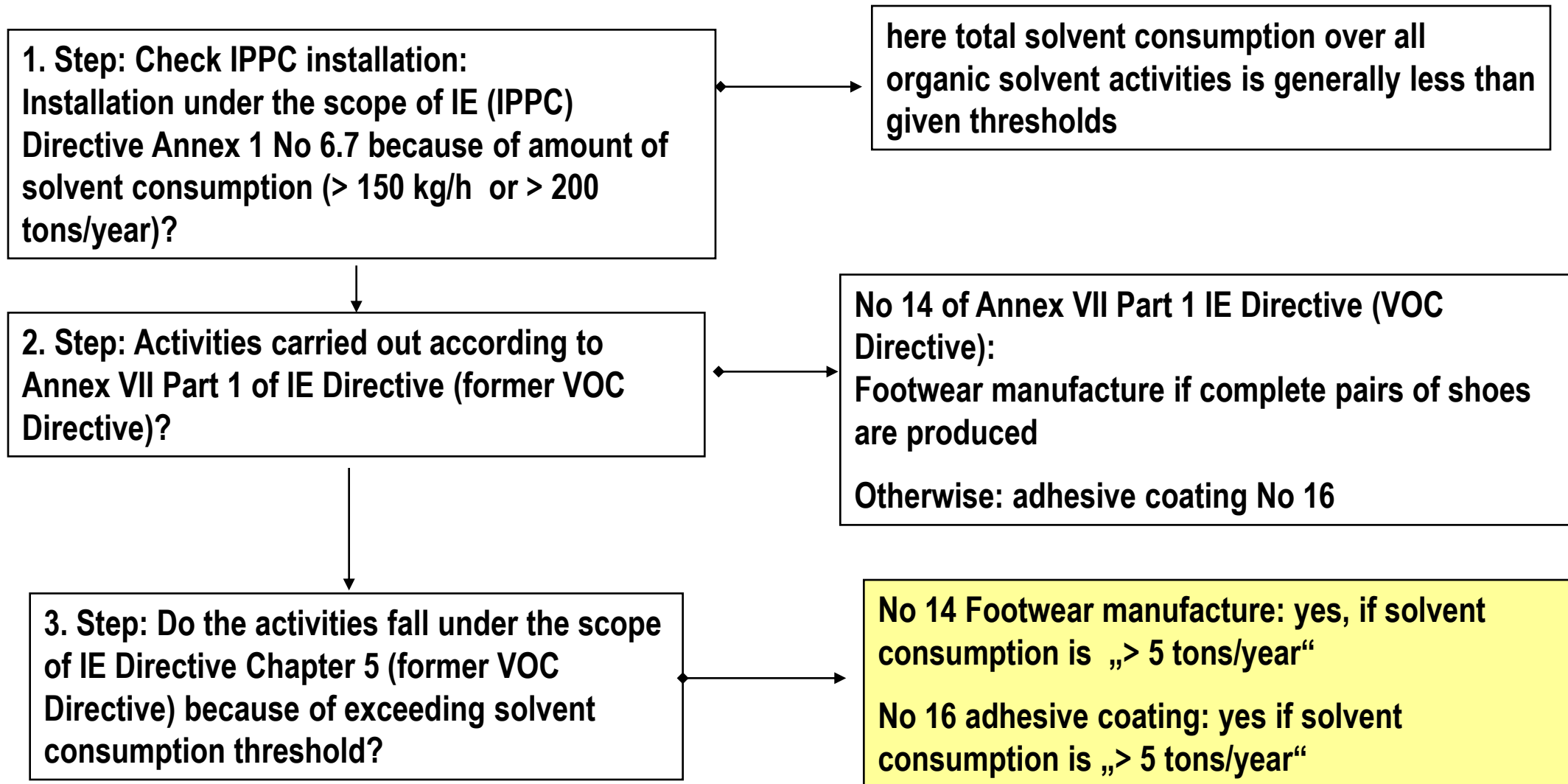
Footwear manufacture

Solvent consumption threshold:
> 5 tons/year

IE (IPPC) Directive Annex I, No. 6.7:

Surface treatment using organic solvents; solvent consumption threshold > 150 kg/h or > 200 tons/year

Checklist: Application of IE Directive)



Requirements according to Annex VII, part 2, No 14 – Footwear manufacture:

- CMR substances (Art. 58):
 - a) Substitution as far as possible by less harmful substances/mixtures within the shortest possible time.
 - b) In case of emission mass flow ≥ 10 g/h:
emission limit for waste gases 2 mg/Nm^3
- The discharge of such VOCs shall be controlled as emissions from an installation under contained conditions as far as technically and economically feasible to safeguard public health and the environment.



Check of Safety Data Sheets necessary and/or confirmation of supplier

Requirements according to Annex VII, part 2, No 14 – Footwear manufacture:

- Emission limit values for **halogenated VOC with hazard statements H341 or H351: In Germany: additionally No 5.2.5 Class I TA Luft**

In case of emission mass flow ≥ 100 g/h:

emission limit for waste gases 20 mg/Nm^3

- The discharge of such VOCs shall be controlled as emissions from an installation under contained conditions as far as technically and economically feasible to safeguard public health and the environment.



Check of Safety Data Sheets necessary and/or confirmation of supplier

Requirements according Annex VII Part 2 No 14 Footwear manufacture

Threshold [t/year]	Total emission limit value	Special provisions
> 5	25 g per pair	Total emission limit value is expressed in grams of solvent emitted per pair of complete footwear produced.

Total emissions of an installation (Art. 2 No 12 1999/13/EC; Art. 57 No 4 IE Directive):
sum of fugitive emissions and emissions in waste gases

Here for footwear manufacture: VOC emissions over all processing steps (including cleaning, adhesive coating, printing etc.)

In case of waste gas cleaning: the part of emitted substances after the waste cleaning has to be added too!

Total emission limit value is equivalent to an installation specific reduction scheme referring to Annex IIB No 1 of VOC Directive (IE Directive: Annex VII part 5 No 1). A specific reduction scheme in sense of Annex IIB No 1 is therefore not necessary

Verification of compliance to total emission limit value by annual solvent mass balance
(elaborated by operator)

Because of dependence of total emission limit value of solvent input -> total emission
limit value = floating value to be determined for each year!

Total emission limit value:

Total emission limit value = 25 g C per pair complete footwear

1. Step: Determination of total emissions by solvent mass balance

Total Emission $E = \text{Fugitive Emission } F + \text{Emission in waste gas (captured) } O1 =$
 $I1 - O5 - O6 - O7 - O8$

Note:

Fugitive Emission $F = I1 - O1$ (emissions of captured waste gases) – $O5$ (solvent destroyed by waste gas cleaning) – $O6$ (solvent in waste) – $O7$ (organic solvent in sold products) – $O8$ (solvents for reuse but not counted as input)

3. Step: Comparison of determined total emissions with emission limit value:

Here in footwear manufacture: Generally no waste gas abatement technique used

-> $O5 = 0$

For simplification:

$O7 = 0$ (no VOC in sold products anymore)

$O8 = 0$ (no recycling of solvents at site of installations – Note: solvent recycled external has to be considered as $O6$ (waste))

Total emission = $I1 - O6$

Calculation of emission factor referring to pairs of shoes = $(I1 - O6) / (\text{total produced pair of shoes in time period})$

Compliance to requirements of Annex IIA No 14 VOC Directive (Annex VII Part 2 No. 17 IE4 Directive) is given:

Determined total emission per complete pair of shoes \leq total emission limit value of 25 g per pair shoes

Example:

Estimated total VOC total emissions per complete pair of shoes:

1 125 000 g VOC/40 000 pairs of shoes = 28 g per pairs of complete shoes

Compliance to EU VOC Directive would not be given
– a more detailed analysis would be required!

Note:

This is only an estimation – for a detailed analysis all VOC weight contents over all VOC solvent containing agents used in manufacturing of shoes must be considered

BAT - Possibilities for emission reduction:

- Use of solvent free adhesives e.g.
Cementation of sole and insole with hot melts or PUR dispersions
- Use of adhesive free soling techniques e.g. injection moulding, sewing techniques
- Reduce quantities of adhesives and cleaning agents (e.g. reduction of material consumption by use of automatic processes)
- Process changes can avoid the need for adhesives (e.g. injection moulding techniques)
E.g. pre-treatment of phylon by UV/ozone technique makes the use of VOC free primer and adhesives for bonding possible
- In case of heavy duty footwear: Installation of end-of pipe techniques like thermal oxidiser with heat recovery, biofiltration

Generally thanks to improved surface preparation and modern chemical technologies solvent-free adhesives can now be reliably used throughout all traditional footwear production processes.

If compliance with the Emission Limit value of 25 g VOC/pair of shoes is not given ->

Possible measures:

- **Use of water-based glues**
- **Use of high solid glues**
- **Use of water-based cleaners**

Recommendation STE:

Contact supplier to develop a strategy for compliance with emission limit value of 25 g VOC/pair of shoes!

There are materials with less VOC content available!

Disclaimer

This presentation is a non-commercial product. No use of this publication may be made for resale or any other commercial purpose.

However, the presentation itself is not an official EU or document of German authorities and does not represent EU or policy of others. The views expressed above are those of the authors. This document is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this document or any part thereof, is made known. Any such party relies on the document at their own risk.

This presentation may not be published in any medium like Internet. All rights remain to the authors.