



COSHH-Essentials Validation: Control Errors, Hazard Classification and Health Protection

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Types of Control Errors

- **Over-control errors:** Instances in which control technologies are recommended but not strictly needed
- **Under-control errors:** Instances in which the recommended control technologies do not adequately limit the airborne concentration



Control Errors: Data Sources

NIOSH Control Technology Assessments
and Health Hazard Evaluations

- Vapor Degreasing Operations

- 34 reports, 424 air samples,
7 substances

- Bag Filling Operations

- 22 reports, 284 air samples,
19 substances



Control Errors: General Methods

- Applied COSHH Essentials to the
chemical substances identified in
NIOSH reports

- Compared measured and target air
concentrations with consideration
for presence/absence of
recommended control technologies

Control Errors: Application of COSHH-Essentials

- Hazard of the chemical (R-phrase)
 - Government Sources
 - HSDB and R-phrase Criteria
 - MSDS
- Ability to become airborne
- Scale of use (quantity, frequency)
- Nature of work task
- Result: Hazard Band, Control Approach, Task-Specific Control Technology

Control Approaches: Definitions

1. General Ventilation: room fans, vents
2. Engineering: slot exhaust ventilation
3. Containment: ventilated enclosures
4. Special: expert opinion needed

Recall: Hazard Bands & Exposure Bands

Hazard Bands	Target Exposure Band	
	Vapor (ppm)	Dusts (mg/m ³)
A	>50-500	>1-10
B	>5-50	>0.1-1
C	>0.5-5	>0.01-0.1
D	<0.5	<0.01
E	Expert Opinion Needed	
S	Skin & Eye Precautions	

Control Error Relative Frequency

Control Status

Vapor Degreasing

Absent (n=167)	Over-Control Error: 61%
Present (n=179)	Under-Control Error: 78%
Unknown (n=78)	≤ Exposure Band: 71%

Bag Filling

Absent (n=36)	Over-Control Error: 8%
Present (n=159)	Under-Control Error: 52%
Unknown (n=89)	≤ Exposure Band: 46%

Over-Control Errors: Details

Over-control errors = air concentrations within or below exposure band in the absence of controls

- Engineering Controls are Recommended:
 - Vapor Degreasing: 84% (98/117)
 - Bag Filling: 39% (18/46)
- Special/Containment Controls are Recommended:
 - Vapor Degreasing: 8% (4/50)
 - Bag Filling: 6% (5/79)

Under-Control Errors: Details 1

Under-control Errors = air concentrations above exposure band in presence of appropriate control

- Engineering Controls:
 - Vapor Degreasing: 79% (30/38)
 - Bag Filling: 50% (1/2)
- Special/Containment Controls:
 - Vapor Degreasing: 17% (4/24)
 - Bag Filling: No samples



Under-Control Errors: Details 2

- Containment/Special categories, in presence of Engineering Controls
 - Vapor Degreasing: 90% (105/117)
 - Bag Filling: 78% (75/91)



Control Errors: Conclusions

- Control technologies are not always required to satisfy exposure bands
- Engineering controls, e.g. slot exhaust ventilation, frequently do not adequately limit exposures
- Air monitoring is important

Aside 1: Hazard Classification

- It can be difficult
- Absence of R-phrases can mean:
 - (1) No health hazard
 - (2) No testing has been done
 - (3) Not classifiable under R-phrase criteria
- No statement of what to do when R-phrase is lacking for reasons 2&3

Aside 2: Health Protection

- Exposure bands are less than PELs or TLVs, but are they low enough?
- The minimal margin (e.g. safety factor) is minimal
- Absent air monitoring and/or medical surveillance we cannot be assured of minimal health protection



Research Questions

- How frequently do over- and under-control errors occur in practice?
- Are small business owners able to correctly utilize COSHH-Essentials?
- Does the approach result in compliance with legal standards?
- Can this be enforced as a legal standard?
- How does the approach compare to other low-cost methods?