



Particulate and Solvent Release Guidance for Cyclone Booth

Site: Veetec Hayes	Quotation Ref: 1647
By: C.Watkins	Booth Type: STL Cyclones, Tempo and PMR

At Veetec Hayes the Cyclone booths have vertical air flow that the calculations are based on. The airflows through the booths are based on an average air velocity of 0.25m/s to 0.3 m/s. On this basis the air volume is calculated. The paint mix room is used for storage and mixing of paints. As a result, there is no particulate release, and the solvent release is only from surface evaporation during mixing.

It has been assumed that the paints used on site are 60% water and 40% solvent based. The particulate release calculation would be for both water and solvent-based paints, but the solvent release would only apply to 40% of the spraying that is solvent based.

The Spray guns being used are the Devilbiss Sri PRO Series, Sri PRO Lite Gravity Spray Gun. The service manual confirms that it is "High efficiency complies with EPA by obtaining transfer efficiency above 65%" The Percentage transfer efficiency of the spraying of 65% is used in the calculation.

Site Maintenance

A site maintenance agreement is set up with STL. There are two programmed services per year. At both filters are changed and at the main 12 monthly service there is an LEV check. Between services the site orders up replacement filters on a regular basis to maintain the particulate capture efficiency of the extract filters to the design 99% of the installed duplex filter

Air Extraction.

STL Spraybooths are designed and manufactured to comply with BS EN 13355, Coating plants, Combined booths, Safety requirements. The booth has a Duplex Filter with G2 Primary and G3 Secondary. This nominally removes 99% of all paint particulates. We understand the majority of paints used are EPA compliant, primarily water based.

The extract duct location and height with its efflux velocity will achieve effective odour dispersal at the boundary. The nearest residential area is at 50m away and the prevailing wind in the UK is from the west and the resultant emission will be dispersed away from the residential area.

VOC Emissions

VOC Emissions are covered under statutory guidance for re-spraying of road vehicles in the Department for Environment, Food & Rural Affairs Process Guidance Notes 6/34. The activities for regulation by the Process Guidance Notes are as listed in table 3.1 for premises with solvent consumption used in coating activity of '1 tonne or more in any 12-month period'.

The VOC emissions is dependent on the Coatings and Process. By the use of compliant coatings and process omission control is demonstrated.

Coatings compliance is achieved if the coating contains VOC's equal or less than the VOC detailed in Section 4 - Table 4.2 within the document. Compliant coatings are labelled with VOC content in grams per litre that corresponds to the permitted level for the category of the product in table 4.2 of the Process Guidance Notes.

The process control techniques are covered in Section 5 of the document. The summary in table 5.21 advises that for coating operations for VOC's the control technique is the use of a 'spray booth enclosure for capture and disposal'.



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Particulate Release

The concentration of particulate matter has been calculated on the following basis

- 1 - Compliant coatings are in use
- 2 - Duplex ultra extract filter is fitted.
- 3 - A spraygun with a transfer efficiency of at least 65% is used (HVLP).

Particulate Release Calculation

$$\text{Particulate Release} = [P] = \frac{M(S/100)(1-T/100)(1-A/100)}{V}$$

Where:

M = 666 mg/s Mass delivery rate of paint from the spray gun.
S = 0.6 Percentage solids content of the paint (60%).
T = 0.35 Percentage transfer efficiency of the spraying (65%).
A = 0.01 Percentage arrestance of the Duplex Filter (99%).
V = 4666 m³ Air volume flow rate of the above spraybooth in 10 mins
[P] = Concentration of particles in the discharge from the spraybooth.

$$\text{Particulate in Discharge} = [P] = \frac{666 \text{ mg/s} \times 0.6 \times 0.35 \times 0.01}{4666 \text{ m}^3}$$

$$\text{Resultant} = 0.000299 \text{ mg/m}^3$$

Paint Mix Room

No particulate release as no spraying taking place only the mixing of paints.

Solvent Release Calculation

Cyclone Booth

$$\text{Particulate Release} = SR = \frac{P \times S}{V}$$

Where:

SR = Solvent Release.
P = 0.3 ltr Paint Volume
S = 419000 mg/ltr Percentage Solvent (419 g/ltr)
V = 4666 m³ Air volume flow rate of the above Spraybooth in 10 mins

$$\text{Particulate in Discharge} = SR = \frac{0.3 \text{ ltr} \times 0.419}{4666 \text{ m}^3}$$

$$\text{Resultant} = 0.0000269 \text{ ltr/m}^3 = 26.9 \text{ mg/m}^3$$

 <small>SPRAYBOOTH TECHNOLOGY LIMITED</small>	Particulate and Solvent Release Guidance for Cyclone Booth
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Paint Mix Room

Any solvent release is from surface evaporation when the paint mixing is open to the air. This surface area is small, and the evaporation is negligible. As a result, solvent release from Paint Mix Rooms is not normally considered. The paint mix room has a minimum air change rate of 20 air changes per hour to maintain a safe working environment.

Conclusion

With the small release levels, the height of emission duct and the efflux velocity in excess of 15m/s that adds further dilution once the extract air has left the ducts there will be no noticeable particulate or solvent spread from the facility to neighbouring properties.