Midland Steel Structures Ltd, Coventry

Permit No: PPC/063

Metal Coatings

Solvent Management Plan 2008 usage

1. Objective

To establish a Solvent Management Plan following the Secretary of State's Guidance for Coating of Metal and Plastic Processes PG6/23 (04). This document particularly refers to the requirements of paragraph 5.12.

2. Definitions and Interpretations

The Guidance Note refers to specific Inputs and Outputs of organic solvent. The interpretation of the definitions in relation to Midland Steel Structures Ltd is as follows;

Definition Ref	Interpretation
I_1 Purchased input	The input quantity of VOC will be the sum of all coatings and thinners used in the application process and solvent used for cleaning purposes
I_2 Recycled & reused	Organic solvents recovered and reused as solvent input into the process, This is not applicable to MSS.
O_1 Waste gasses	The emission of VOC from the exhaust stacks in the spray booths. This is calculated as the difference between the input VOC and the other output VOC.
O_2 Lost in water	MSS do not use a process where solvents are washed in water and therefore this output requirement is not applicable
O_3 Residual	It is believed that no organic solvent remains as residue in the product and therefore this output requirement is not applicable
O_4 Uncaptured emissions	All mixing of the coating components, transfer of coatings and cleaning of application equipment is carried out in extracted areas. This output requirement is therefore not applicable. The work method employed at MSS involves the sprayed work pieces remaining in the spraying area, with the extraction turned on, until they are dry. As there is no forced air make-up into the building, then air for the spray booth extraction is drawn from outside the building through any holes e.g. doors, available. Due to the size of the booths this is a high air volume. In this situation air movement is always into the building which prevents fugitive emissions through doors etc.
O_5 Chemical/Physical reactions	None of the coatings used at MSS generate emissions from chemical or physical reactions and therefore this output is not applicable.
O_6 Collected waste	Organic solvents contained in collected waste arise from the residue of coating materials left in the drums and from waste cleaning solvents. The drums are partially vented prior to collection.
O_7 Sold on	A proportion of coatings bought are subsequently sold on to sub-contractors.

O_8 Recovery for resale	The waste resulting from the gun cleaning process contains 27% VOC and is not considered suitable for recovery.
O_9 Others	To the best of our knowledge all solvent releases are accounted for in the above definitions and therefore this output is not applicable. The waste on the floors of the spray booth is a result of the overspray from the spraying process. A significant part of the solvent in the paint is lost during the transfer of paint from the spray gun to workpiece and the overspray paint reaching the floor is relatively dry. Any remaining solvent is removed by the air flow into the extraction system and subsequently vented through the ducts. The solid waste is subsequently removed as dry dust.

3. Methodology

Inputs

3.1 Input I_1

The input data for materials used in the process is calculated from information supplied by the materials manufacturers.

Outputs

The known outputs cannot realistically be calculated with this level of accuracy and traceability. In order to estimate the relevant outputs the following methodologies have been used.

3.2 Output O_6 - Organic solvents contained in collected waste.

3.2.1 From the residue of coating materials left in nominally empty drums.

This output is calculated from an estimated 5mm thick residual layer in a coatings container after emptying into a mixing drum or being pumped to the spray gun.

The coating VOC content used to determine O_6 is a weighted figure calculated from the total VOC weight of all materials in kg divided by the total usage of all materials in litres less gun cleaner. (It is not an average VOC content of the materials used)

The volume of material in a drum varies with the type of material. For a typical drum the depth of material would be 500mm. The residue therefore is equivalent to 1% of the drum height and therefore 1% volume of coating in the drum. The calculated average coating VOC content can be used to determine the VOC content of the residue then extrapolated to give a total. The average coating VOC content of the residue is 0.366 kg/litre.
The residual volume of coatings is 1% total litres less gun cleaner or 269.05 litres. The total VOC content of the residue left in nominally empty drums is therefore 98.6 kg or 0.099 tonnes.

3.2.2 Gun cleaner residue
Gun cleaner solvent residue is collected every 16 weeks in a 205 litre drum or 3 drums per year. The VOC content of this residue has been measured as 0.278 kg/litre. This gives an equivalent annual VOC waste from this stream of 176.5 kg or 0.177 tonnes.

3.3 Output O_7 - Organic solvents, or organic solvents contained in preparations, which are sold or are intended to be sold as a commercially valuable product.

This output, for materials sold on to sub-contractors, is calculated using the data used for I_1.

4. Determination of Annual Solvent Consumption
The VOC content and solids content are available from data supplied by the coating manufacturer. The VOC or solids content of the total coating used can be determined by multiplying the volume by VOC or solids content as appropriate.

The annual actual consumption of organic solvents (C) is

$$C = I_1 - O_8$$

5. Determination of Target Emission
For installations with a solvent consumption of 5-15 tonnes the Target Emission is

Total Mass of Solids (para 5.6 (a) PG6/23(04)) x **0.60** (see Table 6 PG6/23(04))

Compliance with Reduction Scheme is achieved if the annual actual solvent emission determined by the Solvent Management Plan is less than or equal to the Target Emission.

6. Determination of Annual Actual Solvent Emission
The annual actual solvent emission (para 5.7 PG6/23(04)) equals

$$I_1 - O_8 - O_7 - O_6$$

7. Solvent Management Plan
Using the definitions in paragraph 5.12 the input of VOC is

$$I_1$$

The outputs are

$$O_1 + O_6 + O_7 \text{ (other outputs equal zero)}$$

where
I_1= the quantity of organic solvents used in preparations and as thinners

O_1= the quantity of organic solvent in exhaust air from the spray booths

O_6= organic solvents contained in collected empty drums and waste gun cleaner

O_7= organic solvents contained in coatings sold to sub-contractors

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Total VOC Input (I1)/ tonnes	**10.916**
Total VOC Output in waste (O6)/tonnes	**0.276**
Total VOC Output as sold on (O7)/tonnes	**0.000**
Actual VOC Emission / tonnes	**10.640**
Total retained solids/ tonnes	**31.176**
Ratio VOC : solids	**0.34 :1**

For Midland Steel Structures Ltd during the 12 month period 01/01/08- 31/12/08 (see VOC return in Appendix)

I_1= 10.916 tonnes

O_1= 10.640 tonnes

O_6= 0.099 tonnes (empty drums) + 0.177 tonnes (gun cleaner) = 0.276 tonnes

O_7 = 0 tonnes

The annual actual consumption of organic solvents is

C = 10.916 tonnes

The annual actual solvent emission for MSS is

10.916 - 0.276 = 10.640 tonnes

The Total Mass of Solids is shown in the annual VOC return for MSS Ltd. and is

31.176 tonnes

The target emission for 2008 is therefore

31.176 x 0.60 = 18.706 tonnes

The annual actual solvent emission is therefore less than the target emission.

Appendix-
VOC return 01/01/2008 to 31/12/2008

Midland Steel Structures Ltd, Coventry
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Metal Coatings
01/01/2008 to 31/12/2008
Coatings bought in

Coating	Type	VOC kg/l	solids kg/l	total litres l	total VOC kg	total solids kg
Steelguard 3290	epoxy	0.297	1.303	11460	3403.62	14932.38
Steelguard 3291	epoxy	0.305	1.325	40	12.20	53.00
Amercoat 4116	alkyd	0.421	1.109	14580	6138.18	16169.22
Amercoat 450	alkyd	0.424	0.866	25	10.60	21.65
Gun Cleaner YAP15002	solvent	0.838	0.000	800	670.40	0
Gun Cleaner YAP15008 gun cleaner	solvent	0.851	0.000	800	680.80	0
		Total VOC			10915.80	
		Total solids				31176.25
		Total litres		27705		