

Midland Steel Structures Ltd, Coventry

Permit No: PPC/063

Metal Coatings

Solvent Management Plan 2007 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	<p>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.</p> <p>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.</p>
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	<p>To the best of our knowledge all solvent releases are accounted for in the above definitions and therefore this output is not applicable.</p> <p>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.</p>

3. Methodology

Inputs

3.1 Input I₁

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 O₆ - 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 O₆ 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 0.379 kg/litre. The residual volume of coatings is 1% of I₁ less gun cleaner or 399.88 litres. The total VOC content of the residue left in nominally empty drums is therefore 151.55kg or 0.152 tonnes.

3.2.2 Gun cleaner residue

Gun cleaner solvent residue is collected every 11 weeks in a 205 litre drum. The VOC content of this residue has been measured as 0.278 kg/litre. The quantity of VOC per drum is therefore 56.99kg. This gives an equivalent annual VOC waste from this stream of 493.9 kg or 0.494 tonnes.

3.3 Output O₇ - 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 I₁.

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

5.1 The Target Emission for a metal coating installation in the 15 tonnes or more solvent consumption by 31/10/2005 is

Total Mass of Solids (para 5.6 (a) PG6/23(04)) x 0.56 (see Table 6 PG6/23(04))

5.2 The Target Emission for a metal coating installation in the 15 tonnes or more solvent consumption by 31/10/2007 is

Total Mass of Solids (para 5.6 (a) PG6/23(04)) x 0.37 (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

For Midland Steel Structures Ltd during the 12 month period 01/01/07- 31/12/07
(see VOC return in Appendix)

$$I_1 = 19.252 \text{ tonnes}$$

$$O_1 = 15.454 \text{ tonnes (see below)}$$

$$O_6 = 0.166 \text{ tonnes (empty drums)} + 0.262 \text{ tonnes (gun cleaner)} = 0.428 \text{ tonnes}$$

$$O_7 = 3.370 \text{ tonnes}$$

The annual actual consumption of organic solvents is

$$C = 19.252$$

The annual actual solvent emission for MSS is

$$19.252 - 3.370 - 0.428 = 15.454 \text{ tonnes}$$

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

$$36.645 \text{ tonnes}$$

The target emission for 31/10/2005 is therefore

$$36.645 \times 0.56 = 20.521 \text{ tonnes}$$

The target emission for 31/10/2007 is therefore

$$36.645 \times 0.37 = 13.559 \text{ tonnes}$$

The annual actual solvent emission is therefore less than the 2005 target emission but greater than the 2007 target emission.

Appendix-
VOC return 01/01/2007 to 31/12/2007

Midland Steel Structures Ltd,
Coventry
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Metal Coatings
01/01/2007 to 31/12/2007

Coatings bought in		VOC	solids	total	total	total
Coating	Type	kg/l	kg/l	litres	VOC	solids
				l	kg	kg
Steelguard 3290 cure	epoxy	0.275	0.689	19	5.35	13.41
Steelguard 3290 light grey	epoxy	0.301	1.351	121	36.28	162.85
Amercoat 4116 Red Oxide	alkyd	0.421	1.050	13920	5860.32	14616.00
Amercoat 4116 Light Grey	alkyd	0.419	1.048	28043	11750.16	29389.41
Amercoat 4116 Light Grey	alkyd	0.419	1.048	220	92.18	230.56
Amercoat 4116 Grey	alkyd	0.428	1.016	440	188.32	447.04
Amercoat RAL 5015 sky blue	alkyd	0.356	1.165	210	74.76	244.65
Gun Cleaner YAP15002	solvent	0.838	0.000	825	691.35	0
Gun Cleaner YAP15008	solvent	0.851	0.000	650	553.15	0
		sub-total			19251.87	
		VOC				
		sub-total				45103.92
		solids				
		total litres		44448		

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Metal Coatings

01/01/2007 to 31/12/2007

Coatings sold to third party

Coating	Type	VOC kg/l	solids kg/l	total litres l	total VOC kg	total solids kg
Steelguard 3290 cure	epoxy	0.275	0.689	10	2.75	6.89
Steelguard 3290 light grey	epoxy	0.301	1.351	50	15.05	67.55
Amercoat 4116 Light Grey	alkyd	0.419	1.048	8000	3352	8384
	sub-total VOC				3369.8	
	sub-total solids					8458.44
	total litres			8060		

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Total VOC Input (I1)/ tonnes	19.252
Total VOC Output in waste (O6)/tonnes	0.320
Total VOC Output as sold on (O7)/tonnes	3.370
Actual VOC Emission / tonnes	15.562
Total retained solids/ tonnes	36.645
Ratio VOC : solids	0.42 :1