

Burbidge & Son Ltd, Awson Street, Coventry

Permit No: PPC/045

Woodcoating

Solvent Management Plan

2013 usage

1. Objective

To establish a Solvent Management Plan following the Secretary of State's Guidance for Wood Coating PG6/33 (11). This document particularly refers to the requirements of paragraph 4.12.

2. Definitions and Interpretations

The Guidance Note refers to specific Inputs and Outputs of organic solvent. The interpretation of the definitions in relation to Burbidge & Son Ltd is as follows;

Definition Ref	Interpretation
I ₁	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	Organic solvents recovered and reused as solvent input into the process.
O ₁	The emission of VOC from the exhaust stacks in the spray booths, drying ovens and paint kitchens. This is calculated as the difference between the input VOC and the other output VOC.
O ₂	Burbidge & Son Ltd do not use a process where solvents are washed in water and therefore this output requirement is not applicable
O ₃	The potential retention of solvent in the coating is a significant problem to the industry. This can lead to coating instability that normally becomes visible as cracks in the lacquer film and also leads to the panels sticking when stacked together and to the imprinting of packaging onto the surface. As these issues are not apparent at Burbidge & Son Ltd then we believe that no solvent is retained in the final product and therefore this output requirement is not applicable.
O ₄	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.
O ₅	None of the coatings used at Burbidge & Son Ltd generate emissions from chemical or physical reactions and therefore this output is not applicable.
O ₆	Organic solvents contained in collected waste arise from the residue of coating materials left in the drums. The drums are partially vented then sealed prior to collection. There are no processes at Burbidge & Son that involve the wiping of excess solvent. There is a very low usage of rags for housekeeping purposes. A proportion of this includes contact with a small quantity of solvent but this is carried out in a spraybooth environment and it is believed that the solvent vapour is removed by the airflow into the spraybooth.

O ₇	All materials mixed are used on site and not sold on as a commercially valuable product and therefore this output requirement is not applicable.
O ₈	Materials are sent for recovery and resale but are not reused in the process.
O ₉	To the best of our knowledge all solvent releases are accounted for in the above definitions and therefore this output is not applicable.

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.

3.2 Input I₂

Organic solvents recovered and reused as solvent input into the process, I₂, are calculated from the capacity of the recycle still and the number of times this is used.

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.

3.3 Output O₆ - Organic solvents contained in collected waste arise from the residue of coating materials left in the 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. (It is not an average VOC content of the materials used)

For example assuming a two material usage as follows

100 litres of material with a VOC content of 500 grams/litre

10 litres of material with a VOC content of 800 grams/litre

The simple average VOC content is

$$(500 + 800)/2 = 650$$

The weighted average taking into account relative volumes is

$$((100 \times 500) + (10 \times 800))/110 = 527$$

This weighted average is the VOC content of the mix.

For the residual waste calculation the average VOC content is determined from the data given in the annual VOC return and is calculated by dividing the total VOC by the total volume of material.

The volume of material in a drum varies with the type of material. For a typical full drum the depth of material would be 500mm. The residue therefore is equivalent to 1% of the drum height and therefore 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 for O_6 . The average coating VOC content of the residue is 66.33%. Therefore the residual VOC equates to 66.55% of the 1% of residue i.e. 0.6655%. The output O_6 is therefore 0.6655% of the materials given in I_1 .

3.4 Output O_8 - Materials are sent for recovery and resale but are not reused in the process.

The data for solvent materials sent for recovery is calculated from information supplied by the recycling contractor.

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

The Target Emission for a wood coating installation in the 15 tonne or more solvent consumption band is

$$\text{Total Mass of Solids} \times 1.0 \text{ (see Table 6 PG6/33(11))}$$

Compliance with the 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 4.7 PG6/33(11)) is

$$I_1 - O_8 - O_7 - O_6$$

7. Solvent Management Plan

Using the definitions in paragraph 4.12 the input of VOC is

$$I_1$$

The outputs are

$$O_1 + O_6 + O_8 \text{ (other outputs equal zero)}$$

where

I_1 = the quantity of organic solvents used in preparations and as thinners is taken from the annual VOC return

O_1 = the quantity of organic solvent in exhaust stacks from the spray booths, drying ovens and paint kitchens and is the difference between the input VOC and the other outputs

O_6 = organic solvents contained in collected empty drums and is calculated in section 3.3

O_8 = organic solvents sent for recovery and re-sale but not re-used on site

For Burbidge & Son Ltd during 2013

$$I_1 = 42.972 \text{ tonnes}$$

$$O_1 = 28.812 \text{ tonnes}$$

$$O_6 = 0.286 \text{ tonnes}$$

$$O_8 = 13.874 \text{ tonnes}$$

The annual actual consumption (C) of organic solvents in 2013 is

$$C = 42.972 - 13.874 = 29.098 \text{ tonnes}$$

The annual actual solvent emission for Burbidge & Son Ltd in 2013 equals

$$42.972 - 13.874 - 0 - 0.286 = 28.812 \text{ tonnes}$$

The total mass of solids is shown in the annual VOC return for Burbidge & Son Ltd. and is

$$21.319 \text{ tonnes}$$

The target emission is therefore

$$21.319 \times 1.0 = 21.319 \text{ tonnes}$$

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

Data

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Coatings on Wood, Usage 2013

Sherwin Williams		density	VOC	solids	UoM	total amount	total VOC	total solids
Coating	Type	kg/l	kg/l	kg/l			kg	kg
Butyl Acetate	thinner	0.881	0.881	0.000	litre	1625	1431.63	0.00
DM1132	lacquer	0.990	0.490	0.490	litre	200	98.00	98.00
DM394	lacquer	0.990	0.490	0.490	litre	5580	2734.20	2734.20
DT2004	thinner	0.845	0.845	0.000	litre	600	507.00	0.00
DT1150	thinner	0.830	0.830	0.000	litre	2075	1722.25	0.00
DV309	catalyst	0.901	0.675	0.226	litre	825	556.88	186.45
SUG340	lacquer	1.280	0.639	0.639	litre	7200	4600.80	4600.80
TH720	hardener	0.955	0.707	0.248	litre	5045	3566.82	1251.16
TT4271	thinner	0.955	0.707	0.284	litre	50	35.35	14.20
TZ3610	lacquer	1.010	0.523	0.487	litre	150	78.45	73.11
WM1629000520	lacquer	1.05	0	1.15	litre	2714	0.00	3121.10
WM1629040520	lacquer	1.05	0	1.15	litre	200	0.00	230.00
WM20230030	lacquer	1.05	0.018	1.15	litre	1000	18.00	1150.00
WM840104020	lacquer	1.05	0	1.15	litre	38	0.00	43.70
ZZL0455	lacquer	1.001	0.513	0.488	kg	25	12.81	12.19
ZZL0987	lacquer	1.300	0.463	0.836	kg	1200	427.38	771.69
ZZL0988	lacquer	1.290	0.459	0.830	kg	2575	916.22	1656.78
ZZL1222	lacquer	1.290	0.450	0.840	kg	50	17.44	32.56
ZZL1437	lacquer	1.290	0.542	0.748	kg	550	231.09	318.91
ZZL1836	lacquer	1.300	0.476	0.823	kg	400	146.46	253.23
ZZL1978	lacquer	1.250	0.560	0.690	kg	20	8.96	11.04
ZZL2766	lacquer	1.125	0.529	0.605	kg	1500	705.33	806.67
ZZL3081	lacquer	1.321	0.497	0.823	litre	550	273.35	452.65
ZZL3204	lacquer	1.346	0.615	0.731	kg	20	9.14	10.86
ZZL3368	lacquer	1.321	0.497	0.823	litre	250	124.25	205.75
ZZL3369	lacquer	1.348	0.616	0.732	litre	1325	816.20	969.90
ZZL3370	lacquer	1.339	0.614	0.725	litre	600	368.40	435.00

ZZL3371	lacquer	1.341	0.614	0.727	litre	1325	813.55	963.28	
ZZL4193	lacquer	1.140	0.005	0.459	kg	300	1.32	120.79	
ZZL4368	lacquer	1.270	0.576	0.694	kg	6	2.72	3.28	
ZZL4911	lacquer	1.215	0.556	0.659	kg	250	114.40	135.60	
ZZL4944	lacquer	1.185	0.551	0.634	kg	650	302.24	347.76	
ZZL5039	lacquer	1.154	0.531	0.623	kg	455	209.36	245.64	
ZZL5363	lacquer	1.290	0.549	0.741	kg	1	0.43	0.57	
ZZP0120	stain	0.840	0.879	0.108	litre	450	395.55	48.60	
ZZP0130	stain	0.840	0.840	0.091	litre	100	84.00	9.10	
ZZP330	stain	0.910	0.857	0.004	litre	60	51.42	0.24	
ZZP352	stain	0.860	0.505	0.003	litre	60	30.30	0.18	
							sub-total VOC	21411.69	
							sub-total solids		21314.99

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Coatings on Wood, Usage 2013

Intercoat

		density	VOC	solids	total	total	total
		kg/l	kg/l	kg/l	litres	VOC	solids
Coating	Type					kg	kg
31608/25/BRG	thinner	0.850	0.824	0.000	22200	18290.14	0.00
36923/25/PDE	stain	0.870	0.827	0.041	100	82.74	4.10
					sub-total		
					VOC	18372.87	
					sub-total		
					solids		4.10

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Coatings on Wood, Usage 2013

Others

Coating	Type	density kg/l	VOC kg/l	solids kg/l	total litres	total kg	total VOC kg	total solids kg
recycled on site	thinner	0.850	0.850	0.000	3750	3187.5	3187.5	0
					sub-total VOC		3187.5	
					sub-total solids			0

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Coatings on Wood, Usage 2013

Recovery

Company	Type	VOC kg/l	total litres	total VOC kg
Intercoat	waste to reclaim	0.720	19270	13874.40
		Total		13874.40

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VOC by supplier/ tonnes	Sherwin Williams	21.412
	Intercoat	18.373
	Recycle	3.188
Total VOC Input (I ₁)/ tonnes		42.972

Total VOC Output to Reclaim (O ₈)/tonnes	13.874
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Nett Consumption VOC (C ₁)/ tonnes	29.098
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Solids by supplier/ tonnes	Sherwin Williams	21.315
	Intercoat	0.004
	Recycle	0.000
Total solids/ tonnes		21.319

Ratio VOC : solids	1.365	:1
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