Burbidge & Son Ltd, Awson Street, Coventry

Permit No: PPC/045

Woodcoating

Solvent Management Plan

2012 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 I_1

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

3.2 Input I_2

Organic solvents recovered and reused as solvent input into the process, I_2, 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 O_6 - 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 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. (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 66.33% of the 1% of residue i.e. 0.6633%. The output O_6 is therefore 0.6633% 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

Total Mass of Solids x 1.0 (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

$$O_1 + O_6 + O_8$$ (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 2012

I_1 = 47.278 tonnes

O_1= 32.144 tonnes

O_6= 0.314 tonnes

O_8= 14.908 tonnes

The annual actual consumption (C) of organic solvents in 2012 is

$$C = 47.278 - 14.908 = 32.370 \text{ tonnes}$$

The annual actual solvent emission for Burbidge & Son Ltd in 2012 equals

$$47.278 - 14.908 - 0 - 0.314 = 32.056 \text{ tonnes}$$

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

23.333 tonnes

The Target Emission is therefore

23.333 x 1.0 = 23.333 tonnes

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

Data

Burbidge & Son Ltd, Awson Street, Coventry
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Coatings on Wood, Usage 2012
Sherwin Williams (1)

Coating	Type	density kg/l	VOC kg/l	solids kg/l	UoM	total amount	total VOC kg	total solids kg
AF7405	w/b lacquer	1.040	0.060	0.332	litre	5	0.30	1.66
AFL3110	w/b lacquer	1.050	0.034	0.682	litre	6	0.20	4.09
AFL3161	w/b lacquer	1.060	0.042	0.699	litre	5	0.21	3.50
AFL3162	w/b lacquer	1.040	0.034	0.686	litre	5	0.17	3.43
Butyl Acetate	thinner	0.881	0.881	0.000	litre	2150	1894.15	0.00
DM394	lacquer	0.990	0.490	0.490	litre	4360	2136.40	2136.40
DT2004	thinner	0.845	0.845	0.000	litre	520	439.40	0.00
DT1150	thinner	0.830	0.830	0.000	litre	2300	1909.00	0.00
DV309	catalyst	0.901	0.675	0.226	litre	680	459.00	153.68
SUG340	lacquer	1.280	0.639	0.639	litre	8060	5150.34	5150.34
TH2580	hardener	0.970	0.776	0.194	litre	5	3.88	0.97
TH720	hardener	0.955	0.707	0.248	litre	4605	3255.74	1142.04
TH775	hardener	0.951	0.685	0.266	litre	25	17.13	6.65
TR5008	lacquer	0.920	0.790	0.193	litre	6	4.74	1.16
TU001025	lacquer	0.980	0.529	0.451	litre	50	26.45	22.55
TZ3610025	lacquer	1.010	0.523	0.487	litre	475	248.43	231.52
WM1629000520	lacquer	1.05	0	1.15	litre	3400	0.00	3910.00
WM1629003020	lacquer	1.05	0	1.15	litre	100	0.00	115.00
WM1629040520	lacquer	1.05	0	1.15	litre	400	0.00	460.00
WM20230030	lacquer	1.05	0.018	1.15	litre	1500	27.00	1725.00
ZZL0455005	lacquer	1.001	0.513	0.488	kg	70	35.87	34.13
ZZL0987005	lacquer	1.300	0.463	0.836	kg	1650	587.65	1061.08
ZZL0988005	lacquer	1.290	0.459	0.830	kg	3250	1156.40	2091.09
ZZL1222005	lacquer	1.290	0.450	0.840	kg	75	26.16	48.84
ZZL1437005	lacquer	1.290	0.542	0.748	kg	750	315.12	434.88
ZZL1836005	lacquer	1.300	0.476	0.823	kg	500	183.08	316.54
ZZL1978005	lacquer	1.250	0.560	0.690	kg	30	13.44	16.56

Sherwin Williams	(2)	density	VOC	solids	UoM	total amount	total VOC	total solids
Coating	Type	kg/l	kg/l	kg/l			kg	kg
ZZL2666005	lacquer	1.325	0.607	0.718	kg	30	13.74	16.26
ZZL2766005	lacquer	1.125	0.529	0.605	kg	1650	775.87	887.33
ZZL3081005	lacquer	1.321	0.497	0.823	litre	600	298.20	493.80
ZZL3204005	lacquer	1.346	0.615	0.731	kg	10	4.57	5.43
ZZL3368005	lacquer	1.321	0.497	0.823	litre	300	149.10	246.90
ZZL3369005	lacquer	1.348	0.616	0.732	litre	975	600.60	713.70
ZZL3370005	lacquer	1.339	0.614	0.725	litre	650	399.10	471.25
ZZL3371005	lacquer	1.341	0.614	0.727	litre	1550	951.70	1126.85
ZZL3372005	lacquer	1.343	0.614	0.729	litre	25	15.35	18.23
ZZL41930	lacquer	1.140	0.005	0.459	kg	300	1.32	120.79
ZZL4910	lacquer	1.185	0.551	0.063	kg	5	2.32	0.27
ZZL4911	lacquer	1.215	0.556	0.659	kg	105	48.05	56.95
ZZL4944	lacquer	1.185	0.551	0.634	kg	100	46.50	53.50
ZZP0120	stain	0.840	0.879	0.108	litre	325	285.68	35.10
ZZP0130	stain	0.840	0.840	0.091	litre	125	105.00	11.38
						sub-total VOC	21587.34	
						sub-total solids		23328.82

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Coatings on Wood, Usage 2012
Intercoat

Coating	Type	density kg/l	VOC kg/l	solids kg/l	total litres	total VOC kg	total solids kg
31608/25/BRG	thinner	0.840	0.819	0.000	27375	22420.13	0.00
36923/25/PDE	stain	0.870	0.828	0.041	100	82.80	4.10
					sub-total VOC	22502.93	
					sub-total solids		4.10

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Coatings on Wood, Usage 2012
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 2012
Recovery

Company	Type	VOC kg/l	total litres	total VOC kg
Intercoat	waste to reclaim	0.720	20705	14907.60
		Total		14907.60

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Coatings on Wood, Usage 2012

VOC by supplier/ tonnes	Sherwin Williams	21.587
	Intercoat	22.503
	Recycle	3.188
Total VOC Input (I_1)/ tonnes		47.278

Total VOC Output to Reclaim (O_8)/tonnes	14.908

Nett Consumption VOC (C_1)/ tonnes	32.370

Solids by supplier/ tonnes	Sherwin Williams	23.329
	Intercoat	0.004
	Recycle	0.000
Total solids/ tonnes		23.333

Ratio VOC : solids	1.387	:1