

Burbidge & Son Ltd, Awson Street, Coventry

Permit No: PPC/045

Woodcoating

Solvent Management Plan

2010 usage

1. Objective

To establish a Solvent Management Plan following the Secretary of State's Guidance for Wood Coating PG6/33 (04). This document particularly refers to the requirements of paragraph 5.13.

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. In this instance

$$34,237 \text{ kg VOC} / 66,568 \text{ litres materials} = 51.4\% \text{ rounded to } 51\%.$$

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 51%. Therefore the residual VOC equates to 51% of the 1% of residue i.e. 0.51%. The output O_6 is therefore 0.51% 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 clean solvent materials sent for recovery is calculated from information supplied by the recycling contractors using the average solvent content of 85% as reported in the BFM "Benchmarking solvent use in the UK furniture sector". The solvent content for dirty solvent is measured at an average of 720 g/l by the recycler.

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

$$\text{Total Mass of Solids} \times 1.0 \text{ (see Table 5 PG6/33(04))}$$

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 5.8 PG6/33(04)) is

$$I_1 - O_8 - O_7 - O_6$$

7. Solvent Management Plan

Using the definitions in paragraph 5.13 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 2010

$$I_1 = 43.027 \text{ tonnes}$$

$$O_1 = 29.143 \text{ tonnes}$$

$$O_6 = 0.219 \text{ tonnes}$$

$$O_8 = 13.665 \text{ tonnes}$$

The annual actual consumption (C) of organic solvents in 2010 is

$$C = 43.027 - 13.665 = 29.362 \text{ tonnes}$$

The annual actual solvent emission for Burbidge & Son Ltd in 2010 equals

$$43.027 - 13.665 - 0 - 0.219 = 29.143 \text{ tonnes}$$

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

$$23.410 \text{ tonnes}$$

The Target Emission is therefore

$$23.410 \times 1.0 = 23.410 \text{ tonnes}$$

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

Data

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Coatings on Wood, Usage 2010

Sonneborn & Rieck Ltd

Coating	Type	density kg/l	VOC kg/l	solids kg/l	total litres	total kg	total VOC kg	total solids kg
01:60	thinner	0.850	0.850	0.000	1300	1105.00	1105.00	0.00
01:446	thinner	0.792	0.792	0.000	100	79.20	79.20	0.00
04:34 C6574	stain	0.940	0.640	0.153	567	532.98	362.88	86.75
09:09	thinner	0.880	0.880	0.000	650	572.00	572.00	0.00
40:3595/A	lacquer	0.953	0.585	0.368	1500	1429.50	876.86	552.65
40:3597/A	lacquer	0.957	0.583	0.374	200	191.40	116.55	74.85
40:3739/A	lacquer	0.958	0.578	0.380	2814	2695.81	1627.76	1069.10
40:AH-11	catalyst	0.892	0.745	0.147	502	447.78	373.99	73.79
41:64X4420/A	lacquer	0.982	0.565	0.417	400	392.80	226.00	166.80
501:213	thinner	0.731	0.731	0.000	200	146.20	146.20	0.00
509:22	thinner	0.780	0.780	0.000	25	19.50	19.50	0.00
					sub-total VOC		5505.94	
					sub-total solids			2023.94

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Coatings on Wood, Usage 2010

Beckers Ltd

Coating	Type	density kg/l	VOC kg/l	solids kg/l	total litres	total kg	total VOC kg	total solids kg
DM394-0010	lacquer	0.990	0.532	0.458	8800	8712.0	4681.6	4032.8
DT2004	thinner	0.860	0.861	0.000	1620	1393.2	1394.8	0.0
DV309	catalyst	0.870	0.675	0.120	1196	1040.5	807.3	143.7
WM2023-0005	w/b lacquer UV	1.060	0.015	0.426	4620	4897.2	69.3	1968.7
WM2023-0015	w/b lacquer UV	1.055	0.018	0.412	400	422.0	7.2	165.0
WM2023-0030	w/b lacquer UV	1.050	0.018	0.402	3200	3360.0	57.6	1287.6
WM2023-0405	w/b lacquer UV	1.060	0.016	0.427	399	422.9	6.4	170.4
XX699	cleaner	1.000	0.124	0.000	2225	2225.0	275.9	0.0
					sub-total VOC		7300.10	
					sub-total solids			7768.11

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Coatings on Wood, Usage 2010

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	4875	4143.75	4143.75	0
					sub-total VOC		4143.75	
					sub-total solids			0

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Coatings on Wood, Usage 2010

Arch Coatings Ltd		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	1850	1629.85	0.00
DT1146	thinner	0.875	0.875	0.000	litre	50	43.75	0.00
DT1150	thinner	0.830	0.830	0.000	litre	2550	2116.50	0.00
SUG340	lacquer	1.280	0.639	0.639	litre	6200	3961.80	3961.80
TH720	hardener	0.960	0.707	0.248	litre	5227	3695.49	1296.30
TH780	hardener	0.960	0.691	0.269	litre	25	17.28	6.73
TU14813025	lacquer	1.310	0.394	0.915	kg	150	45.11	104.77
TZ7010025	lacquer	0.920	0.644	0.276	litre	54	34.78	14.90
ZZL0455005	lacquer	1.010	0.518	0.492	kg	150	76.93	73.07
ZZL0987005	lacquer	1.300	0.463	0.836	kg	2235	796.00	1437.28
ZZL0988005	lacquer	1.290	0.459	0.830	kg	5000	1779.07	3217.05
ZZL1222005	lacquer	1.290	0.450	0.840	kg	250	87.21	162.79
ZZL1437005	lacquer	1.290	0.542	0.748	kg	950	399.15	550.85
ZZL1836005	lacquer	1.300	0.476	0.823	kg	750	274.62	474.81
ZZL1837005	lacquer	1.150	0.569	0.581	kg	20	9.90	10.10
ZZL1978005	lacquer	1.250	0.560	0.690	kg	120	53.76	66.24
ZZL2666005	lacquer	1.325	0.607	0.718	kg	5	2.29	2.71
ZZL2766005	lacquer	1.125	0.529	0.605	kg	2050	963.96	1102.44
ZZL3081005	lacquer	1.321	0.497	0.823	litre	250	124.25	205.75
ZZL3204005	lacquer	1.346	0.615	0.731	kg	55	25.13	29.87
ZZL3368005	lacquer	1.321	0.497	0.823	litre	145	72.07	119.34
ZZL3369005	lacquer	1.348	0.616	0.732	litre	275	169.40	201.30
ZZL3370005	lacquer	1.339	0.614	0.725	litre	175	107.45	126.88
ZZL3371005	lacquer	1.341	0.614	0.727	litre	250	153.50	181.75
ZZL3372005	lacquer	1.343	0.614	0.729	litre	75	46.05	54.68
ZZL3374005	lacquer	1.290	0.459	0.830	kg	50	17.79	32.17
						sub-total VOC		16703.07
						sub-total solids		13433.57

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Coatings on Wood, Usage 2010

Intercoat Ltd

		density	VOC	solids	total	total	total	total
		kg/l	kg/l	kg/l	litres	kg	VOC	solids
Coating	Type						kg	kg
02444/0.1/SAM	activator	1.08	0.460	0.623	0.1	0.108	0.05	0.06
08670/0.1/SAM	catalyst	0.86	0.709	0.150	0.1	0.086	0.07	0.01
13900/2.25/CPO	catalyst	0.880	0.682	0.199	18.6	16.368	12.68	3.70
31608/25/BRG	thinner	0.840	0.827	0.000	11225	9429	9287.57	0.00
36923/25/PDE	stain	0.870	0.834	0.036	100	87	83.44	3.60
37205/25/CPO	w/b lacquer UV	1.050	0.001	0.388	50	52.5	0.06	19.41
37210/25/CPO	w/b lacquer UV	1.040	0.002	0.393	25	26	0.05	9.84
37630/25/CPO	w/b lacquer UV	1.040	0.001	0.382	149	154.96	0.18	56.89
38452/5/SAM	stain	0.870	0.834	0.038	5	4.35	4.17	0.19
38608/25/CDE	stain	0.870	0.845	0.020	80	69.6	67.64	1.58
38643/22.5/PDE	ac basecoat	0.960	0.549	0.414	177.5	170.4	97.39	73.47
38965/5/SAM	stain	0.860	0.795	0.029	5	4.3	3.98	0.14
39443/5/SAM	stain	0.900	0.842	0.054	5	4.5	4.21	0.27
39445/5/SAM	stain	0.910	0.834	0.074	5	4.55	4.17	0.37
39736/5/SAM	hs ac lacquer	0.980	0.552	0.427	5	4.9	2.76	2.13
39737/1/SAM	ac lacquer	1.200	0.453	0.748	1	1.2	0.45	0.75
39742/1/SAM	2 pk acrylic	1.230	0.490	0.739	1	1.23	0.49	0.74
40019/1/SAM	ac lacquer	1.200	0.440	0.761	1	1.2	0.44	0.76
40152/5/CPO	w/b lacquer UV	1.100	0.001	0.491	20	22	0.02	9.82
					sub-total			
					VOC		9383.98	
					sub-total			
					solids			183.67

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Coatings on Wood, Usage 2010

Reclaim for Resale

Company	Type	VOC kg/l	total litres	total VOC kg
Intercoat	waste to reclaim	0.720	13530	9741.60
Intercoat	clean to reclaim	0.870	4510	3923.70
		Total		13665.30

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VOC by supplier/ tonnes	S&R	5.506
	Beckers	7.300
	Others (I ₂)	4.134
	Arch	16.703
	Intercoat	9.384
Total VOC Input (I ₁)/ tonnes		43.027

Total VOC Output to Reclaim (O ₈)/tonnes	13.665
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Nett Consumption VOC (C ₁)/ tonnes	29.362
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Solids by supplier/ tonnes	S&R	2.024
	Beckers	7.768
	Others	0.000
	Arch	13.434
	Intercoat	0.184
Total solids/ tonnes		23.410

Ratio VOC : solids	1.254	:1
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