Burbidge & Son Ltd, Awson Street, Coventry

Permit No: PPC/045

Woodcoating

Solvent Management Plan

2009 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 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 x 500) + (10 x 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 kg VOC/ 66,568 litres materials = 51.4% 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 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".

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 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 2009

I_1= 34.237 tonnes

O_1= 19.494 tonnes

O_6= 0.174 tonnes

O_8= 14.569 tonnes

The annual actual consumption (C) of organic solvents in 2009 is

$$C = 34.237 - 14.569 = 19.668 \text{ tonnes}$$

The annual actual solvent emission for Burbidge & Son Ltd in 2009 equals

$$34.237 - 14.569 - 0 - 0.174 = 19.494 \text{ tonnes}$$

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

18.934 tonnes

The Target Emission is therefore

18.934 x 1.0 = 18.934 tonnes

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

Input data

Burbidge & Son Ltd, Awson Street, Coventry
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Coatings on Wood, Usage 2009
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	2840	2414.00	2414.00	0.00
01:446	thinner	0.792	0.792	0.000	75	59.40	59.40	0.00
04:34 C6574	stain	0.883	0.640	0.154	685	604.86	438.40	105.15
09:09	thinner	0.880	0.880	0.000	815	717.20	717.20	0.00
40:3595/A	lacquer	0.953	0.584	0.369	1480	1410.44	864.32	546.12
40:3597/A	lacquer	0.957	0.583	0.374	265	253.61	154.50	99.11
40:3739/A	lacquer	0.958	0.578	0.380	2240	2145.92	1294.72	851.20
40:AH-11	catalyst	0.892	0.745	0.147	560	499.52	417.20	82.32
41:41 X4420/A	lacquer	0.965	0.586	0.378	245	236.43	143.57	92.72
41:64X4420/A	lacquer	0.982	0.565	0.417	290	284.78	163.85	120.79
501:213	thinner	0.731	0.731	0.000	65	47.52	47.52	0.00
					sub-total VOC		6714.67	
					sub-total solids			1897.414

Burbidge & Son Ltd, Awson Street, Coventry
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Coatings on Wood, Usage 2009

Beckers Ltd		density	VOC	solids	total litres	total kg	total VOC	total solids
Coating	Type	kg/l	kg/l	kg/l			kg	kg
DF2004-9130	lacquer	1.373	0.393	0.975	100	137.3	39.3	97.5
DH2010-91342	lacquer	1.187	0.449	0.720	330	391.7	148.2	237.5
DL2036	compliant A/C base	0.990	0.551	0.415	200	198.0	110.2	83.1
DM2126-0610-X	lacquer	0.971	0.551	0.418	100	97.1	55.1	41.8
DM394-0010	lacquer	0.990	0.531	0.455	4380	4336.2	2325.8	1994.7
DT2004	thinner	0.859	0.859	0.000	650	558.4	558.4	0.0
DV2001-C	catalyst DV2005	0.850	0.695	0.138	660	561.0	458.7	90.9
NS2160-54800X	stain	0.836	0.807	0.028	200	167.2	161.4	5.5
NS2160-56400X	stain	0.860	0.800	0.042	1900	1634.0	1520.0	79.4
NS2160-57300X	stain	0.881	0.813	0.025	400	352.4	325.2	10.0
NT2001	thinner	0.850	0.850	0.000	25	21.3	21.3	0.0
WM1600-0025	w/b lacquer UV	1.050	0.016	0.410	1435	1506.8	23.0	588.4
WM2012-0005	w/b lacquer UV	1.023	0.008	0.399	380	388.7	3.0	151.5
WM2023-0005	w/b lacquer UV	1.060	0.016	0.420	4165	4414.9	66.6	1749.3
WM2023-0015	w/b lacquer UV	1.055	0.017	0.410	500	527.5	8.5	205.1
WM2023-0030	w/b lacquer UV	1.077	0.017	0.419	3360	3618.7	57.1	1406.6
WM2023-0405	w/b lacquer UV	1.040	0.016	0.413	395	410.8	6.3	163.1
XX699	cleaner	0.990	0.128	0.000	3650	3613.5	467.2	0.0
					sub-total VOC		6355.2	
					sub-total solids			6904.2

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Others		density	VOC	solids	total litres	total kg	total VOC	total solids
Coating	Type	kg/l	kg/l	kg/l			kg	kg
SWS	thinner	0.850	0.850	0.000	2925	2486.25	2486.25	0
recycled on site	thinner	0.850	0.850	0.000	4875	4143.75	4143.75	0
					sub-total VOC		6630	
					sub-total solids			0

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Coatings on Wood, Usage 2009
Arch Coatings Ltd

Coating	Type	density kg/l	VOC kg/l	solids kg/l	UoM	total amount	total VOC kg	total solids kg
Butyl Acetate	thinner	0.881	0.881	0.000	litre	480	422.88	0.00
DT450025	thinner	0.830	0.830	0.000	litre	1480	1228.40	0.00
DX931	thinner	0.790	0.790	0.000	litre	25	19.75	0.00
IS256013025	lacquer	1.150	0.090	1.060	kg	3075	240.65	2835.15
RX7102	catalyst	0.950	0.646	0.304	litre	545	352.07	165.68
SUG340	lacquer	1.280	0.639	0.639	litre	1360	869.04	869.04
TH715	hardener	0.970	0.640	0.330	litre	6	3.84	1.98
TH720	hardener	0.960	0.707	0.248	litre	3175	2244.73	787.40
TH780	hardener	0.960	0.691	0.269	litre	100	69.10	26.90
TH790	hardener	0.950	0.640	0.342	litre	10	6.40	3.42
TU14813025	lacquer	1.310	0.394	0.915	kg	375	112.79	261.93
TZ7010025	lacquer	0.920	0.644	0.276	litre	50	32.20	13.80
XA4080	hardener	0.970	0.000	0.970	litre	13	0.00	12.61
ZZK763025	thinner	0.846	0.843	0.000	litre	25	21.08	0.00
ZZL0455005	lacquer	1.010	0.518	0.492	kg	100	51.29	48.71
ZZL0987005	lacquer	1.300	0.463	0.836	kg	1550	552.04	996.77
ZZL0988005	lacquer	1.290	0.459	0.830	kg	3595	1279.15	2313.06
ZZL1222005	lacquer	1.290	0.450	0.840	kg	300	104.65	195.35
ZZL1437005	lacquer	1.290	0.542	0.748	kg	650	273.10	376.90
ZZL1836005	lacquer	1.300	0.476	0.823	kg	600	219.69	379.85
ZZL1837005	lacquer	1.150	0.569	0.581	kg	80	39.58	40.42
ZZL1978005	lacquer	1.250	0.560	0.690	kg	110	49.28	60.72
ZZL2696025	lacquer	1.230	0.043	0.555	litre	25	1.08	13.88
ZZL2741020	lacquer	1.152	0.077	0.447	litre	400	30.80	178.80
ZZL2742020	lacquer	1.151	0.079	0.328	litre	45	3.56	14.76
ZZL2766005	lacquer	1.125	0.529	0.619	kg	485	228.06	266.86
ZZL2838020	lacquer	1.153	0.077	0.448	kg	20	1.34	7.77

ZZL3067005	lacquer	1.321	0.497	0.823	kg	10	3.76	6.23
ZZL3081005	lacquer	1.321	0.497	0.823	kg	60	22.57	37.38
ZZM696025	thinner	0.920	0.460	0.460	litre	300	138.00	138.00
					sub-total VOC		8620.86	
					sub-total solids			10053.36

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Intercoat		density	VOC	solids	total amount	total VOC	total solids
Coating	Type	kg/l	kg/l	kg/l		kg	kg
13900/2.25/CPO	catalyst	0.880	0.682	0.196	2	1.36	0.39
20901/25/CDE	thinner	0.840	0.823	0.000	325	267.48	0.00
31608/25/BRG	thinner	0.840	0.823	0.000	6385	5254.86	0.00
33005/22.5/PDE	lacquer	0.980	0.555	0.426	18	10.22	7.84
36659/5/RDE	stain	0.950	0.832	0.122	8	6.81	1.00
36660/5//RDE	stain	0.890	0.854	0.038	8	6.99	0.31
36782/5//RDE	stain	0.940	0.837	0.099	8	6.85	0.81
36783/5/RDE	stain	0.940	0.832	0.110	8	6.81	0.90
36923/25/PDE	stain	0.870	0.834	0.036	425	354.99	15.32
37240/25/CPO	w/b lacquer	1.050	0.001	0.388	20	0.02	7.94
37630/20/CPO	w/b lacquer	1.040	0.001	0.382	15	0.01	5.63
37630/25/CPO	w/b lacquer	1.040	0.001	0.382	20	0.02	7.81
37630/25/PDE	w/b lacquer	1.040	0.001	0.382	85	0.09	32.47
				sub-total VOC		5916.49	
				sub-total solids			80.42

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Reclaim for Resale

Company	Type	VOC kg/l	total litres	total VOC kg
Intercoat	waste to reclaim	0.850	17140	14569.00
		Total		14569.00

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VOC by supplier/ tonnes	S&R	6.715
	Beckers	6.355
	Others	6.630
	Arch	8.621
	Intercoat	5.916
Total VOC Input (I1)/ tonnes		34.237

Total VOC Output to Reclaim (O8)/tonnes	14.569

Nett Consumption VOC (C1)/ tonnes	19.668

Solids by supplier/ tonnes	S&R	1.897
	Beckers	6.904
	Others	0.000
	Arch	10.053
	Intercoat	0.080
Total solids/ tonnes		18.934

Ratio VOC : solids	1.039	:1