Burbidge & Son Ltd, Awson Street, Coventry

Permit No: PPC/045

Woodcoating

Solvent Management Plan

2014 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 67.81%. Therefore the residual VOC equates to 67.81% of the 1% of residue i.e. 0.6781%. The output O_6 is therefore 0.6781% 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 2014

I_1 = 53.977 tonnes

O_1= 39.294 tonnes

O_6= 0.366 tonnes

O_8= 14.317 tonnes

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

$$C = 53.977 - 14.317 = 39.660 \text{ tonnes}$$

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

$$53.977 - 14.317 - 0 - 0.366 = 39.294 \text{ tonnes}$$

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

23.193 tonnes

The target emission is therefore

23.193 x 1.0 = 23.193 tonnes

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

Data

Burbidge & Son Ltd, Awson Street, Coventry
Permit No: PC/045
Coatings on Wood, Usage 2014
Sherwin Williams

Coating	Type	density kg/l	VOC kg/l	solids kg/l	UoM	total amount	total VOC kg	total solids kg
DM394-0010-C	lacquer	0.98	490.00	490.00	L	7100	3479.00	3479.00
DT1150/00-25	thinner	0.83	830.00	0.00	L	3775	3133.25	0.00
DT2004-P	thinner	0.85	845.00	0.00	L	1020	861.90	0.00
DV309-A	catalyst	0.91	675.00	226.25	L	1300	877.50	294.13
ZZL0987005	lacquer	1.30	463.00	836.03	KG	700	249.31	450.17
ZZL0987025	lacquer	1.30	463.00	836.03	KG	700	249.31	450.17
ZZL0988005	lacquer	1.29	459.00	829.47	KG	1000	355.81	643.00
ZZL0988025	lacquer	1.29	459.00	829.47	KG	1325	471.45	851.98
ZZL1437005	lacquer	1.29	542.00	748.20	L	450	243.90	336.69
ZZL1437025	lacquer	1.29	542.00	748.20	KG	400	168.06	232.00
ZZL1836005	lacquer	1.30	476.00	823.16	KG	550	201.38	348.26
ZZL1836025	lacquer	1.30	476.00	823.16	KG	50	18.31	31.66
ZZL1978005	lacquer	1.250	560.000	690.000	KG	55	24.64	30.36
ZZL2766005	lacquer	1.13	529.00	605.14	KG	950	446.71	511.01
ZZL2766025	lacquer	1.13	529.00	605.14	KG	900	423.20	484.11
ZZL3081005	lacquer	1.32	497.00	823.25	KG	400	150.49	249.28
ZZL3081025	lacquer	1.32	497.00	823.25	KG	20	7.52	12.46
ZZL3368005	lacquer	1.32	497.00	823.25	L	350	173.95	288.14
ZZL3369005	lacquer	1.35	616.00	731.83	KG	750	342.73	407.18
ZZL3369025	lacquer	1.35	616.00	731.83	KG	500	228.49	271.45
ZZL3370005	lacquer	1.34	614.00	725.07	KG	650	298.06	351.98
ZZL3370025	lacquer	1.34	614.00	725.07	KG	475	217.81	257.21
ZZL3371005	lacquer	1.34	614.00	726.96	KG	775	354.85	420.13
ZZL3371025	lacquer	1.34	614.00	726.96	KG	675	309.06	365.92
ZZL4193025	lacquer	1.14	681.38	458.62	L	300	204.41	137.59
ZZL4121A005	lacquer	1.36	618.00	737.00	L	10	6.18	7.37
ZZL4911005	lacquer	1.26	488.00	782.46	KG	400	154.92	248.40

ZZL4944005	lacquer	1.25	599.00	646.03	KG	1425	685.60	739.43
ZZL4944025	lacquer	1.25	599.00	646.03	KG	1100	529.24	570.79
ZZL5039005	lacquer	1.15	531.00	623.28	L	400	212.40	249.31
ZZL5039025	lacquer	1.15	531.00	623.28	L	50	26.55	31.16
ZZL5493005	lacquer	1.34	524.00	721.05	KG	200	78.21	107.62
ZZL5505005	lacquer	1.32	606.00	718.00	KG	10	4.58	5.42
ZZL5707005	lacquer	1.15	531.00	623.28	KG	10	4.60	5.40
ZZL5708005	lacquer	1.15	531.00	623.28	KG	10	4.60	5.40
ZZL5710005	lacquer	1.15	531.00	623.28	KG	10	4.60	5.40
ZZL5713005	lacquer	1.15	531.00	623.28	KG	160	73.62	86.42
ZZL5715005	lacquer	1.15	531.00	623.28	KG	10	4.60	5.40
ZZL5716005	lacquer	1.15	531.00	623.28	KG	150	69.02	81.02
ZZL5717	lacquer	1.15	531.00	623.28	KG	10	4.60	5.40
ZZL5755005	lacquer	1.15	531.00	623.28	KG	140	64.42	75.61
ZZL5756005	lacquer	1.15	531.00	623.28	KG	250	115.03	135.03
ZZL5757025	lacquer	1.16	530.00	629.22	L	75	39.75	47.19
ZZL5757005	lacquer	1.15	531.00	623.28	KG	540	248.47	291.65
ZZL5758005	lacquer	1.15	531.00	623.28	KG	295	135.74	159.33
ZZL5760005	lacquer	1.15	531.00	623.28	L	70	37.17	43.63
ZZL5761005	lacquer	1.15	531.00	623.28	KG	330	151.85	178.23
ZZL5762005	lacquer	1.15	531.00	623.28	KG	215	98.93	116.12
BUTACE025	thinner	0.88	880.00	0.00	L	2725	2398.00	0.00
ZZP014025	lacquer	1.01	521.85	491.31	L	200	104.37	98.26
ZZP330025	lacquer	0.91	877.00	33.12	L	100	87.70	3.31
ZZP352020	lacquer	0.86	815.78	43.77	L	190	155.00	8.32
ZZP352025	lacquer	0.86	815.78	43.77	L	575	469.07	25.17
ZZP366025	lacquer	0.85	823.31	29.51	L	300	246.99	8.85
ZZP368020	lacquer	0.90	825.82	69.00	L	460	379.88	31.74
SU0340/13-20	lacquer	1.20	639.00	639.36	L	9000	5751.00	5754.24
TH0720/00-12,5	hardener	0.96	707.00	248.30	L	5750	4065.25	1427.73
TH0720/00-3	hardener	0.96	707.00	248.30	L	489	345.72	121.42
TH0724/00-12,5	hardener	0.95	656.00	294.50	L	100	65.60	29.45
TH0727/00-12,5	hardener	0.96	656.00	302.00	L	13	8.20	3.78
WM1629-0005-C	lacquer	1.05	55.86	380.78	L	2900	161.99	1104.25
WM1629-0405-C	lacquer	1.01	58.61	352.29	L	300	17.58	105.69

WM2023-0030-C	lacquer	1.05	34.47	305.10	L	900	31.02	274.59
WM840104020	lacquer	1.05	36.54	370.06	L	60	2.19	22.20
XA4080/00-1	cleaner	1.18	142.00	920.40	KG	1	0.12	0.78
						sub-total VOC	30574.23	
						sub-total solids		23186.47

Burbidge & Son Ltd, Awson Street, Coventry
Permit No: PC/045
Coatings on Wood, Usage 2014
Intercoat

Coating	Type	density kg/l	VOC kg/l	solids kg/l	total litres	total VOC kg	total solids kg
31608/25/BRG	thinner	0.850	0.824	0.000	25825	21276.70	0.00
13900/0.5/SAM	catalyst	0.880	0.681	0.200	1	0.34	0.10
33002/5/SAM	lacquer	0.980	0.561	0.418	5	2.81	2.09
36923/25/CDE	stain	0.870	0.827	0.041	100	82.74	4.10
46079/5/SAM	stain	0.890	0.840	0.040	5	4.20	0.20
46096/5/SAM	stain	0.870	0.765	0.104	5	3.83	0.52
					sub-total VOC	21362.58	
					sub-total solids		7.01

Burbidge & Son Ltd, Awson Street, Coventry
Permit No: PC/045
Coatings on Wood, Usage 2014

Others		density	VOC	solids	total litres	total kg	total VOC	total solids
Coating	Type	kg/l	kg/l	kg/l			kg	kg
recycled on site	thinner	0.850	0.850	0.000	2400	2040	2040	0
					sub-total VOC		2040	
					sub-total solids			0

Burbidge & Son Ltd, Awson Street, Coventry
Permit No: PPC/045
Coatings on Wood, Usage 2014
Recovery

Company	Type	VOC kg/l	total litres	total VOC kg
Intercoat	waste to reclaim	0.720	19885	14317.20
		Total		14317.20

Burbidge & Son Ltd, Awson Street, Coventry
Permit No: PPC/045
Coatings on Wood, Usage 2014

VOC by supplier/ tonnes	Sherwin Williams	30.574
	Intercoat	21.363
	Recycle	2.040
Total VOC Input (I_1)/ tonnes		53.977

Total VOC Output to Reclaim (O_8)/tonnes	14.317

Nett Consumption VOC (C_1)/ tonnes	39.660

Solids by supplier/ tonnes	Sherwin Williams	23.186
	Intercoat	0.007
	Recycle	0.000
Total solids/ tonnes		23.193

Ratio VOC : solids	1.710 : 1