

Burbidge & Son Ltd, Awson Street, Coventry

Permit No: PPC/045

Woodcoating

Solvent Management Plan

2015 usage

1. Objective

To establish a Solvent Management Plan following the Secretary of State's Guidance for Wood Coating PG6/33 (11 rev. 14). 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	<p>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.</p> <p>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.</p>

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 O₆. The average coating VOC content of the residue is 65.61%. Therefore the residual VOC equates to 65.61% of the 1% of residue i.e. 0.6561%. The output O₆ is therefore 0.6561% of the materials given in I₁.

3.4 Output O₈ - 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 2015

$$I_1 = 47.429 \text{ tonnes}$$

$$O_1 = 31.267 \text{ tonnes}$$

$$O_6 = 0.311 \text{ tonnes}$$

$$O_8 = 15.851 \text{ tonnes}$$

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

$$C = 47.429 - 15.851 = 31.578 \text{ tonnes}$$

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

$$47.429 - 15.851 - 0 - 0.311 = 31.267 \text{ tonnes}$$

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

$$23.735 \text{ tonnes}$$

The target emission is therefore

$$23.735 \times 1.0 = 23.735 \text{ tonnes}$$

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

Data

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Coatings on Wood, Usage 2015

Sherwin Williams

Coating	Type	density g/l	VOC g/l	solids g/l	UoM	total amount	total VOC kg	total solids kg
AR6605/00-25	lacquer	1.05	51.14	336.00	KG	25	1.22	8.00
AR6630/00-25	lacquer	1.05	51.14	336.00	KG	25	1.22	8.00
AUL3396/13-25	lacquer	1.23	40.00	553.50	L	25	1.00	13.84
DM1132-0025-C	lacquer	0.98	490.00	490.00	L	440	215.60	215.60
DM394-0010-C	lacquer	0.98	490.00	490.00	L	5400	2646.00	2646.00
DT1150/00-25	thinner	0.85	848.00	0.00	L	3735	3167.28	0.00
DT2004-P	thinner	0.86	861.15	0.00	L	900	775.04	0.00
DV309-D2	catalyst	0.87	675.00	650.93	L	54	36.45	35.15
DV309-A	catalyst	0.91	675.00	226.25	L	925	624.38	209.28
ZZL0455005	lacquer	1.01	518.00	492.48	L	45	23.31	22.16
ZZL0987025	lacquer	1.36	458.61	896.68	KG	450	152.28	297.75
ZZL0987005	lacquer	1.36	458.61	896.68	KG	550	186.13	363.91
ZZL0988025	lacquer	1.35	460.42	891.69	KG	1025	349.06	676.02
ZZL0988005	lacquer	1.35	460.42	891.69	KG	925	315.00	610.07
ZZL1222005	lacquer	1.29	450.00	839.79	KG	100	34.88	65.10
ZZL1437005	lacquer	1.35	459.31	891.50	L	650	298.55	579.48
ZZL1836005	lacquer	1.35	460.76	890.37	KG	625	213.15	411.90
ZZL2766005	lacquer	1.35	460.45	890.86	KG	625	212.98	412.07
ZZL2766025	lacquer	1.35	460.45	890.86	KG	775	264.10	510.97
ZZL2931005	lacquer	1.35	457.61	893.79	KG	100	33.86	66.14
ZZL3081005	lacquer	1.32	497.00	823.25	KG	255	95.94	158.92
ZZL3368005	lacquer	1.18	495.97	683.66	L	350	173.59	239.28
ZZL3369025	lacquer	1.35	460.45	891.36	KG	675	229.94	445.12
ZZL3369005	lacquer	1.35	460.45	891.36	KG	750	255.49	494.57
ZZL3370005	lacquer	1.35	460.67	890.45	KG	625	213.12	411.94
ZZL3371005	lacquer	1.35	459.88	892.42	KG	1100	374.11	725.97
ZZL3372005	lacquer	1.34	614.00	728.71	KG	25	11.43	13.57

ZZL4911025	lacquer	1.35	456.90	895.91	KG	100	33.78	66.23
ZZL4911005	lacquer	1.35	456.90	895.91	KG	270	91.20	178.82
ZZL4944005	lacquer	1.35	459.34	892.36	KG	1200	407.82	792.27
ZZL4944025	lacquer	1.35	459.34	892.36	KG	1200	407.82	792.27
ZZL5039005	lacquer	1.09	495.86	597.94	L	350	173.55	209.28
ZZL5290005	lacquer	1.14	497.36	646.28	L	85	42.28	54.93
ZZL5493005	lacquer	1.35	459.49	892.34	KG	145	49.29	95.72
ZZL5620005	lacquer	1.15	531.00	623.28	L	80	42.48	49.86
ZZL5713005	lacquer	1.15	531.00	623.28	KG	100	46.01	54.01
ZZL5716005	lacquer	1.35	454.61	891.01	KG	175	59.13	115.89
ZZL5755005	lacquer	1.15	531.00	623.28	KG	75	34.51	40.51
ZZL5756005	lacquer	1.35	459.87	892.45	KG	400	136.04	264.00
ZZL5757005	lacquer	1.35	460.10	892.23	KG	700	238.18	461.89
ZZL5758005	lacquer	1.35	459.66	891.96	KG	550	187.06	362.99
ZZL5761005	lacquer	1.35	457.96	890.46	KG	635	215.68	419.37
ZZL5762005	lacquer	1.15	531.00	623.28	KG	100	46.01	54.01
ZZL6283020	lacquer	1.24	51.00	508.77	L	20	1.02	10.18
ZZL6495005	lacquer	1.37	453.97	917.63	KG	105	34.76	70.25
ZZL6537005	lacquer	1.02	476.00	539.27	L	30	14.28	16.18
ZZL6538005	lacquer	1.14	499.84	635.77	KG	80	35.21	44.79
ZZL6598005	lacquer	1.25	600.00	649.88	KG	50	24.00	26.00
BUTACE025	thinner	0.88	880.00	0.00	L	3050	2684.00	0.00
ND2012-9001-C	lacquer	1.25	589.97	657.17	L	20	11.80	13.14
ZZP014025	lacquer	1.01	521.85	491.31	L	200	104.37	98.26
ZZP017020	lacquer	1.05	55.75	383.08	L	500	27.88	191.54
ZZP352020	lacquer	0.86	815.78	43.77	L	420	342.63	18.39
ZZP352025	lacquer	0.86	815.78	43.77	L	200	163.16	8.75
ZZP366025	lacquer	0.85	823.31	29.51	L	125	102.91	3.69
ZZP368020	lacquer	0.90	825.82	69.00	L	520	429.43	35.88
ZZP669005	lacquer	1.35	460.77	878.15	KG	25	8.53	16.25
SU0340/13-20	lacquer	1.20	639.00	639.36	L	10760	6875.64	6879.51
TH0775/00-12,5D	hardener	0.95	685.00	266.56	L	13	8.56	3.33
TH0715/00-3	hardener	0.96	758.00	201.60	L	3	2.27	0.60
TH0720/00-12,5	hardener	0.96	707.00	248.30	L	6475	4577.83	1607.74
TZ3610/00-6	lacquer	1.01	523.00	487.33	L	6	3.14	2.92

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Coatings on Wood, Usage 2015

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	18925	15591.93	0.00
12208/25/BRG	acetone	0.790	0.793	0.000	25	19.83	0.00
36923/25/CDE	stain	0.870	0.827	0.041	50	41.37	2.05
sub-total							
VOC						15653.12	
sub-total							
solids							2.05

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Coatings on Wood, Usage 2015

Others		density	VOC	solids	total	total	total	total
Coating	Type	kg/l	kg/l	kg/l	litres	kg	VOC	solids
recycled on site	thinner	0.850	0.850	0.000	3600	3060	3060	0

sub-total	VOC				3060			
sub-total	solids							0

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Coatings on Wood, Usage 2015

Recovery		VOOC	total	total
Company	Type	kg/l	litres	VOOC
Intercoat	waste to reclaim	0.720	22015	15850.80
Total				15850.80

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 Coatings on Wood, Usage 2015

VOC by supplier/ tonnes	Sherwin Williams	28.716
	Intercoat	15.653
	Recycle	3.060
Total VOC Input (I ₁)/ tonnes		47.429

Total VOC Output to Reclaim (O ₂)/tonnes	15.851
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Net Consumption VOC (C ₁)/ tonnes	31.578
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Solids by supplier/ tonnes	Sherwin Williams	23.732
	Intercoat	0.002
	Recycle	0.000
Total solids/ tonnes		23.735

Ratio VOC : solids	1.330 : 1
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