

VOLATILE ORGANIC COMPOUNDS (VOC) LIMITS

Editorial Note: This version reflects the new VOC limits for the period 2015-2019

1 SCOPE

- 1.1 This document details the limits on Volatile Organic Compounds (VOC) which will apply for a range of APAS paint specifications for the interval 2015 - 2019.
- 1.2 These limits apply to all APAS product certifications as detailed in Tables 1 & 2 below.

2 AUTHORITY & RESPONSIBILITY

- 2.1 The Executive Officer APAS (EO) is accountable for the implementation of these limits.

3 REFERENCED DOCUMENTS

- 3.1 Reference is made to the following documents in this Document;

ASTM D3960 Practice for determining volatile organic compound (VOC) content of paints & related coatings.

ASTM documents are available from the ASTM website; www.astm.org

APAS documents;
D182 Volatile Organic Compounds (VOC); Statement of VOC content in paint

APAS documents are available from the APAS website www.apas.gov.au

4 DEFINITIONS & ACRONYMS

4.1 Definitions

VOC - organic compounds present in paint formulations (either as individual ingredients of the formula or as part of eg an intermediate raw material) that have;

- a) a vapour pressure >0.01mm Hg at 21°C, or
- b) an initial boiling point <250°C measured at a standard pressure of 101.3 kPa.

Note 1 Ammonia will be classified as a VOC

Note 2: Acetone is not considered a VOC as current evidence indicates it does not participate in smog forming reactions.

VOC Levels

The following descriptors have been adopted by APAS;

Very High	>250 gm/L
High	100 – 249 gm/L
Moderate	50 – 99 gm/L
Low	5 – 49 gm/L
Very Low	<5 gm/L

4.2 Acronyms

The following acronyms are used in this document;

APAS – Australian Paint Approval Scheme

APMF – Australian Paint Manufacturers Federation

CSIRO – Commonwealth Scientific and Industrial Research Organisation

CVS – CSIRO Verification Services

EO – Executive Officer, APAS

5 BACKGROUND

5.1 Technical

- a) VOCs contribute negatively to air pollution by participating in the chemical reactions that take place in the atmosphere and produce a variety of air pollution effects including the effect known as "smog".
- b) The "Guide to VOC Reduction in Decorative Coatings" produced by the CEPE (European Industrial Council for Paints, Printing Inks and Artists' Colours) Technical Committee states:
"The action of sunlight on NO_x and VOCs leads to the formation of ground level ozone, a long-range pollutant, which can impact on rural areas at some distance from the original source of emission. Ozone can irritate the eyes and lungs, causing breathing difficulties, and may reduce resistance to infection. Ozone can also damage some vegetation, crops and trees. Ozone levels are normally higher on still, sunny, summer days, when the air is already polluted with NO_x and VOCs (eg urban areas with traffic). Because of the time required for the chemical reactions to take place, ozone formation tends to occur downwind of the pollution. The resulting smog may persist for several days and can be transported over long distances".
- c) VOCs also contribute negatively to indoor air quality through emissions, both during and after curing, into the daily living environment. As a result, they impact on individual health and well-being including personal allergic reactions. This aspect of VOCs is not the subject of this APAS Document.

5.2 Historical

- a) Since 1996 APAS has been setting limits for VOC content of certified products. Progressive reductions have been made over this period and this version of the Document details the latest round of reductions which have been arrived at in consultation with the APMF.
- b) The limits set in this document apply only to paint products sold in Australia and New Zealand.

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6 DETERMINATION OF VOC CONTENT

6.1 The VOC content of a paint or coating shall be determined by one or more of the following methods;

- a) Using raw material supplier's data that corresponds with the above definition of VOC, by calculation for each of the raw materials and individual ingredients in any intermediate raw materials, the total VOC content of the formula, or
- b) Determined experimentally in accordance with ASTM D3960 as qualified below,

By determining the weight percent non volatile content (and hence the volatile content) by ASTM D2369 (60 minutes at $110 \pm 5^\circ\text{C}$) and converting to g/L (as per ASTM D3960). This method is inappropriate for constituents that decompose at elevated temperature.

Note 3: Where the supplier fails to report VOC content for the ingredient in accordance with the above definition, or where the intermediate formula is not known, the VOC content must be determined by method 6.1b) above.

Note 4 The VOC shall be expressed to include any thinning solvent recommended as mandatory on the label or data sheet for the method of application proposed.

Note 5 Tinter additions are excluded from VOC calculations.

7 REPORTING OF RESULTS

7.1 Results shall be reported on APAS document D182. The results shall be expressed in terms of the weight of VOC per litre of wet paint and is equal to:

$$\frac{[\text{mass of volatiles (g)} - \text{mass of water (g)} - \text{mass of exempt volatiles (g)}]}{[\text{volume of wet paint (L)}]}$$

8 ARCHITECTURAL COATINGS

8.1 In order to allow greater formulating flexibility where manufacturers of certain high volume architectural products, have a number of products eg tinting bases certified to the one APAS specification, APAS allows the use of average *and* maximum VOC calculations. This allows paint formulators greater flexibility in formulating paints that require higher VOC content to make them easier to apply. These paints (typically deep and ultra deep-style tint bases) are significantly lower in sales volume compared to whites and light tint bases so have less of an impact on the environment.

8.2 Where a manufacturer has more than one architectural product certified against an APAS specification, an average VOC shall be calculated across those certified products. The average for that product list shall not exceed the average figure quoted in this Document.

8.3 Split-fills or re-labels shall not be included in the calculation, only master or parent formulae.

8.4 In addition, within that product list, no single product shall have VOC content greater than the Maximum limit specified in this Document.

8.5 The manufacturer's certified products shall comply to both the Average and Maximum limits set in this document.

9 INDUSTRIAL COATINGS

9.1 The vast bulk of industrial (protective) coatings are still solvent based and hence very high VOC content. Although there have been some successful transitions to water based formulations without any reduction in protective properties, many formulations remain solvent based.

9.2 There is little advantage for the environment if you halve the VOC content but need to paint twice as often. Hence for this revision of the document, APAS have removed Table 3 (solvent based very high VOC products).

9.3 As technology permits water based, solvent-free or high solids products with acceptable performance properties onto the market, protective coatings products will progressively be returned to Table 3.

9.4 RMUs making application (or re-application) for certification must still report VOC content,

10 CHANGES TO FORMULATIONS

10.1 Where minor formulation changes are made to APAS Certified Products to achieve VOC limits, full resubmission will not be required. Rather it will only be necessary to provide test results relevant to those properties which could be expected to be altered by the formulation change. For example, for reduction of a coalescent agent in an architectural latex paint, test results showing basic application properties, coalescence, mudcracking and washability tests would typically suffice.

11 NEW APAS SPECIFICATIONS

11.1 APAS will progressively introduce new specifications to accommodate the development of new VOC replacement technology. (One aspect of this approach is that water based technologies may be introduced that contain higher VOC levels than traditional water based products, but are lower in VOCs than the solvent based products they are designed to replace).

12 FAILURE TO ACHIEVE VOC TARGETS

12.1 Where new limits have been applied through this revision of the Document, RMUs will be given until the end of 2015 to ensure their product/s comply to the new limits.

12.2 Products not complying after the 'period of grace' has ended, shall have their certification withdrawn.

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13 TABLES

Table 1 – High Volume Architectural Products

VOC limits, expressed in g/litre of wet paint, applicable to selected APAS specifications are as follows:

APAS Specification	Product type	1 Feb 2015 to 30 June 2019	
		Average	Max
0134	Latex primer for galvanised iron & Zinalume®		20
0172	Interior sealer		55
0183	Exterior timber primer		45
0215/1-5	Low odour; very low VOC		<5
0260/1	Interior gloss	≤60	70
0260/2	Interior semi gloss	≤60	70
0260/3	Interior low sheen	≤40	60
0260/4	Interior flat - washable	≤45	60
0260/5	Interior flat - ceilings	≤40	50
0280/1	Exterior gloss	≤55	70
0280/2	Exterior semi gloss	≤55	65
0280/3	Exterior flat & low sheen	≤40	60
0280/4	Exterior gloss	≤50	70
0280/5	Exterior low sheen	≤45	55

Table 2 – Light Industrial & Protective Coating Products

VOC limits, expressed in g/litre of wet paint, applicable to selected APAS specifications are as follows:

APAS Specification	Product type	1 Feb 2015 to 30 June 2019 maximum
0012	Latex roof paint	100
0041/5	Roadmarking paint – White water borne	60
2974	Solventless epoxy to 400µm; 2 pack	120
2977	Solvent borne epoxy mastic, slow drying; high volume solids; >400 µm	180