



VOLATILE ORGANIC COMPOUNDS (VOC) LIMITS

Editorial Note: This version adds the new APAS logo, editorial changes. THERE ARE NO CHANGES TO THE VOC DEFINITION, NOR THE VOC LEVELS, NOR THE DETERMINATION OF VOC CONTENT, NOR THE VOC LIMITS

1 SCOPE

- This document details the limits on Volatile Organic Compounds (VOC), which will apply for the range of APAS paint specifications noted in Table 1 and Table 2 of this document, for the interval 2015 - 2019.
- APAS is a registered trademark owned by CSIRO and protected under applicable laws. Use of the trademark or the general scheme is prohibited unless prior approval in writing is obtained from CSIRO via the APAS Secretariat.

2 AUTHORITY & RESPONSIBILITY

The Executive Officer (EO) - APAS is responsible for the content of this document and for ensuring conformance to the noted VOC limits for product submission(s) and product re-submission(s) seeking certification to an APAS specification(s) listed in Table 1 and Table 2.

3 REFERENCED DOCUMENTS

- APAS Document AP-D001 should be read to obtain an overview of how the Australian Paint Approval Scheme operates.
- APAS Document AP-D004 should be read to obtain an overview of how to appeal a decision made by APAS and/or lodge a complaint against an APAS officer.
- APAS Document AP-D139 Application form for product certification.
- APAS Document AP-D177 should be read to obtain an overview of how to participate in the Australian Paint Approval Scheme.
- APAS Document AP-D182 Statement of Volatile Organic Compound (VOC) Content in paint.
- APAS Document AP-D192 should be read to obtain an overview of the Australian Paint Approval Scheme product certification system.
- ASTM D2369 Standard Test Method for Volatile Content of Coatings.
- ASTM D3960 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints & Related Coatings.

4 DEFINITIONS & ACRONYMS

4.1 General terms

VOC – volatile organic compounds present in paint formulations (either as a unique ingredient or as a component of an ingredient/manufactured intermediate) that has;

- a vapour pressure >0.01mm Hg at 21°C or,
- 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 g/L
- High 100 – 249 g/L
- Moderate 50 – 99 g/L
- Low 5 – 49 g/L
- Very Low < 5 g/L

4.2 Acronyms

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
g/L	grams per litre

5 BACKGROUND

5.1 Technical

- 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".
- The "Guide to VOC Reduction in Decorative Coatings" produced by the CEPE (European Industrial Council for Paints, Printing Inks and Artists' Colours) Technical Committee Decorative Paints 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 (e.g. 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".

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- 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 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 APAS certified paints sold in Australia and New Zealand.

6 DETERMINATION OF VOC CONTENT

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

- a) Determined by calculation using the suppliers' raw material data. Applying the definition of a VOC as noted in Clause 4.1, determine the VOC content for every raw material/intermediate in the formulation. Tally the VOC content of every raw material/intermediate in the formulation to determine the total VOC content of the formulation 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 as per Clause 6.1 b).

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

- a) For initial product certification applications or a full re-submissions, notification of the Volatile Organic Compound (VOC) Content shall be reported on APAS Document AP-D182.

- b) For minor re-submissions, where there has been no significant change to the formulation, notification of the Volatile Organic Compound (VOC) Content shall be reported on APAS Document AP-D139.

8 ARCHITECTURAL COATINGS

- a) Table 1 of this document lists the APAS specifications for architectural coatings where a VOC limit applies.
- b) In order to allow greater formulating flexibility, where organisations that manufacture architectural coatings of the type(s) noted in Table 1 have a number of products (e.g. tinting bases) certified to the one APAS specification, APAS allows the use of average *and* maximum VOC limits. 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 and so, have less of an impact on the environment.
- c) Where an organisation has more than one architectural product certified against an APAS specification listed in Table 1, the average VOC shall be calculated. The calculated average VOC shall not exceed the average VOC limit noted in this document.
- d) Split-fills or re-labels shall not be included in the calculation; only master/parent formulae.
- e) In addition, no single product shall have a VOC content greater than the maximum VOC limit noted in this document.

9 LIGHT INDUSTRIAL & PROTECTIVE COATINGS

- a) Table 2 of this document lists the APAS specifications for light industrial and protective coatings where a VOC limit applies.
- b) The vast bulk of industrial (protective) coatings are still organic solvent based and hence, have very high VOC content. Although there have been some successful transitions to water-borne formulations without any reduction in protective properties, many formulations remain organic solvent based.
- c) There is little advantage for the environment if the VOC content of an organic solvent based paint is halved with the need to paint twice as often. Hence, for this revision of the document, APAS has removed Table 3 (organic solvent based very high VOC products).
- d) As technology permits the introduction of water-borne, organic solvent-free or high-solids products with acceptable performance properties onto the market, protective coatings products will be reinstated to this document.



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- e) Organisations making an initial product submission or re-submission for APAS certification must report VOC content.

10 CHANGES TO FORMULATIONS

Where minor formulation changes are made to APAS certified products to conform to VOC limits, full re-submission 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 the reduction of a coalescing agent in an architectural water-borne paint, test results demonstrating conformance to application properties, coalescence, mudcracking and washability requirements, would typically suffice.

11 NEW APAS SPECIFICATIONS

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

12 FAILURE TO ACHIEVE VOC TARGETS

- a) 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.
- b) Products not complying after the 'period of grace' has ended, shall have their certification withdrawn.

13 COMPLAINTS & APPEALS

- a) APAS recognised manufacturers or suppliers may lodge an appeal against a decision made by an APAS officer and/or lodge a complaint against an APAS officer.
- b) Appeals and complaints shall subject to the process detailed in APAS Document AP-D004.

**VOLATILE ORGANIC COMPOUNDS (VOC) LIMITS****14 TABLE 1 – HIGH VOLUME ARCHITECTURAL COATINGS PRODUCTS**

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

APAS Specification	Product type	1 Feb 2015 to 30 June 2019	
		Average	Maximum
0134	Latex primer for galvanised iron & Zinalume®		20
0172	Interior sealer		55
0183	Exterior timber primer		45
0215/1	Interior gloss - low odour; very low VOC		<5
0215/2	Interior semi-gloss - low odour; very low VOC		<5
0215/3	Interior low gloss - low odour; very low VOC		<5
0215/4	Interior washable flat – low odour; very low VOC		<5
0215/5	Interior ceiling flat - low odour; very low VOC		<5
0260/1	Interior gloss	≤60	70
0260/2	Interior semi-gloss	≤60	70
0260/3	Interior low gloss	≤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 low gloss or matt	≤40	60
0280/4	Exterior gloss – heavily pigmented DTS*	≤50	70
0280/5	Exterior low sheen – heavily pigmented DTS* finish	≤45	55

* where DTS = direct to substrate

15 TABLE 2 – LIGHT INDUSTRIAL & PROTECTIVE COATINGS PRODUCTS

VOC limits, expressed in g/L 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