

# Reduced Exposure to Pollutants

## Aim of the Credit

To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.

## Credit Criteria

1	<b>Total VOCs</b>	1 point is awarded where all internally applied paints, adhesives, sealants and carpets meet the 'Total VOC Limits' stipulated in this credit, or where there are no paints, adhesives, sealants or carpets are used in the building.
2	<b>Formaldehyde</b>	1 point is awarded where all engineered wood products meet the formaldehyde limits stipulated in this credit or no new engineered wood products are used.

## Compliance Requirements

### 1 - Total VOCs

#### Nominated Area

The nominated area this credit is all primary, secondary and tertiary spaces.

#### Paints

This criterion addresses internal applications for all types of paints, adhesives or sealants applied on-site, including both exposed and concealed applications. If exterior grade products are used in an internal application then these must also meet the credit criteria.

The following items are excluded from this credit:

- Glazing film, tapes, and plumbing pipe cements;
- Products used in exterior applications;
- Paints, adhesives and sealants used off-site, for example applied to furniture items in a manufacturing site and later installed in the fitout;
- Products used in car parks; and
- Adhesives and mastics that are used for temporary formwork and other temporary installations.

Total VOC (TVOC) values should reflect the final product ready to use, inclusive of tints (in the case of paints) and irrespective of the amount used or the number of coatings. TVOC content results must be made in grams of VOC per litre (g/L) of ready to use product.

TVOC limits relevant to paints adhesives or sealants are detailed in the following table. Most paints adhesives and sealants are addressed in the General purpose paints, adhesives and sealant category of the table, unless these clearly belong in the remaining six product categories

Product Category	Max TVOC content in grams per litre (g/ L) of ready to use product.
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

Table: Maximum TVOC limits for Paints, Adhesives and Sealants

The following experimental test methods are relevant to paints:

- ISO Method 17895 (2005), for a material with a presumed VOC content <1%;
- ISO Method 11890-2 (2006), for a material with a presumed VOC <15%;
- ISO Method 11890-1 (2007), for a material with a presumed VOC content >15%;
- ASTM D3960, which is comprised of four individual testing procedures that measures TVOC (D2369) as well as density (D1475) and water content (D4017). Exempt compounds (D4457) must not be subtracted in the calculation of VOC content.

The testing method applicable to adhesive and sealants is only ASTM D3960 as detailed above for paints. For more information on ASTM D3960 refer to South Coast Air Quality Management District Rule 1168.

Other standards can be submitted for approval through a Credit Interpretation Request. For a standard to be recognized, a project must establish that:

- The standard is nationally or international used and can be applied by any ISO/IEC 17025 accredited laboratory internationally; and
- Using expert peer reviewed references, that the standard is an appropriate alternative to a standard already listed in this credit.

Paints or adhesives and sealants certification to GBCA recognised schemes does not provide evidence of compliance to the credit criteria.

### **Carpets**

All new carpets are addressed by this credit regardless if these are installed by the building owner, the tenant or the contractor. Reused carpets or existing carpets are excluded. All other flooring products do not need to be documented. There are two methods for demonstrating that a carpet complies:

Option A - Product Certification	<p>Carpets certified under a relevant Product Certification Scheme standard recognised by the GBCA under the GBCA assessment Framework for Product Certification Schemes are deemed to satisfy the requirements of this criterion. Relevant GBCA recognized standards are listed on the GBCA web site. The certificate must be current at the time of project registration or submission and list the relevant product name and model.</p> <p>A UL GREENGUARD Children &amp; Schools® certification current at the time of project registration or submission is another acceptable evidence for demonstrating compliant TVOC levels for carpets.</p>														
Option B - Experimental Testing	<p>All carpets comply with the Total VOC (TVOC) limits within Table IEQ-7.2. The emission levels detailed in this table must be established by a NATA or another ISO/IEC17025 accreditation laboratory.</p> <table border="1" data-bbox="395 689 1406 1182"> <thead> <tr> <th data-bbox="395 689 1086 741">Carpets using ASTM D5116 test protocol</th> <th data-bbox="1086 689 1406 741">Limit</th> </tr> </thead> <tbody> <tr> <td data-bbox="395 741 1086 808">Total VOC limit</td> <td data-bbox="1086 741 1406 808">0.5mg/sqm per hour</td> </tr> <tr> <td data-bbox="395 808 1086 875">4-PC (4-Phenylcyclohexene)</td> <td data-bbox="1086 808 1406 875">0.05mg/sqm per hour</td> </tr> <tr> <td colspan="2" data-bbox="395 875 1406 943">Carpet using ISO 16000 test protocol (also known as EN 13419)</td> </tr> <tr> <td data-bbox="395 943 1086 1010">TVOC at three days-</td> <td data-bbox="1086 943 1406 1010">0.5 mg/sqm per hour</td> </tr> <tr> <td colspan="2" data-bbox="395 1010 1406 1111">Flooring using ISO 10580 (also known as ISO/TC 219) – Document N238</td> </tr> <tr> <td data-bbox="395 1111 1086 1182">TVOC at 24 hours</td> <td data-bbox="1086 1111 1406 1182">0.5mg/sqm per hour</td> </tr> </tbody> </table> <p>Table : Floor coverings relevant standards and TVOC emissions limits</p>	Carpets using ASTM D5116 test protocol	Limit	Total VOC limit	0.5mg/sqm per hour	4-PC (4-Phenylcyclohexene)	0.05mg/sqm per hour	Carpet using ISO 16000 test protocol (also known as EN 13419)		TVOC at three days-	0.5 mg/sqm per hour	Flooring using ISO 10580 (also known as ISO/TC 219) – Document N238		TVOC at 24 hours	0.5mg/sqm per hour
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## 2 – Formaldehyde

### Engineered Wood Products

Engineered wood products include particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels. All engineered wood products, except excluded applications, must meet the limits in Table 3 when using the listed test methods.

This includes engineered wood products for items that may be addressed in other credits in the Materials category, such as those addressed by the Assemblies, Furniture or Flooring credits. The criterion, however, is only relevant to the engineered wood products used within these items, not the finished assembled item.

A timber veneer itself is not an engineered wood product. However, in most cases, a veneer would be adhered to an engineered wood product. In the example of a veneered or laminated product a formaldehyde datasheet may be submitted for either the 'raw' or veneered or laminated product.

The following applications of engineered wood products are excluded from this credit and do not require documentation:

- Any engineered wood products used in exterior applications (e.g. decorative façade);
- Formwork;
- Car park applications;
- Re-used engineered wood products; and
- Non engineered wood products such as milled timber.

The emission levels of engineered wood products must be established by a NATA or another ISO/IEC 17025 accredited laboratory as per the testing methodologies and relevant limits provided in Table 3

Test Protocol	Emission limit/ Unit of Measurement
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/ L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1mg/ L
AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)	≤1mg/ L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1mg/ L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/m <sup>2</sup> hr*
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1 mg/m <sup>2</sup> hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m <sup>2</sup> hr (at 3 days)
ASTM D6007	≤0.12mg/m <sup>3</sup> **
ASTM E1333	≤0.12mg/m <sup>3</sup> ***
EN 717-1 (also known as DIN EN 717-1)	≤0.12mg/m <sup>3</sup>
EN 717-2 (also known as DIN EN 717-2)	≤3.5mg/m <sup>2</sup> hr

Table: Formaldehyde Emission Limit Values for Different Testing Protocols

mg/m<sup>2</sup>hr may also be represented as mg/m<sup>2</sup>/hr

\*\* The test report must confirm that the conditions of Table 1 comply for the particular wood product type, the final results must be presented in EN 717-1 equivalent (as presented in the table) using the correlation ratio of 0.98.

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## Guidance

### Laboratory testing

The formaldehyde and carpet criteria require laboratory emission test reports, meaning TVOC or formaldehyde emissions are measured as a rate in milligrams per metre square per-hour, or another emission based unit. The paints adhesives and sealant requirements of the credit are based on content and therefore measured in grams per litre of ready to use product, hence in the case of paint, the TVOC content of tints is relevant.

### Rate of Emission Testing

VOCs are emitted from products throughout their lifetime. Rate of emission testing involve testing the product in a specified chamber, and measure the emissions released during a period of time. The testing for rate of emissions is reported in milligrams per metre square per-hour

### Measurement by content

Where TVOC content for the individual items is known, a theoretical calculation based on the subtotal of the known VOC values of the product's raw material components is acceptable. This is not relevant to carpets and engineered wood products; it is not possible to determine the TVOC concentration rate of carpets or engineered wood products therefore experimental testing is therefore required.

### VOC and Formaldehyde data sheets

Compliance with emission limits levels listed in the credit criteria must be demonstrated through the provision of VOC or Formaldehyde data sheets.

In relevance to paints, adhesives and sealants, carpets and engineered wood products a VOC or formaldehyde datasheet is a test certificate by a laboratory accredited by National Association of Testing Authorities (NATA) in Australia or other ISO/IEC 17025 (General requirements for the competence of testing and calibration laboratories) accredited laboratory elsewhere.

In the case of paints, adhesives and sealants, two additional options apply. These are:

Material Safety Data Sheets (MSDS). The MSDS must state the following:

The TVOC numerical result in g/litre of ready product (highlighted);

The test method used to obtain the results; and

For tinted products, also confirming the TVOC value is inclusive of tints.

Theoretical TVOC calculations prepared by the manufacturer in an appropriately signed letter containing the following:

Numerical TVOC results expressed in g/litre of product; and

Statement that the results have been obtained based on the subtotal of the known TVOC values of the product's raw ingredients.

### VOC and Formaldehyde Schedule

When documenting the use of paints, adhesives, sealants and carpets the following example template should be used. For the purpose of this example only paints are documented.

Product type	Product name	type	Benchmark TVOC mg/l of ready to use product	Actual VOC	Reference to datasheet
Paints	Greencoat low sheen	General	50	45	page 12
	Green coat floorcoat	One or two pack performance coating for floors	140	100	Page 13
	Acasia flat	general	50	5	Page 14
	Stick to me ceiling	general	50	47	Page 15
	Color mad walls and ceilings gloss	general	50	18	Page 16

### Paints

Paints are defined as any liquid applied surface finishes, including varnishes and protective coatings.

### Reused

Re-used items include items:

- Purchased from a second-hand retailer, such as an auction house;
- That were used on the current site by a previous occupant;
- Relocated to the site from the new tenant's, or occupant's, previous fitout or building; and
- Remanufactured carpet is not considered reused.

### Primary Space

All areas where a person is expected to work, or remain for an extended period of time, including, but not limited to:

- Living Spaces
- Kitchens
- Offices, either open plan or private;

- Classrooms, laboratories, computer labs;
- Ward rooms, nurse's stations, clinic rooms;
- Inpatient spaces
- Kitchen and preparation areas where food is being sold;
- Retail / sales floor, exhibition halls, galleries (unless exclusion is justified), multi-purpose rooms (as a general setting); and
- Industrial spaces, warehouse areas, shop floors, work stations.

These examples are indicative, and the project is encouraged to submit a Credit Interpretation Request to ensure that all spaces have been accurately defined.

The predominant use of the space determines the space type classification. Where the functional requirements of the space demand specific ventilation conditions (e.g. laboratories, auditoriums, cinemas, or archives) the exclusion must be justified by the project team in a Credit Interpretation Request.

### **Secondary Space**

All areas used to support the principal activity of the primary space. These spaces will be regularly occupied, though a single person is unlikely to remain within for more than 2 hours. Examples of secondary space include:

- Meeting rooms, boardrooms;
- Auditoriums, gyms, seminar rooms (if not intended for regular classes);
- Waiting rooms and any diagnostic area where no specific lighting requirements exist;
- Cafeterias, restaurants, seating areas, office breakout areas, food courts; and
- Stock or store rooms.

Where the project team is unsure of whether a space is primary or secondary, it is recommended that the project team either submits a Credit Interpretation Request for confirmation, or classify the space as a primary space.

Corridors that are exclusively used for transit between spaces (i.e. do not act as a foyer, lounge, waiting space, or reception), and are bound on both sides by a wall these are excluded from the nominated area. Where a corridor is part of a shared space, this corridor, or section of a corridor, cannot be excluded and is considered part of the adjacent space.

### **Tertiary space**

All areas which are either transient spaces, or accessed intermittently. Examples of these areas include: back of house areas, corridors, hallways, plant rooms, storage facilities, or similar.

### **References noted in this Credit**

Aerías Air Quality Sciences IAQ Research Center [www.aerías.org](http://www.aerías.org)

Environment Australia (2001), State of Knowledge Report: Air Toxics and Indoor Air Quality in Australia, Department of the Environment, Water, Heritage and the Arts (DEWHA), Commonwealth of Australia,  
[www.environment.gov.au/atmosphere/airquality/publications/sok/index.html](http://www.environment.gov.au/atmosphere/airquality/publications/sok/index.html)

Health Canada, Environmental and Workplace Health Indoor Air Quality in Office Buildings: A Technical Guide, [http://www.hc-sc.gc.ca/ewh-semt/pubs/air/office\\_building-immeubles\\_bureaux/organic-organiques-eng.php](http://www.hc-sc.gc.ca/ewh-semt/pubs/air/office_building-immeubles_bureaux/organic-organiques-eng.php)

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Liteplo, R. G. & Chénier, R. (2002), Concise International Chemical Assessment Document 40 – Formaldehyde, World Health Organization, <http://whqlibdoc.who.int/hq/2002/a73769.pdf>

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US Environmental Protection Agency (US EPA) (no date), An Introduction to Indoor Air Quality: Organic Gases (VOCs), [www.epa.gov/iaq/voc.html](http://www.epa.gov/iaq/voc.html)

Weller, K. (2006), The Green Guide: The Top Ten Green Hospitals in the US, [www.thegreenguide.com/doc/113/top10hospitals](http://www.thegreenguide.com/doc/113/top10hospitals)

World Health Organization (WHO) (2000), Air quality guidelines for Europe – second edition, WHO Regional Publishers, [www.euro.who.int/document/e71922.pdf](http://www.euro.who.int/document/e71922.pdf).

Burchett, M. Torpy, F. Tarran, J. (2008), Interior Plants for Sustainable Facility Ecology and Workplace Productivity, Faculty of Science, University of Technology, Sydney,

## Documentation Requirements

### 'Design Review' Submission (Optional)

Project teams are to submit information / documentation marked with an asterisk\* for 'Design Review'

### As Built Submission

All project teams re to submit the following documentation:

#### Submission Template\*

- Summary of how credit compliance has been achieved
- List of all products relevant and how they comply with the credit criteria.

Project teams are required to submit documentation supporting credit compliance. The following documents may be used to demonstrate compliance:

- Specifications
- Product Certificates
- Product Data sheets
- Invoices and proof of purchase

**Please provide feedback on the technical content of this credit:**