

No. of credits available				Issue Title	Minimum Standards				
Retail	Office	Indust.	Educat.		P	G	VG	E	O
2	2	2	2	Hea 9 – Pollutants in the indoor environment	P	G	VG	E	O
					-	-	1	2	2

Aim

To reduce pollutants in the indoor air (suspended dust and chemical compounds) through requirements for documented good building cleanliness and the choice of materials and products with documented low emissions of volatile organic compounds and other chemical signal substances/compounds.

Assessment Criteria

The following demonstrates compliance:

First point

- Documentation being available that fixed procedures have been established for clean and tidy building processes with respect to recommendations given in Building Detail 501.107.
- The quality of the cleaning upon the delivery of the building being documented and fulfilling at least quality level 4 given in Building Detail 501.108 and NS-EN-INSTA-800.
- All decorative paints and varnishes have been tested against EN ISO 11890-2:2006 Paints and varnishes. *Determination of volatile organic compound (VOC) content. Gas-chromatographic method* and meet the phase II maximum VOC content limit values set in Annex II of Decorative Paint Directive 2004/42/CE. All decorative paints and varnishes must also be fungal and algal resistant.
- The aim must be to use health-friendly interior paint in the building. Degassing (TVOC) from the interior painting three full days after application must be specified. The degassing must be measured with respect to SVEFF's trade standard "Chemical Emission from paint and lacquer" with FLEC method, SP method 1598 or ISO 16000-10.
- At least five out of the eight product categories listed in table 11 below (where specified) have been tested against and meet the *relevant standards* outlined in the table below for Volatile Organic Compound (VOC) emissions.
- Mineral fibre products and other products with small fibres that might come loose are shaped or built-in such that emission of fibres to the air in the room is prevented. Polluting activities and processes are encapsulated, equipped with point exhaust vacuuming or take place in premises with suitable separate ventilation.

Second point

- The first point must be achieved.
- At least six of the eight product categories that are listed in table 11 below (if specified), have been tested against and satisfy the relevant standards that are outlined in the table below.

Exemplary level criteria

The following outlines the exemplary level criteria to achieve an *innovation credit* for this BREEAM issue:

9. Two credits HEA 9 is awarded
10. All product categories listed below (where specified) have been tested against and meet the relevant standards outlined in the table below for Volatile Organic Compound (VOC) emissions.

Table 5.5 VOC criteria by product type

<p>Wood Panels</p> <ul style="list-style-type: none"> • Particleboard, • Fibreboard including MDF, • OSB, • Cement-bonded particleboard • Plywood • Solid wood panel and acoustic board 	<p>EN 13986:2002 NS-EN 15251:2007</p>	<p>Formaldehyde E1 (Testing req 1 – see below) 2. The level of emissions 4 weeks after production must be lower than what is posed as a requirement for low pollutant materials in NS-EN 15251:2007, Supplement C, and which are based upon the same measurement methodology/test methodology that is used in Emission Classification of Building Materials (M1). Verify that regulated wood preservatives are absent and of the minimum content.</p>
<p>Timber Structures</p> <ul style="list-style-type: none"> • Glued laminated timber 	<p>EN 14080:2005 NS-EN 15251:2007</p>	<p>Formaldehyde E1 (Testing req 1) 2. The level of emissions 4 weeks after production must be lower than what is posed as a requirement for low pollutant materials in NS-EN 15251:2007, Supplement C, and which are based upon the same measurement methodology/test methodology that is used in Emission Classification of Building Materials (M1).</p>
<p>Wood flooring</p> <ul style="list-style-type: none"> • e.g. parquet flooring 	<p>EN 14342:2005 NS-EN 15251:2007</p>	<p>Formaldehyde E1(Testing req 1) 2. The level of emissions 4 weeks after production must be lower than what is posed as a requirement for low pollutant materials in NS-EN 15251:2007, Supplement C, and which are based upon the same measurement methodology/test methodology that is used in Emission Classification of Building Materials (M1). Verify that regulated wood preservatives are absent and of the minimum content.</p>

<p>Resilient, textile and laminated Floor coverings</p> <ul style="list-style-type: none"> • Vinyl/linoleum • Cork and rubber • Carpet • Laminated wood flooring 	<p>EN 14041:2004 NS-EN 15251:2007</p>	<p>Formaldehyde E1 (Testing req 1) 2. The level of emissions 4 weeks after production must be lower than what is posed as a requirement for low pollutant materials in NS-EN 15251:2007, Supplement C, and which are based upon the same measurement methodology/test methodology that is used in Emission Classification of Building Materials (M1). Verify that regulated preservatives are absent and of the minimum content.</p>
<p>Suspended ceiling tiles</p>	<p>EN 13964:2004 NS-EN 15251:2007</p>	<p>Formaldehyde E1 (Testing req 1) 2. The level of emissions 4 weeks after production must be lower than what is posed as a requirement for low pollutant materials in NS-EN 15251:2007, Supplement C, and which are based upon the same measurement methodology/test methodology that is used in Emission Classification of Building Materials (M1). No asbestos.</p>
<p>Flooring adhesives</p>	<p>EN 13999-1:2007 NS-EN 15251:2007</p>	<p>1. The level of emissions 4 weeks after production must be lower than what is posed as a requirement for low pollutant materials in NS-EN 15251:2007, Supplement C, and which are based upon the same measurement methodology/test methodology that is used in Emission Classification of Building Materials (M1). Verify that carcinogenic or sensitising volatile substances are absent (Testing req. 2-4).</p>
<p>Sealants</p>		<p>1. Emissions Level to 4 weeks after production will be lower than the primary requirement for low polluting materials in EN 15251:2007, Appendix C, which is based on the same measurement method / test method used in Emission Classification of Building Materials (M1)</p>
<p>Wall-coverings</p> <ul style="list-style-type: none"> • Finished wallpapers • Wall vinyl's and plastic wall-coverings • Wallpapers for subsequent 	<p>EN 233:1999 EN 234:1989 EN 259:2001 EN 266:1992 NS-EN 15251:2007</p>	<p>Formaldehyde (testing req. 5) and Vinyl chloride monomer (VCM) (testing req. 5) release should be low and within the EN standard for the material.</p>

<p>decoration.</p> <ul style="list-style-type: none"> • Heavy duty wall-coverings • Textile wall-coverings 		<p>2. The level of emissions 4 weeks after production must be lower than what is posed as a requirement for low pollutant materials in NS-EN 15251:2007, Supplement C, and which are based upon the same measurement methodology/test methodology that is used in Emission Classification of Building Materials (M1). Verify that the migration of heavy metals (5) and other toxic substances are within the EN standard for the material.</p>
<p>Testing requirement:</p> <ol style="list-style-type: none"> 1. EN 717-1:2004 2. EN 13999-2:2007 - Volatile Organic Compounds (VOCs) 3. EN 13999-3:2007 - Volatile aldehydes 4. EN 13999-4:2007 - Volatile diisocyanates 5. EN 12149:1997 		

New Build	There are no additional or different criteria to those outlined above specific to new-build projects.
Refurbishment	There are no additional or different criteria to those outlined above specific to refurbishment projects.
Extensions to existing buildings	There are no additional or different criteria to those outlined above specific to the assessment of extensions to existing buildings.
Shell Only	<p>Compliance with this BREEAM issue can be demonstrated via one of the following means in shell only buildings/areas:</p> <ul style="list-style-type: none"> • Option 1 – Use of a tenancy lease agreement between the developer and tenant/s (full value of available credits) • Option 2 – A Green Building Guide (ref chapter 2) for tenant fit outs (half the value of the available credits) • Option 3 – Developer/Tenant collaboration (full value of available credits) <p>Where compliance with the assessment criteria cannot be demonstrated the available credits must be withheld (option 4).</p> <p>Refer to the <i>Scope</i> section 2.2 <i>Types of project that can be assessed using BREEAM</i> (Shell and Core / Speculative Assessments) for further description of the above options.</p>
Fit Out only	There are no additional or different criteria to those outlined above specific to shell-only assessments.
Furnishings	The scope of this BREEAM issue does not extend to furnishings e.g. desks/shelving, it focuses on the key internal finishes and fittings integral to the building.
Relevant standards	All standards outlined in the table above are standards recognised across Europe for VOC content, with the exception of the requirements that are posed for indoor painting. In this area there currently are no other boundary values /requirements that are able to give the manufacturers who focus on low-emission paint the requisite assistance in delineating their products. We thus

	<p>have taken a point of departure in NAAF's requirement for TVOC specifically in order to contribute to manufacturers who have high quality paint with low emissions receiving such assistance with their segment.</p> <p>Other standards and guidelines: Building Details 501.107 Clean, dry building processes Building Details 501.108 Cleanliness during the building period SP method No. 1598, Swedish National Testing and Research Institute, www.sp.se</p> <p>SVEFF's trade standard "Chemical Emission from paint and lacquer" with FLEC method (Field and Laboratory Emission Cell), The Swedish Paint and Ink Makers Association NS-EN ISO 16000-10:2006 Air examination in indoor air – Part 10: Determination of emissions of volatile organic compounds from building materials and interior fittings – Emission cell method. NS-INSTA 800:2010 Cleaning quality – System for establishing and assessing cleaning quality</p>
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Schedule of Evidence Required

	Design Stage	Post Construction Stage
1 and 2	A copy of the control plan/checklist that documents procedures for clean, dry building processes and cleaning quality	A copy of a completely filled in control plan/checklist that documents fulfilment of criteria for clean, dry building processes and cleaning quality
3, 4 and 5	A copy of the relevant specification clause confirming: <ul style="list-style-type: none"> • The VOC content of the relevant specified product types will comply with the standards specified above. • That the products fulfil the requirements posed for degassing from building materials and indoor paint 	For each relevant product, a formal letter from or copies of the manufacturer's literature confirming: <ul style="list-style-type: none"> • The standard(s) against which the product is tested • The VOC content in the relevant specified product groups correspond with the standards that are mentioned above. • That the products fulfil the requirements posed for degassing from building materials and indoor paint
6	Drawings or specifications that confirm that: <ul style="list-style-type: none"> • Mineral fibre products and the like are shaped or built-in such that emission of fibres to the air in the room is prevented. • Polluting activities and processes are encapsulated, equipped with point exhaust vacuuming or take place in premises with suitable separate ventilation. 	Assessor's inspection report and as built drawings that confirm that: <ul style="list-style-type: none"> • Mineral fibre products and the like are shaped or built-in such that emission of fibres to the air in the room is prevented. • Polluting activities and processes are encapsulated, equipped with point exhaust vacuuming or take place in premises with suitable separate ventilation.

Additional Information

Relevant definitions

None.

Pollutants in the indoor environment upon takeover

The indoor environment is often worse in new buildings than in buildings that have been in use for a while. This is due to the emissions from materials being greater when the materials are new, and that the indoor air contains pollutants in the form of dust that is not removed to a sufficient degree during the building process.

Dust in the indoor environment from the building process

Dust and waste from the building process are often found in large quantities inside shells and in hollow areas such as shafts, spaces above suspended ceilings, spaces under raised floors, ventilation ducts, etc. The dust is released gradually and injected into the indoor air when the building is placed into service. The process is influenced by the pressure conditions in the rooms and can occur for an extremely long time. One common problem is cement dust from the building process that sits as a thin layer over surfaces in the rooms. Dust in the indoor air is a common cause of skin and mucous membrane irritations in humans.

In order to reduce that content of dust in indoor air due to the building process, fixed procedures must be established for tidying up and cleaning during the entire building process with respect to recommendations given in Building Details 501.107 and the cleaning quality upon delivery of the building must be documented and fulfil the requirements given in Building Details 501.108 and NS-EN-INSTA-800 for the type of building concerned.

Volatile Organic Compounds

VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, glues and adhesives, Urea-formaldehyde foam insulation (UFFI), pressed wood products (hardwood plywood wall panelling, particleboard, fibreboard) and furniture made with these pressed wood products.

'No' or 'low' VOC paints are available from most standard mainstream paint manufacturers. There 'eco-friendly' paints are made from organic plant sources and also powdered milk-based products. The emissions of VOCs from paints and varnishes are regulated by the Directive 2004/42/CE, implemented in the UK by the Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulation 2005. Products containing high organic solvent content should also be avoided (EU VOC Solvent Directive 1999/13/EC).

Wood products that contain phenol-formaldehyde (PF) generally emit formaldehyde at considerably lower rates than those containing urea-formaldehyde (UF). Although formaldehyde is present in both types of resins, pressed woods that contain PF would be preferable to those containing UF resin.

Exposure risk assessment of any possible release of chemicals from manufactured products and their possible impact on health and the environment generally, is an important requirement of European regulations. The possible impact of a building product on indoor air quality is included in the European Construction Products Directive, 89/106/EEC. The amended Directive, 93/68/EEC provided the criteria for CE Marking of products.

Products to be fitted in buildings should not contain any substances regulated by the Dangerous Substances Directive 2004/42/CE, which could cause harm to people by inhalation or contact. Materials containing heavy metals (e.g. antimony, barium, cadmium, lead and mercury) and other toxic elements (e.g. arsenic, chromium and selenium) or regulated biocides (e.g. pentachlorophenol) should be avoided.

Materials emitting low levels of pollutants must be used in buildings to the greatest extent possible. What is meant by low polluting materials is specified in NS-EN 15251:2007, supplement C.

Various labelling schemes identify products that have been tested and shown to be low emitting and these have been summarised in BRE Digest 464³.

Dangerous substances are defined in the Dangerous Substances Directive (67/548/EEC)