Annexes

Annex 1. Technical definitions related to paint and/or road marking specifications

(1) 'White and light coloured' paints are those with a tri-stimulus (Y-value) > 70%

(2) 'Gloss paints' are those which at an angle of incidence of 60° show a reflectance of ≥ 60

(3) 'Mid sheen paints' (also referred to as semi-gloss, satin, semi-matt) are those which at an angle of incidence of 60° or at 85° show a reflectance of < 60 and ≥ 10

(4) 'Matt paints' are those which at an angle of incidence of 85° show a reflectance of <10

(5) 'Dead matt paints' are those which at an angle of incidence of 85° show a reflectance of <5

(6) 'Transparent' and 'semi-transparent' means a film with a contrast ratio of < 98% at 120µ wet film thickness,

(7) 'Opaque' means a film with a contrast ratio of > 98% at 120µ wet film thickness,

(8) 'Volatile organic compounds' (VOC) means any organic compounds having an initial boiling point less than or equal to 250 °C measured at a standard pressure of 101,3 kPa as defined in Directive 2004/42/EC and which, in a capillary column, are eluting up to and including n-Tetradecane (C14H30),

(9) 'Semi-volatile organic compounds' (SVOCs) means any organic compound having a boiling point greater than 250 °C and less than 370 °C measured at a standard pressure of 101,3 kPa and which, in a capillary column are eluting with a retention range after n-Tetradecane (C14H30) and up to and including n-Docosane (C22H46).

Annex 2. Formaldehyde testing

Requirement	Report method
A sum total formaldehyde limit of 0.0010% w/w applies unless a derogation applies (see the row below).	The Merckoquant method shall be used. If the outcome is inconclusive, high-performance liquid chromatography (HPLC) shall be used to confirm the in-can concentration.
A higher formaldehyde limit 0.010% w/w applies where: (i) Preservatives that are formaldehyde donors are required as an in-can preservative to protect a specific type of paint or varnish and where the formaldehyde donor is used in the place of isothiazolinone preservatives (ii) Polymer dispersions (binders) provide, through residual levels of formaldehyde, the function of formaldehyde donors instead of in-can preservatives.	Determination of the in-can formaldehyde concentration by means of analysis using VdL-RL 03 or high-performance liquid chromatography (HPLC). Indoor paints and varnishes: Determination by means of analysis[1] according to ISO 16000-3. Emissions must not exceed 0.25 ppm upon first application and they must be less than 0.05 ppm after 24 hours from the first application. Initial application is considered to be once stable air mixing in the test chamber has been achieved. It is recommended that stable air mixing can be achieved after 1 hour with the aid of a fan. In all cases the results shall be corrected to reflect a ventilation rate of 1.0 air change/hour by dividing them by 2. This ensures that the results reflect the chamber conditions used in EN 717-1 which form the basis for the emission thresholds.

[1]Equivalent standards exist which may be used, in particular CEN/TS 16516 which is intended to supersede the ISO 16000 series.

Annex 3. SVOC test method markers and modifications

Guidance on the determination of Semi-Volatile Organic Compounds (SVOC) using ISO 11890-2 (2013) (extending its scope)

***Scope**:*

This guidance interprets the specifications of ISO 11890-2 to allow the running of a test to quantify paint SVOC content, either alone or in one run together with an ISO 11890-2 VOC test, so as to evaluate compliance with the requirements of the EU Ecolabel. This guidance should therefore be read alongside ISO 11890-2, but with the modified sample preparation method, apparatus and parameters specified taking precedence.

***Sample preparation**:*

An organic solvent suitable for diluting the sample shall be used. It shall have a purity of at least 99% by mass. The recommended dilution solvent is methanol 100%. If necessary, the sample can be stirred during 30 minutes with application of ultrasound in order to achieve a homogenous liquid phase, or by mechanically stirring during two hours followed by centrifugation or a filtration step using a PTFE filter type for paints containing large, undissolved particles. In the case that a homogenous liquid phase cannot be achieved using methanol 100% then another suitable dilution solvent, such as acetonitrile or tetrahydrofuran, shall be used.

Note:

The marker compounds to be used are n-tetradecane (n-C14) and n-Docosane (n-C22). It may be necessary to prepare a marker solution containing these compounds in acetone due to the limited solubility of n-Docosane in acetonitrile.

***Apparatus**:*

Capillary column:

- The preferred choice of column shall be one made of fused silica coated with 5% phenyl / 95% dimethyl polysiloxane (slightly polar type, DB5 or equivalent).

- A column coated with 100% dimethyl polysiloxane (non-polar type, DB1 or equivalent) may be used if it can be shown to perform better for predominantly non-polar paint ingredients.

Note:

A suitable combination of column length (30m or 60m), diameter and temperature programme shall be selected such that compounds in the sample and the markers elute in the order of their increasing boiling points. A column length of 60m may be used to improve the elution order for the slightly polar column type.

Oven:	
- Oven initial temperature:	*between 40 and 100°C*
- Isothermal holding time:	*between 2 and 5 min*
- Heating rate:	*between 3 and 20°C/min*
- Oven final temperature:	*between 280 and 325°C*
- Isothermal holding time:	*>2min*
- Flow in the column:	*between 1 and 2 ml/min*
Detector:	
- Identification by mass spectrometer	
- Quantification by flame ionization detector (FID)	
- FID detector temperature:	*Final oven temperature or higher*
Carrier gas:	
- helium	
Hot injection system:	
- injector temperature :	*between 250 and 280°C*
- injection volume:	*between 1 and 2 µl*
Calibration:	
- the preferred internal standard for quantification of SVOC peaks shall be n-tetradecane (n-C14)	
- an alternative internal standard, 1,2-diethoxyethane (also named ethylene glycol diethyl ether) can be used in order to achieve improved recovery values when analysing water-based paints.	

Note:

If the calibration procedures are run in an appropriate manner the selection of the internal standard should have no impact on the test result. However, it is important to ensure that the internal standard does not overlap or hide any peaks arising from the sample itself. It must therefore show a complete separation from other peaks in the chromatogram. A large choice of internal standards is thus possible but internal standards having very low boiling points (e.g. acetone…) or very high boiling points (C22 and more…) must be excluded to avoid any discriminatory phenomenon in the injector.

- All SVOCs shall be identified as far as achievable, and then quantification shall be performed with their authentic calibration standards, as specified for VOCs in ISO 11890-2, or via their relative response factors.

- Remaining unknown SVOC peaks shall be quantified using the response factor of diethyl adipate, expressed in diethyl adipate equivalents.

During the validity period of the criteria it is likely that ISO 11890-2 will be revised and its scope extended to also provide a test method for SVOC's. This guidance shall therefore be used in the interim until the standard is revised.

Annex 4. Exempted compounds

- methane;
- ethane;
- methylene chloride (dichloromethane);
- 1,1,1-trichloroethane (methyl chloroform);
- 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113);
- trichlorofluoromethane (CFC-11);
- dichlorodifluoromethane (CFC-12);
- chlorodifluoromethane (HCFC-22);
- trifluoromethane (HFC-23);
- 1,2-dichloro 1,1,2,2-tetrafluoroethane (CFC-114);
- chloropentafluoroethane (CFC-115);
- 1,1,1-trifluoro 2,2-dichloroethane (HCFC-123);
- 1,1,1,2-tetrafluoroethane (HFC-134a);
- 1,1-dichloro 1-fluoroethane (HCFC-141b);
- 1-chloro 1,1-difluoroethane (HCFC-142b);
- 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124);
- pentafluoroethane (HFC-125);
- 1,1,2,2-tetrafluoroethane (HFC-134);
- 1,1,1-trifluoroethane (HFC-143a);
- 1,1-difluoroethane (HFC-152a);
- parachlorobenzotrifluoride (PCBTF);
- cyclic,
- branched, or linear completely methylated siloxanes;
- acetone;
- perchloroethylene (tetrachloroethylene);
- 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca);
- 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb);
- 1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC 43-10mee);
- difluoromethane (HFC-32);
- ethylfluoride (HFC-161);
- 1,1,1,3,3,3-hexafluoropropane (HFC-236fa);
- 1,1,2,2,3-pentafluoropropane (HFC-245ca);
- 1,1,2,3,3-pentafluoropropane (HFC-245ea);
- 1,1,1,2,3-pentafluoropropane (HFC-245eb);
- 1,1,1,3,3-pentafluoropropane (HFC-245fa);
- 1,1,1,2,3,3-hexafluoropropane (HFC-236ea);
- 1,1,1,3,3-pentafluorobutane (HFC-365mfc);
- chlorofluoromethane (HCFC-31);
- 1 chloro-1-fluoroethane (HCFC-151a);
- 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a);
- 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane ($C_4F_9OCH_3$ or HFE-7100);
- 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OCH_3$);
- 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane ($C_4F_9OC_2H_5$ or HFE-7200);
- 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OC_2H_5$);
- methyl acetate; 1,1,1,2,2,3,3-heptafluoro-3-methoxy-propane (n-C3F7OCH3, HFE-7000);
- 3-ethoxy- 1,1,1,2,3,4,4,5,5,6,6,6-dodecafluoro-2-(trifluoromethyl) hexane (HFE-7500);
- 1,1,1,2,3,3,3-heptafluoropropane (HFC 227ea);
- methyl formate (HCOOCH3);
- 1,1,1,2,2,3,4,5,5,5-decafluoro-3-methoxy-4-trifluoromethyl-pentane (HFE-7300);

- propylene carbonate;
- dimethyl carbonate;
- *trans*-1,3,3,3-tetrafluoropropene;
- HCF_2OCF_2H (HFE-134);
- $HCF_2OCF_2OCF_2H$ (HFE-236cal2);
- $HCF_2OCF_2CF_2OCF_2H$ (HFE-338pcc13);
- $HCF_2OCF_2OCF_2CF_2OCF_2H$ (H-Galden 1040x or H-Galden ZT 130 (or 150 or 180));
- *trans* 1-chloro-3,3,3-trifluoroprop-1-ene;
- 2,3,3,3-tetrafluoropropene;
- 2-amino-2-methyl-1-propanol;
- ethyl acetate;
- butyl acetate;
- and perfluorocarbon compounds which fall into these classes:
    - Cyclic, branched, or linear, completely fluorinated alkanes;
    - Cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
    - Cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
    - Sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.