CEPE GUIDANCE DOCUMENT
on the Use of Solvent in
the Protective Coatings Sector

Introduction

For paints that are used in the Protective Coatings (PC) sector there is no specific (dedicated) legislation that governs its solvent or VOC content as is the case for decorative coatings where the Product Directive 2004/42/EC (PD) sets maximum VOC limits. However due to the lack of clear definitions in the PD some Protective Coating products are impacted. This is addressed in section A of this guide.

Even when there is no need to comply with legislation, it makes sense to reduce solvents in paint formulations from the perspective of sustainability. The impact of such reductions is illustrated in section B of this guide.

1. Where and for what reasons are Protective Coatings used?

‘Protective Coatings’ mean products that are used for chemical resistance, corrosion and fire protection of metal and concrete structures. They are not used for coating of decorative panels and claddings, nor for purely decorative applications nor for ships, Floating Production Storage and Offloading Vessels (FPSOs) or other mobile marine craft.

2. How are VOC emissions from Protective Coatings currently regulated and controlled?

Protective coatings applied ‘in shop’ (inside an installation) are subject to the Industrial Emissions Directive 2010/75/EU or IED (which incorporates the provisions of the Solvent Emissions Directive 1999/13/EC in Chapter V and Annex VII) - and which regulates the emitted amounts of VOC from the installation. There is no prescription on the VOC content of the paint as such, but the owner of the installation is required to comply with emission limits.

Some types of protective coatings applied ‘on site’ in buildings are subject to the Product Directive 2004/42/EC. This Directive prescribes a certain maximum VOC content for the ready to use form of a paint. See further under 4.

Applications include – typically but not exclusively:

- protection of the structural framework of steel-framed buildings, designed to provide long-term structural support and integrity.
- Concrete, steel and other metallic structures such as petrochemical facilities – including oil and chemical storage tanks
- offshore structures such as jetties and oil and gas platforms;
- infrastructures such as bridges, dams, waterworks, and harbour facilities;
- pipelines;
- seagoing containers
- power generation, including nuclear, hydroelectric, coal, oil and gas powered stations and sustainable energy facilities such as windmills

Section A – Clarification of where and how the Product Directive applies in this Sector

This section of the guidance seeks to clarify where and how the Product Directive should be applied for Protective Coatings.

3. The Product Directive (PD) does not define what constitutes a building, nor does it stipulate the point of application of building products at which conformance with the PD is required. Can CEPE clarify these definitions for the Protective Coatings market?

In the absence of a definition in the legal text, CEPE advises the following definition for the term “Building”: a constructed edifice designed to stand more or less permanently, covering a space of land, usually covered by a roof and more or less completely enclosed by walls and serving as a dwelling, storehouse, factory, shelter for animals, or other useful structure – distinguished from structures not designed for occupancy (such as bridges or monuments) and from structures not intended for use in one place (such as boats and trailers) even though subject to occupancy.

4. There is no specific ‘Protective Coatings’ listing in the Product Directive, so what VOC limits apply to these coatings and where in the Directive are these found?

As mentioned above only some protective coatings are subject to the Product Directive.

These are found in Annex II of the Product Directive as two categories:

- category (i): one-pack performance coatings
- category (ii): two-pack performance coatings

They are described as performance coatings based on film-forming material. They are designed for applications requiring a special performance, such as primer and topcoats for ferrous substrates, primer coats for reactive metals such as zinc and aluminum, anticorrosive finishes, floor coatings (including for wood and cement floors), graffiti resistance, flame retardance and fire resistance, and hygiene standards in the food and drink industry or health services.

Maximum VOC content in the ready to use form:

- for Waterborne paints: 140 Grams / liter
- for Solvent Borne paints: 500 Grams / liter

5. Do all Protective Coatings have to comply with this VOC limit?

No, see also the summary in the table on page 4. There are a number of product ‘groups’ within the PC product range that are designed and intended for use ‘in shop’ only and therefore have no reason to comply with the PD limits on VOC. Rarely some may be used ‘on site’ but for this purpose are considered to be ‘out of scope’. The main product groups not falling under the PD are:

Prefabrication and blast primers
Sealer-coats and tie coats
Heat resistant finishes.
Zinc silicates
Also considered as ‘out of scope’ are:

Protective Coatings products which are certified for use in highly specialised situations, for example specific nuclear or military applications.

These uses generally involve small quantities of material, but because of the special properties required and the serious consequences of product failure, the testing and certification process may be extremely onerous, lengthy and expensive. The time and costs involved may be out of all proportion to the value of the supply or the environmental benefit that may be obtained, providing little justification for undertaking development and testing of reduced VOC product options.

The use in buildings of all products in the above categories will be very small and in view of insurmountable technical difficulties at the present time, they are considered to be out of scope of the Productive Directive.

Structures not covered by the above definition, and thus excluded from the PD, include concrete, steel and other metallic structures such as petrochemical facilities – including oil and chemical storage tanks, offshore structures such as jetties and oil and gas platforms, infrastructures such as bridges, dams, waterworks and harbour facilities, seagoing containers and power generation – including nuclear, hydroelectric, coal, oil and gas powered stations and sustainable energy facilities such as windmills.

In order to distinguish Product Directive applications from ‘in-shop’ applications which are regulated under the IED, CEPE consider protective coatings used on buildings to be those used ‘in-situ’ – i.e. on the site of the building. Products applied at another location to building components which are then transported for fitting in the building are regulated under the IED and so are considered to be outside the scope of the PD.

Maximum VOC content in the ready to use form:

- for Waterborne paints: 140 Grams / liter
- for Solvent Borne paints: 500 Grams / liter
Section B – Higher Solids contribute to Sustainable Protective Coatings

6. Why should manufacturers wish to sell lower VOC products when there is no legislation requiring them to do so?

Investing in reducing VOCs is worthwhile from several perspectives, and beneficial to customers and the public for a number of reasons. For example:

a. In today’s business there is an ever increasing focus on Sustainability. Procurement of products and services will increasingly need to meet the criteria of Green Public Procurement that are being introduced across the EU. Such criteria consider the performance of a product balanced against its environmental impact. The evaluation of this balance is laid down in so-called environmental product declarations (EPDs). Low solvent products have significantly less environmental impact and will be favoured by many large customers, in particular by government and local authority buyers.

b. Less solvent in protective coatings may also help those who apply paints in an installation to meet the levels of VOC emissions imposed on them by the Industrial Emissions Directive, so maintaining higher solids products will assist customers who apply our coatings 'in shop'.

c. From a national perspective, reductions in VOCs will help Member States to comply with the National Emission Ceilings they have all committed to meet. CEPE estimates that the PC sector can save Europe over 5,000 Tonnes of emitted VOCs annually if the entire PC industry switched to Higher Solids products.

Solvents in relation to sustainability

Solvents play an indispensable role in the application and the ultimate characteristics of Protective Coatings. The coating producers are aware that a complete elimination of solvents will not be achievable for those paints that need to be applied under outdoor conditions and where performance characteristics like corrosion protection are too important to be compromised. For example, less durable products requiring a higher frequency of maintenance painting would be more expensive and less sustainable in the long term.

Today’s solvents are derived from mineral oil and may eventually face depletion. They also have a relatively high carbon footprint. In anticipation of more sustainable products, the producers of Protective Coatings in Europe, gathered as members of the European Paint and Ink Council, CEPE, have taken the initiative to set challenging targets for reducing solvents in those products that had the highest contribution to overall VOC emissions linked to their sector. They believe that the solvent levels introduced below for Higher Solids products are the most sustainable levels currently achievable for these high performance paints.

<table>
<thead>
<tr>
<th>Product Group</th>
<th>Conventional VOC in gm/m² at 100 microns dt</th>
<th>Higher solids VOC in gm/m² at 100 microns dt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Pack Primers and Intermediates</td>
<td>430</td>
<td>290</td>
</tr>
<tr>
<td>Zinc Primers</td>
<td>500</td>
<td>460</td>
</tr>
<tr>
<td>3-Pack Primers and Intermediates</td>
<td>490</td>
<td>420</td>
</tr>
<tr>
<td>Multi-Pack Finishes</td>
<td>350</td>
<td>440</td>
</tr>
<tr>
<td>Tank Linings</td>
<td>450</td>
<td>370</td>
</tr>
<tr>
<td>Solvent-free Tank Linings</td>
<td>150*</td>
<td>94*</td>
</tr>
<tr>
<td>2-Pack Intumescent Coatings</td>
<td>450</td>
<td>350</td>
</tr>
</tbody>
</table>

NB. All quoted limits are for ready-for-use (RFU) product, with no further thinning permitted.
NB* ‘Solvent-free’ tank linings may contain up to 150gm/litre of diluent, which technically would be defined as VOC but is not volatile or released from the film under normal conditions.

Other Protective Coatings products that fall outside the above groups fulfill more specialised functions and contribute a relatively small proportion of overall VOC emissions, so have not therefore been included.

The VOC levels quoted above for higher solids coatings are not necessarily the lowest levels possible for individual products within each product group, but they represent the highest VOC content, using current technology ingredients, that is consistent with the film thicknesses and specifications required to provide good long-term durability and sustainability.

Water-borne equivalents are available for most of the above product categories, which have zero or at least significantly lower VOC content than solvent-borne formulations. However, because a large proportion of protective coatings are applied in open-shop or fully external conditions, environmental factors such as low temperatures and high humidities impose greater restrictions on their use (especially in winter months and in Northern Europe). They may also be less able to be applied at the high film thicknesses necessary for very long-life applications, so for fair and realistic comparisons between solvent and water-borne technologies, these are best assessed on the basis of a full Life Cycle Analysis (LCA).

Caution

The VOC levels shown above only deal with the paint as it leaves the factory gate and when it is theoretically applied to a square metre of surface. Full life cycle thinking also includes an extensive list of ‘after the gate’ factors, of which the intervals between maintenance cycles make the biggest difference. However, if these ‘after gate’ factors are consistent for both ‘conventional’ and ‘higher solids’ systems (which in general will be the case), the environmental benefits of higher solids – illustrated by the significant reductions in VOC emissions per m² in the table above – will remain valid.

In order to quantify the full life cycle impacts of different coating systems, CEPE’s Sector Group for Protective Coatings has carried out a full life cycle analysis of some typical corrosion protection systems. The results of this study have been presented separately and will be published in due course.

Summary

Within the Protective Coatings sector, use is made of a large number of paint categories. Some of these are subject to the Product Directive 2004/42/EC when they are applied to a building ‘in situ’. In that case these categories have to meet the respective VOC limits defined in the Directive.

Without any legal obligation CEPE’s PC sector supports initiatives to reduce the VOCs of their products to more sustainable levels, especially for those paint groups that contribute the highest use of VOCs throughout the sector. Such Higher Solids products will contribute to a more sustainable system for corrosion protection.

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