87099  Cyclododecane Spray

Cyclododecane is a wax-like, water-repelling and non-toxic substance. It has the amazing characteristic to simply vanish by evaporation (sublimation) after a few days.

Physical Properties:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Melting point:</td>
<td>58 - 61°C</td>
</tr>
<tr>
<td>Boiling point:</td>
<td>243°C</td>
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<tr>
<td>Flash point:</td>
<td>98°C</td>
</tr>
<tr>
<td>Ignition temperature:</td>
<td>265°C</td>
</tr>
<tr>
<td>Vapor pressure: (20°C)</td>
<td>approx. 0.1 hPa</td>
</tr>
</tbody>
</table>

Cyclododecane (CCD) may be solved in solvents such as iso-octane or naphthas with low boiling points (e.g. 60 - 90°C).

With slowly evaporating solvents, CCD produces a kind of felt consisting of long, needle-like crystals. This film only offers little resistance to mechanical pressure. The faster subliming solvents build an amorphous precipitation, developing a film which gets harder and harder by the time. This film is absolutely water-proof and it also offers mechanical protection. As a rule it can be stated that on porous, non-sucking surfaces, the density of the film as well as its ability to resist mechanical pressure increases with the volatility of the used thinner.

In addition to the applications used so far, melt and solution, cyclododecane as spray represents a third form. In the spray can cyclododecane is found in a dissolved form. The only solvent present is in this case the propellant. No further solvents are present. The propellant, being an extremely volatile solvent, also determines the main properties of the cyclododecane film.

IMPORTANT information about the Spraying Distance:

Because the propellant dissolves rather fast from the fluid into the gaseous state, the cyclododecane, dissolved at first, precipitates in a solid state. That part of the gas that is still fluid in the sprayed fog when exiting the spray can get less and less with growing distance to the nozzle until only the pure cyclododecane dust is left over. To end up with a film that is as dense as possible, the distance between nozzle and object should **be as short as possible**.

A distance of 3 to 4 cm is recommended to get an abrasion-resistant film. A soft but very even film is reached at a distance of 6 to 10 cm. Larger distances will lead to films which do not adhere properly and which lead to a higher loss.

Spraying Direction onto Horizontal Surfaces (to the top or the bottom)

Spraying vertically to the top or directly downwards is absolutely possible, but not the standard procedure. In order to get an even, non-changing spray you need to turn the nozzle until the lower end of the rising pipe inside the can submerges into the material. As the pipe always touches a side of the can, it is possible to completely empty the can even in the horizontal position.

Characteristics of the Film

Basically the sprayed film adheres on any surface. Be it a textile, wood, glass, varnished surfaces, metal, plastic material, etc., but also on porous surfaces like stone, mortar or paper.

The characteristics of the film differ from those of the melt. It is rather an amorphous film with a mechanical solidity mainly depending on the distance of spraying. It does not reach the density nor the solidity of the film from a melt. The solidity increases from the moment of application, the individual dust particles condense more and more. The protective effect against water and aqueous solvents is safe. Whereas the melted film offers perfect protection against all highly polar solvents, the sprayed film is penetrated easily by polar solvents like ethanol, isopropanol or acetone, without being solvent itself.
**Depth of Penetration:**
With porous surfaces the question of the depth of penetration certainly is of importance. Whereas the ability to penetrate of both melt and solution is rather great, that of the sprayed film is near to zero. As the sprayed film doesn’t penetrate into the surface it doesn’t have any solidifying effect.

**Reversibility:**
The characteristics of the sprayed CCD-film also determine the rate of evaporation. A melt of 1 mm film needs about 30 days to totally evaporate, whereas the sprayed film distinctively faster. A 1 mm film will totally disappear in 2 to 3 days at 20°C. On facades without direct sunlight the same film may disappear within a day.

**Instant Removal of the Cyclododecane Film**
In some situations you may want to remove the film without wanting to wait until it has evaporated. This is possible without any problems by spraying or brushing with petroleum spirit. On sensitive surfaces you should use petroleum spirit without aromatic additives.

**Main Field of Application**
The main field of application is certainly the temporary protection of sensitive surfaces. Using a spray can have big advantages when a quick evaporation of the protective film is desired after one or two days and when a quick, uncomplicated application is important. Another advantage is that an even, regular film thickness can be reached on large surfaces. Of course a sprayed cyclododecane film can also be melted in. We recommend using a heating lamp or a heated spatula.

For small, local consolidations or seals with CCD-melt a CCD-coated foil is used as a transfer paper. For this purpose a hostaphan (polyester) foil is coated using a spray can and cut into stripes of usable length. Using a heatable spatula you can then apply it where needed.

Good experiences have been made with the following applications:
- Protection of sensitive areas when working with water, with aqueous solutions, aqueous coatings, etc.
- Protection of sensitive areas when working with aqueous adhesives or injection mortars.
- Protection of sensitive areas when working with plaster and mortar of any kind.

**Nozzles:**
Basically you can use different nozzles for different forms of application.

The standard version of the can is fitted with a fan-like nozzle (red) to spray with. It has a variable outlet, so that the angle of spraying can be adjusted individually. A spraying distance of 6 cm will spray a film on a stripe of 50 mm.

**Consumption:**
A clear statement as to how much area can be sprayed with one can is not easily possible. Important factors are the density of the film as well as the spraying distance. Roughly you can expect that a 400 ml can is enough for about one square meter of surface.

**Literature:**

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