



## INTRODUCTION

Fujifilm is offering a complete range of pressroom chemicals. By building up the perfect combination of pressroom products, we can provide the customer with a complete pressroom solution. Solving problems across the printing process implies that we have to think in terms of the whole process as they are often interlinked and not just located in one area.

By avoiding problems through the printing process, we manage not only to boost performance but also to reduce costs for our customer.

Our product range:

1. **Fountain solutions** ■
2. **Coatings** ■
3. **Glues** ■
4. **Washes** ■
5. **Silicone emulsions** ■
6. **Spray powders** ■
7. **Auxiliaries** ■



A series of horizontal lines for writing, consisting of 25 evenly spaced lines that fill the majority of the page.

## 5. Silicone emulsions

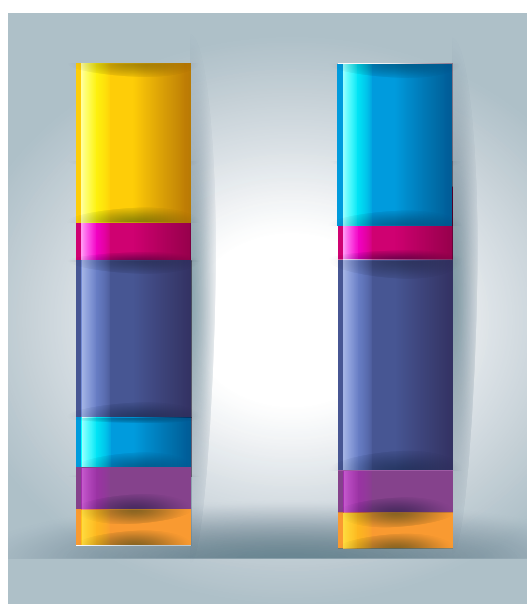
### 5.1 Basic role of a silicone emulsion












The basic role of a silicone emulsion is versatile and has an effect on different domains. To clarify the benefits you profit from when using a silicone emulsion, first we will explain the process.

Silicone emulsions are used in heatset applications after the dryer unit. This dryer unit is needed as the ink in heatset applications is dried at high temperature and therefore the paper web runs through an oven operating at  $\pm 280$  °C. In this oven, the oil within the ink evaporates. The printed product emerges from the oven ready for finishing, but typically the ink is not totally dry, additionally the oven removes all moisture from the paper. Due to this the paper needs to be re-moistened and this is done by the water in the silicone emulsion

In the folder following the oven, the printed image undergoes a lot of stress and needs to be protected to avoid scratches and smearing. Moreover the paper also requires a degree of humidity, as absolutely dry paper tends to crack.

[1]:



 oil	 polymer
 emulsifier	 emulsifier
 water	 water
 performance additive	 antistat
 antistat	 wax
 wax	

Silicone emulsions satisfy these requirements as the water re-moisturizes the paper while the silicone oil gives the protection in the folder to protect the image and avoid ink build-up on the turn bars. Simultaneously, the gloss of the finished print is improved, thanks to the application of a very thin layer of silicone oil.

So in summary, by using a silicone emulsion, you will be able to:

- remoisten the paper web after the oven
- protect the print against marks
- prevent build up in turn bars and the folder
- reduce friction on idle rollers
- avoid static electricity in the stack

### 5.2 Groups of silicone emulsions

Silicone emulsions differ based on the composition [1]:

- emulsions without wax
- emulsions with wax
- polymer-based emulsions.

### 5.3 Composition of a silicone emulsion

A silicone emulsion is composed out of silicone oil and water. In order to get a stable emulsion of water and silicone oil, emulsifiers are used. By choosing the optimum combination of silicone oil and emulsifiers, the wetting properties of the silicone emulsion can be boosted. Additionally following components are added to the silicone emulsion:

- wetting additives
- antistatic agent
- rub resistance additives

### 5.3.1 Wetting additives

The reason for adding wetting additives to the silicone emulsion is to get an optimum distribution (closed film) of the silicone emulsion on the application roller and as a result an even levelling on the print, in order to avoid spotting.

#### 5.3.1.2 Better wetting

Standard silicone emulsions tend not to form a closed film when applied to the web, resulting in a reduced protection for the print. Fujifilm silicone emulsions provide a better and faster wetting [2] than standard ones, this by the Fujifilm CT technology. This is resulting in more closed film which, on its turn provides better protection and increased gloss. [3] [4]

### 5.3.2 Antistatic agent

In order to reduce static charge on a paper surface, antistatic agents are needed. After the paper web run through the oven the paper is running with high speed through the folder. During the folding process, a lot of static charge is built up on the web caused by friction. Additionally extreme climate conditions, such as low humidity can increase the static charge. The function of the antistatic agent is to make the surface of the paper slightly conductive. Therefore electrical charge can flow in all directions and will not stay on the paper surface.

FUJIFILM silicone emulsion contains very effective antistatic agents to ensure highest press speed.

### 5.3.3 Rub resistance additives

Essential to obtain improved rub resistance are rub resistance additives. These additives contribute to keep distance between web and turner bars and former. Based on our CT technology we have created our CXT technology. For this technology we have chosen the best possible combination of waxes and polymers to provide outstanding rub protection [5] which is especially suited for critical print jobs with high ink load or when using matt coated paper. By using CXT technology the wax is well incorporated in the emulsion so no separation of wax will appear.

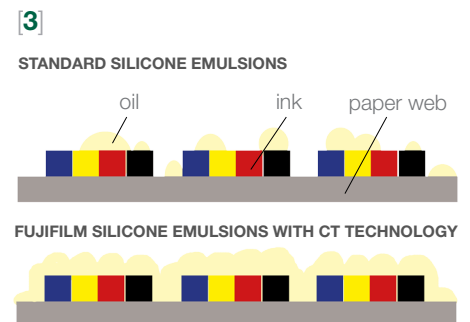
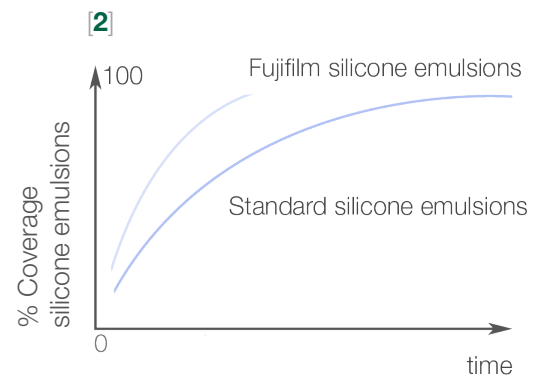
## 5.4 What defines the performance of a silicone emulsion?

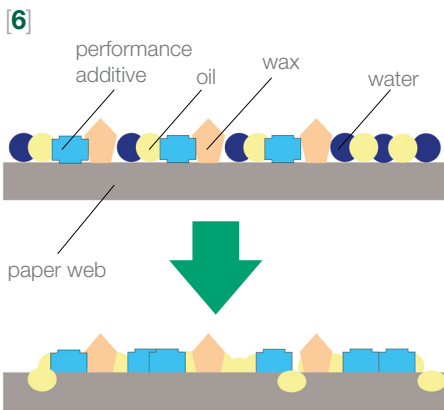
There are 4 important influencers of the performance of the used silicone emulsion:

- quality of the silicone oil
- wetting properties
- compatibility of the waxes
- antistatic agent

### 5.4.1 Quality of the silicone oil

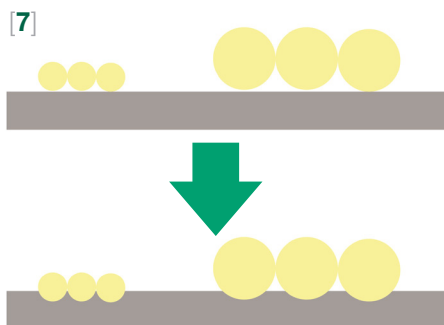
The quality of the silicone oil is the major influencer on rub resistance and gloss. To define the quality of the silicone oil, we have to look mainly to the size of the oil drop in the emulsion.





When the emulsion is being applied on the paper web, different processes will start. The water will partly evaporate and partly penetrate into the paper web, while oil particles will stay on the surface, but will also partly penetrate into the paper. On the other hand, wax and polymer will stay on the surface and build a film together with the silicone oil. [6]

When oil is penetrating into the paper, it can't give any protection to the paper and by this performance/functionality goes to waste. Therefore, with the new series of silicone emulsions, FUJIFILM has found the optimum oil drop size to minimize the penetration into the web and by this offering more protection to the paper. [7]



#### 5.4.2 Wetting properties

The wetting properties are, like already mentioned before, important to achieve fast and full wetting on the whole print. By using products with our CT technology, the needed properties will be added to the paper web.

#### 5.4.3 Compatibility of the waxes

To avoid wax build up on application bars and print, the compatibility of the waxes is very important. Our CXT technology helps our customers to meet these goals.

#### 5.4.4 Antistatic agent

The antistatic agent is crucial in order to avoid static charge in the folder and stack.

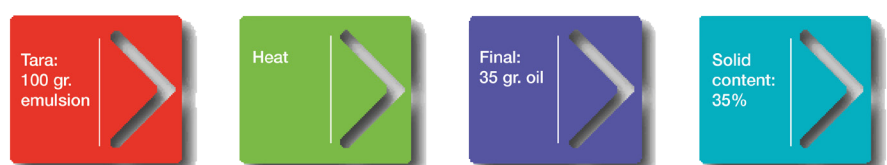
#### 5.5 Solid vs active content

In the past silicone emulsions have been classified by solid content. This could be measured in the lab by evaporating the water with heat. The oil that remained (oil needs a much higher temperature to evaporate) was measured by weight and this represented the solid content. [8]

These days, modern emulsions do not only contain silicone oil but also other components for functionality. These additional components can't be measured by solid content.

Therefore, to classify the performance of modern silicone emulsions, not the solid, but active content is important. Active content is the percentage of active ingredients in the emulsion.

[8]



## 5.6 Application of silicone emulsions

At customer' side the silicone emulsion is diluted depending on [9]:

- concentration of the silicone emulsion
- application

Moreover the difference in performance can be influenced by the different press conditions, paper stock and ink coverage.

## 5.7 Measurement of the silicone concentration

In order to reach an optimum printing result and to guarantee an economical consumption, a reliable measurement tool is needed to measure the concentration of the silicone emulsion on press.

For more information regarding this subject, please consult our "Measurement of the silicone concentration" TIS.

## 5.8 Summary

Using the correct silicone emulsion gives you several advantages: cost reduction, increased productivity & troubleshooting.

### 5.8.1 Cost reduction

Our silicone emulsions are formulated to provide maximum protection without the need for a high dosage. Moreover they minimize the build up on turn bars and folder by which cleaning intervals, which take time and therefor money, can be avoided.

### 5.8.2 Increased productivity

Especially in the case of matt coated paper or areas with high ink load an good protection is needed. For this, a good film formation is essential. The oil drops in our silicone emulsions melt quickly into each other resulting in an excellent film formation even at high speed.

Also by the minimized build up on turn bars and folders, the cleaning intervals can be extended resulting in an increased productivity.

### 5.8.3 Trouble free process

Using a silicone emulsion of a minor quality can cause several problems like static charge in the stack, build up on application rollers, turn bars and folder. For this reason our products are formulated with high quality ingredients ensuring a trouble free process, even at high machine speed.

[9]

