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V_{th}

CALCULATION OF SCREEN INKS CONSUMPTION

Screen printers often ask how much ink they will need for a specific print job. Especially if high quantities and large prints are involved, calculation of ink consumption should not get out of control.

IMPORTANT:

Because of the greatly differing specific weights of colour shades the required amount of ink is always calculated in volume.

ESSENTIAL PARAMETERS TO DETERMINE YIELD OF AN INK:

1. Total printing area of the job
2. **Screen Fabric (Mesh Count)**
3. Stencil profile
4. Substrate
5. Screen Printing Ink
6. Printing Equipment

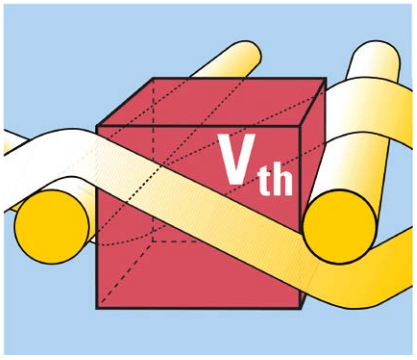
1. CALCULATION OF THE PRINTING AREA

The starting point of any calculation of ink consumption is the total size of the total area to be printed. The first step is to determine the size of the print area. Simple for solid surfaces (l x w), a little more complex for asymmetrical details scattered across the print sheet.

The print area for a colour shade on a print sheet is then multiplied by number of prints (gross). The result is the total print area in m^2.

2. SCREEN FABRIC/ THEORETICAL INK VOLUME V_{th}

This is the most important parameter to determine ink yield. The mesh count (number of fabrics/ cm plus thread thickness) will basically preset the amount of ink which can be applied to the substrate with each print. The information on the theoretical ink volume (V_{th} cm^3/m^2) of the respective fabric number, which can be found in the technical tables of the fabric manufacturers, is extremely helpful.



Theoretical Ink Volume

The V_{th} is a calculated value of the mesh thickness and degree of screen openness. V_{th} values and the resulting ink consumption values of some mesh counts are listed in the following table.

polyester fabric mesh count number threads/cm	thread Ø in micron (µ)	weave type	theoretical ink volume V_{th}	theoretical yield m^2/litre
43 - *80*		1:1 (PW)	**53,0** cm^3/m^2	**19** m^2
77 - *55*		1:1 (PW)	**23,0** cm^3/m^2	**43** m^2
90 - *48*		1:1 (PW)	**19,9** cm^3/m^2	**50** m^2
100 - *40*		1:1 (PW)	**21,1** cm^3/m^2	**47** m^2
120 - *34*		1:1 (PW)	**16,3** cm^3/m^2	**61** m^2
150 - *34*		1:1 (PW)	**6,6** cm^3/m^2	**151** m^2
150 - *31*		1:1 (PW)	**10,9** cm^3/m^2	**92** m^2
165 - *27*		1:1 (PW)	**9,6** cm^3/m^2	**104** m^2

Source: Sefar

When dividing 1 litre of ink, i.e. 1.000 cm^3 by V_{th} of the intended screen fineness the result will be a value in m^2. This value specifies how many m^2 of a solid print area can be printed with one litre of ink (ready-to-print adjustment) with this fabric (+/-).

In practice, there may also be certain deviations due to other influencing variables. Printers will therefore initially calculate a mark-up and then subject this value to a subsequent calculation. Later more and more exact consumption values will be available for repeat orders or similar print jobs.

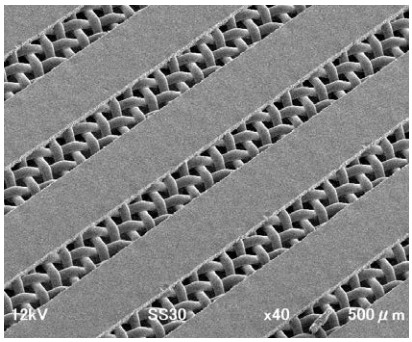
3. STENCIL THICKNESS EMULSION OVER MESH (EOM)

Stencil layer thickness has no relevant influence on ink consumption when printing full solid areas. When printing motives with lines below 2 mm or in process printing applications stencil thickness will influence ink deposit to a certain degree if you have higher emulsion over mesh level (> 10% of screen thickness).

In the case of relief effect prints, the stencil build-up thickness can be up to 400% higher than the screen thickness. In this case, you will have to consider a higher influence on ink consumption.

4. SUBSTRATE

The absorbency of the substrate is also an important factor. Non-absorbing materials such as most plastics only have little or no influence on ink consumption.



Commercial stencil thickness Murakami

When printing absorbent materials such as paper, above all absorbing textile materials you may experience an increase of ink consumption (as calculated above) up to 40%.

5. SCREEN PRINTING INK

The calculation of ink consumption should always be based on a ready-to-print ink adjustment. With “common” screen inks processed under standard conditions such as our ranges HG, CX, UVX2 etc. there will be no significant “increase” of ink consumption to be considered in the calculation.

This is different with special inks, such as our coarse texture varnishes or relief varnishes. As already mentioned in combination with printing conditions, these products may require “more or less” ink consumption as calculated based on screen fabric data.

6. PRINTING EQUIPMENT

Another factor of influence on ink consumption is the type of printing equipment used. You may have a deviation of up to 10%.

Machine type such as flat/flat, flat/round or round/round as well as machine adjustments like printing speed, type of squeegee or flood bar and sharpness and angle of the latter are all factors to be considered. Also consider the minimum amount of ink required for the specific printing equipment.

SUMMARY

One cannot exactly calculate consumption or yield of a screen printing ink; there is no universal formula. The most important factor to calculate ink consumption is the theoretical ink volume (V_{th}) of the screen fabric in combination with the total print size and the number of prints.

Under local printing conditions, increasingly more accurate values can be obtained by recalculation.

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