

## Contact yellowing

### Yellowing on the reverse side of sheets

By contact yellowing we understand partial yellowing on the reverse of sheets in places where in the pile the printed image came into contact with the unprinted reverse of the paper.

The causes for the generation of this effect will be explained below. The basic statements are in accordance with FOGRA.

Contact yellowing often is confused with ghosting, a mat/gloss effect created by marking of the impression on the obverse side of the sheet in the impression on the reverse.

Contact yellowing is caused by interaction between, on the one hand, fission products which, unavoidably, are generated during oxidative drying of offset inks and oil-based print varnishes, and paper coating on the other hand. If, in the pile, the slightly yellow, volatile fission products penetrate into the unprinted, coated reverse of the sheet they will be fixed in the coating by adsorption. The yellowing may be caused by the own colour of the fission products or by chemical changes of the optical brighteners and binders contained in the paper coating.

The degree of yellowing strongly depends on the composition of the paper coating. On one type of paper the yellowing may appear very strongly, while on another type of paper nearly no yellowing can be recognized.

The intensity of yellowing also depends on the quantity and quality of the fission products, e.g. on the composition of the printing ink.

According to our experience, offset inks which are formulated to remain “fresh” have a greater tendency to contact yellowing.

As the operational conditions vary (e.g. thicknesses of ink or varnish films, conditions of drying), the discolouring does not necessarily occur with every job. Even within the same run its degree may vary considerably.

The only absolutely safe way of avoiding, under all circumstances, contact yellowing is to exclusively use inks which do not dry by oxidation (e.g. low-odour inks). Such inks are, however, under certain conditions unable to meet the requirements regarding gloss and abrasion resistance.

The below suggestions list measures which may be taken to avoid or diminish contact yellowing:

- With heavy formes UCR should be used to reduce the thickness of the total ink film. This reduces the quantity of the fission products generated during oxidative drying.
- The use of ink additives, particularly driers, should be completely avoided.
- Pile venting has a positive effect. It removes fission products.
- For surface finishing dispersion varnish (special paper varnish) is preferable to oil-based overprint varnish.
- Avoid using offset inks which are formulated to stay “fresh”. Inks of this type are not the only cause for contact yellowing but they may increase the risk.  
(The effect was observed a long time before inks which stay fresh were introduced).

The tendency of papers to contact-yellow can be checked by means of a laboratory test (measurement of yellowing in accordance with DIN 6167 using a spectrophotometer).

## Application of the low-odour, drying TGA ink series

TGA ink series		Fastness characteristics per DIN 16 524/25			
		Light WS*	Alcohol	Solvent mixture	Alkali
<b>Yellow</b>	<b>41 TGA 5025</b>	5	+	+	+
<b>Magenta</b>	<b>42 TGA 5025</b>	5	+	+	-
<b>Cyan</b>	<b>43 TGA 5025</b>	8	+	+	+
<b>Black</b>	<b>49 TGA 5025</b>	8	+	+	+

\* WS = wool scale

This ink series does not form any unwanted and interfering decomposition products during drying. Since these inks do not offer the same high degree of rub resistance as oxidative-drying inks, we recommend that you overvarnish.